Enhancing Climate Resilience in San Cristóbal Province, Dominican Republic - Integrated Water Resources Management and Rural Development Program

PROPOSAL PROJECT TO THE ADAPTATION FUND

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TABLE OF CONTENTS

TABLE INDEX

INDEX OF FIGURES

PART I: PROGRAM INFORMATION

Antecedents and Context

Geographical, Environmental and Socioeconomic Context

- Geographical and Environmental Context

Located in the Caribbean region, the Dominican Republic shares the island of Hispaniola with Haiti. The surface of the country is 48,442 km2, with a topography and a very diversified geomorphology, including coastal plains, mountain ranges, mountain ranges, and valleys. The elevations range from -46 m (Lago Enriquillo) to Pico Duarte (3,098 m), which is the highest elevation in the Caribbean.

In the Dominican Republic, surface waters cover 0.7% of the country's surface. The main water systems are Yaque del Norte, Yaque del Sur and Yuna. The Yaque del Norte, with 296 km, is the longest river in the country, and its basin has an area of 7,044 km^2. The Yuna River is 209 km long, and its contribution area is 5,498 km^2. The Yaque del Sur is 183 km long and its basin area is 4,972 km^2.

The Dominican Republic is home to a wide variety of plants and animals (more than 6,000 species including amphibians, birds, mammals, reptiles and vascular plants). As protected areas represent 23% of the national territory, the country maintains a significant percentage in comparison with the rest of the world (the average of the developing world is 13%, and of the developed world it is 8%) (Ministerio de Medio Environment and Natural Resources, 2012, World Bank, 2014).

Figure 1: Location of the Dominican Republic

- Socioeconomic and Development Context

The Dominican Republic has a population estimated at 10.03 million, with a population growth rate of approximately 1.2% (ONE, 2018). Administratively, the country is divided into a National District and 32 provinces, which are divided into Municipalities and Municipal Districts (descending levels of administration). The population density is 197 inhabitants per km2. Despite the high urbanization rate recorded in recent years, still approximately 25% of the population lives in rural areas. The Greater Santo Domingo (the Santo Domingo province and the National District) is the capital of the country and its main administrative center. Currently the capital concentrates 35% of the population.

Figure 2: Provincial Map of the Dominican Republic

The country's main economic activities are tourism, free zones, remittances, agriculture, services, and more recently, mining. After services and industry, the agricultural sector is the most demanding of labor and is based - in large part - on subsistence agriculture, focused on rice, fruits, coffee, cocoa, vegetables and livestock. The agriculture sector occupies 14% of the economically active population and presents 5.6% of GDP (Central Bank, 2016). The industry has a high significance in the economy, and concentrates on the production of sugar, mining, textiles and tobacco, among many others.

According to recent official figures, almost 50% of households in the country live in poverty and more than 10% live in extreme poverty. In rural areas, the poor population exceeds 60% (Morillo P., 2014). This population includes women and men who are heads of families, small-scale farmers, landless peasants, microentrepreneurs, small merchants, agricultural workers and workers of rural service providers. These groups are particularly vulnerable, and not only suffer from low income and poor living conditions, but also from social exclusion. In all of these groups, women (heads of household) and children are the most vulnerable, due to the lack of focused opportunities and because they are not beneficiaries of many types of social assistance programs (Berigüete, 2015).

The recorded increase in the population results in an increase in the demand for food, water resources and energy, both for people's lives, for their means of subsistence, and for

economic development in the short term. Access to water is limited in many areas, so agricultural production is based mainly on rainfall, and any eventual increase in productivity is connected, in large part, to a greater extension of cultivated land and not an increase in productivity per unit area, at the expense of other ecosystems such as forests. Cultivation and extensive ranching cause degradation and put more pressure on water resources, reduce soil capacity, and increase the need for agrochemicals. These factors decrease the availability of drinking water.

- Principal Development Challenges

As established in the National Development Strategy 2030, the Dominican Republic aspires to be a prosperous country, where people live with dignity, attached to ethical values and within the framework of a participatory democracy that guarantees the social and democratic rule of law that promotes equity, equal opportunities, social justice that manages and uses its resources to develop in an innovative, sustainable and territorially balanced and integrated manner and is competitively inserted into the global economy (END, 2012). This strategy focuses on four strategic areas: a) that which seeks a democratic social rule of law; b) that which seeks a society with equal rights and opportunities, c) that which seeks a sustainable, inclusive and competitive economy; and d) that which seeks an environmentally sustainable production and consumption society that adapts to climate change.

In addition to these issues, the most urgent problems in the country are related to:

- Poverty, extreme poverty and, in general, the reduced capacity to create new jobs and increase the income of vulnerable populations;

- Agriculture, livestock, forestry and fishing activity lack modernization, resulting in low productivity, unsustainability, minimal growth and fewer jobs;

- Little territorial cohesion that causes regional development to be unbalanced, in terms of infrastructure, services and capacities;

- Ensure the adequate and timely supply of drinking water and access to sanitation services that must exist in vulnerable populations;

- High dependence on imported fossil fuels and the lack of a reliable, efficient and environmentally sustainable energy supply;

- The public administration lacks effectiveness, transparency and orientation towards results, and is not based on the rule of law, democracy or citizenship;

- Lack of epidemiological and nutritional surveillance and education systems as fundamental instruments for the food security of the population;

– Lack of risk management mechanisms necessary to minimize human, economic and environmental losses, and for adequate adaptation to climate change;

– Regional integration (generally with the Caribbean) has been -traditionally- poorly managed, resulting in loss of business opportunities;

– Many existing public policies do not incorporate elements of sustainability, gender, territorial cohesion, social participation and institutional responsibility.

Climate Vulnerability and Climate Impacts

• Current Climate Variability

Throughout the year, the Dominican Republic experiences temperature and humidity conditions associated with the tropics. Seasonal temperatures range from 20-25˚C in the coldest months (December to February), to 25-27˚C in the hottest seasons (June to November). The wet season occurs from May to November, in which most regions receive 100-200 mm of rainfall per month.

Similar to other Caribbean nations, the interannual climate variability of the Dominican Republic is strongly influenced by El Niño. El Niño episodes bring hotter and drier conditions than the average June and August conditions, and La Niña brings colder and more humid conditions in that same period of time. As the country is at the center of the Atlantic hurricane belt, hurricanes and storms occur from August through October. The heavy rains associated with cyclones and hurricanes contribute significantly to the rainfall totals of the wet season. The occurrence of hurricanes is strongly linked to El Niño, with the most frequent hurricane activity associated with the occurrence of La Niña, and less frequent events in El Niño years.

A recent study on climate trends in the Dominican Republic from 1960 to 2003 (McSweeney et al., 2010) concludes that:

– The annual temperature has increased approximately 0.45˚C, at an average rate of 0.1˚C per decade. This overheating is faster in the hottest seasons.

– The frequency of *"hot days"* and *"hot nights"* increased considerably, annually in all seasons. The average number of hot days per year increased to 63 (17.4% of the days); and the average number of hot nights per year increased to 48 (13.2% of the nights).

– The frequency of *"cold days"* and *"cold nights"* decreased considerably, annually in all seasons. The average number of cold days per year decreased to 30 (8.3% of the days); and the average number of cold nights per year decreased to 31 (8.6% of nights).

– The average rainfall in the Dominican Republic has decreased by 5.0 mm per month (4.5%) per decade. This decrease is mainly due to decreases in precipitation, of 7.5 and 5.4 mm per month (6.4% and 3.7%) per decade respectively.

- Expected Climate Change Impacts

Several models on temperature in the Dominican Republic in the long term indicate that:

– The average annual temperature is projected to increase from 0.5 to 2.3˚C by 2060, and from 1.1 to 3.6˚C by 2090. The range of projections to 2090, under any emissions scenario, is approximately 1 to 1.5 ˚C (being the fastest heating rate in winter).

– It will substantially increase the frequency of days and nights that are considered "hot" in the current climate. Hot days will occur during 29-72% of the days by 2060 and 32-98% of the days by 2090. The days considered hot in the current standards for your season are projected to increase even more rapidly, occurring during the 100% of the days in the season.

– Evenings that are considered "hot" for the annual climate of 1970-99 are projected to occur for 33-68% of nights by 2060 and 39-98% of nights by 2090. Nights considered hot by current standards of the weather for its season is projected to increase even more rapidly, occurring during 100% of the days in the season.

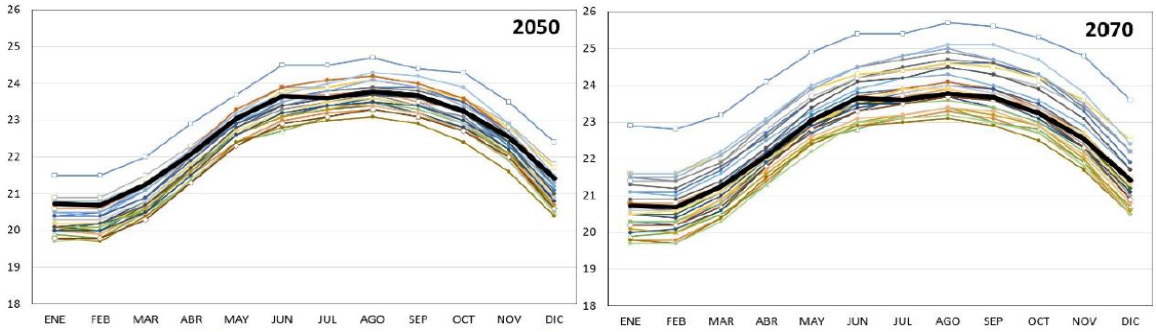

Figure 3: Expected Changes in the Minimum Temperature to 2050 (left) and to 2070 (right)
Source: Ministry of Environment and Natural Resources, 2016.

Various projections indicate decreases in the frequency of days and nights that are considered cold in the current climate. These events are expected to be extremely rare, not happening at all in most projections, which means that the increase in warming is inevitable.

Regarding precipitation, the long-term rainfall patterns consulted indicate that:

– The projections of average annual rainfall, under different models, are broadly consistent indicating decreases in precipitation, largely due to decreases in rainfall during the wet season. Projected changes in rainfall vary from (-78 to + 21%) by 2090. Annual changes range from -55 to + 20%.

– The proportion of total precipitation that falls in extreme events is projected to decrease in most models, with changes in the limits of 29% to + 8% by 2090.

– The maximum precipitations of 1 and 5 days tend to decrease in the projections, particularly in wet seasons when the largest reductions in total rainfall are projected.

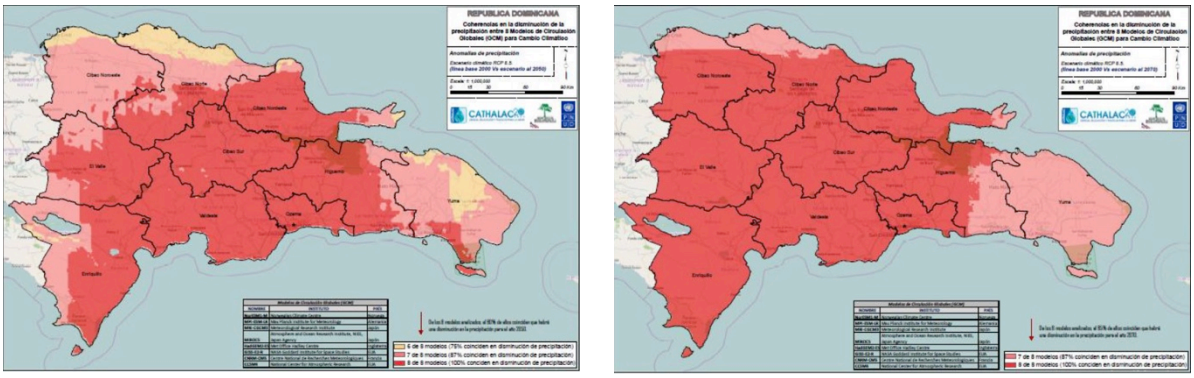

Figure 4: Expected reduction of Annual Precipitation to 2050 (left) and to 2070 (right)
Source: Ministry of Environment and Natural Resources, 2016.

Due to climate change, the Dominican Republic can suffer combined impacts in the medium and long term (Christensen et al., 2007). Such impacts, among many others, are:

– Tropical cyclones will probably be, in general, more intense under a warmer climate as a result of higher sea surface temperatures. There is great uncertainty about changes in frequency and changes in trajectories of storms and their interactions with other features of climate variability (ie, El Niño) that introduces more uncertainty.

– Potential changes in the occurrence of cyclones, storms and hurricanes, add uncertainty to precipitation in future wet season. Potential increases in summer rainfall, associated with tropical cyclone activity, which may not be captured in current projections, can counteract the projected decreases in rainfall.

– As with all Caribbean islands, the Dominican Republic is very vulnerable to sea level rise. The sea level in the region is projected to rise (relative to the sea level of 1980-1999) to the following levels: towards 2090: 0.13 to 0.43 m (SRES B1); 0.16 to 0.53 m (SRES A1B); and 0.18 to 0.56 m (SRES A2). Forecasts made at the country level, indicate similar values.

Within the National Communications to the UNFCCC, the Ministry of Environment and Natural Resources has made a special effort to contribute to the scientific documentation that supports the decision making process relevant to climate change[1]. In addition, it participates in other national enclaves for the production of relevant scientific information, such as the DR Climate Change Observatory.

[1] The Dominican Republic has submitted National Communications in 2003, 2009 and 2017. These documents are available at: https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-update-reports-non-annex-i-parties/national-communication-submissions-from-non-annex-i-parties.

- Climate Vulnerability and Exposure

The Dominican Republic is particularly vulnerable to weather phenomena. As the country is located in the Caribbean, it is affected by the variable recurrence of climatic phenomena and, frequently, it is affected by extreme hydrometeorological events (i.e., storms, hurricanes and droughts). This climatic vulnerability is exacerbated by a combination of human and socioeconomic factors: such as the presence of populations in areas prone to floods and landslides, eroded by subsistence agriculture and poorly managed human settlements (World Bank, 2011).

As part of the aforementioned National Communications, several studies have been carried out on vulnerability in relation to coastal zones, water resources, agriculture, tourism and energy. These studies show how extreme hydrometeorological events have caused damage, disasters and diseases in almost all regions, and make some projections of long-term climate scenarios.

In its 2016 version the Climate Risk Index, a global analysis based on one of the most reliable datasets available, in relation to the impacts of extreme weather events and associated socio-economic data, classifies the Dominican Republic as the tenth most vulnerable country to the impacts of climate change (Germanwatch, 2016). According to the same source, Haiti is the second nation in the same classification, which means that the island of Hispaniola will be affected by climate change in the short, medium and long term; and that a complete and integral adaptation is not only necessary, but it is urgent.

Figure 5: Effects of Olga and Noel (2007, left) and Impacts of Sandy (2012, right)

According to the latest Natural Disaster Hotspot, which presents a global view of the disaster risks associated with the main natural risks (such as drought, floods, cyclones, earthquakes, etc.), the Dominican Republic is the third country in the world most exposed to multiple risks (World Bank, 2016). According to the report, a total of 97.3% of the territory and 96.8% of the general population is exposed to two or more risks. The report also places the country in the second position of the countries that have the highest probability of experiencing economic risks as a result of greater exposure to two or more risks. In addition, it is considered that 90.7% of the Dominican population and 92.1% of the country's Gross Domestic Product (GDP) reside in areas at risk. A similar picture is reported in relation to experiencing three or more risks, drawing attention to the need to increase resilience.

From 1961 to 2014, the Dominican Republic experienced 56 hydrometeorological events (those with the highest recurrence, causing significant losses), representing 96% of extreme events from that period. These events were: floods (41%), droughts (2%) and storms (50%). Storms were responsible for almost all economic damages (96%) in such period. For the period 1979-2007, the country experienced losses of USD 5,220.1 Million (of 2005) for only 6 events (David, Federico, Georges, Jeanne, Olga and Noel) (World Bank, 2015).

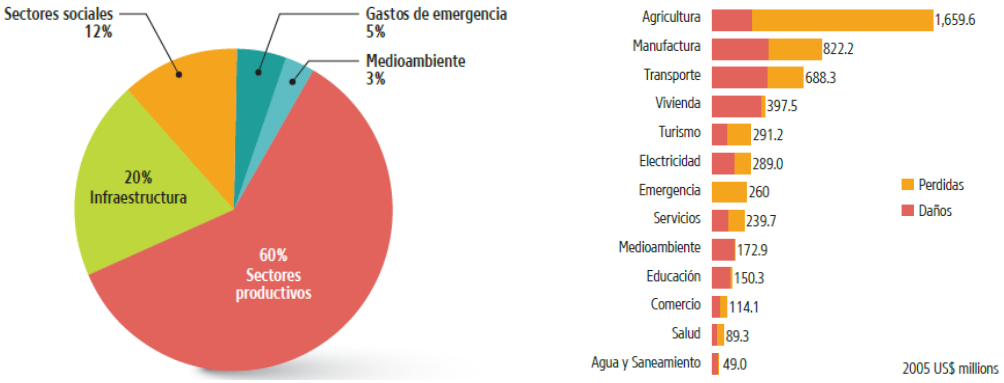

Figure 6: Damage Caused by Sector (David, Federico, Georges, Jeanne, Olga and Noel)
Source: World Bank, 2015.

Currently, the economic impact of extreme hydrometeorological events is estimated at USD 420 Million per year (average for the period 1961-2014). In the case of hurricanes, such damages are estimated at USD 1,997 Million (3.3% of GDP) (World Bank, 2015). The agriculture sector has been one of the most affected, due to its high vulnerability to climate-related phenomena. From 1979 to 2007, this sector has lost USD 1,659.6 million as a result of the impact of extreme events - approximately 32% of the total loss since this period - and USD 220 Million from 2007 to 2012 (Ministry of Agriculture, 2015). Other damages have not yet been quantified.

Table 1: Damage to Agriculture due to Storms and Hurricanes (2007-2012)

Year	Event	Econimic Impacto (Million DOP)	% GDP Agriculture	% GDP National
2007	Noel y Olga	5,829	7.18%	0.43%
2011	Irene	413	0.35%	0.02%
2012	Excessive Rains	86	0.07%	0.00%
2012	Isaac	929	0.71%	0.04%
2012	Sandy	993	0.76%	0.40%

Source: Ministry of Environment, 2015

In terms of food security, the countries located in the tropics share the characteristic that most of the edible crops are at the upper limit of the optimum production temperature, which means that any increase in the average temperature will cause a decrease in the crop yields. Also, extreme rains reduce the productive capacity of soils.

Water is recognized as a low transversal resource of the National Development Strategy (Dominican Republic, 2012), with a direct link to the Sustainable Development Goals. The physical demand for water resources is projected to increase by 13% by 2030. The shortage of drinking water due to the incidences of extreme climatic events, such as droughts and floods, will increase the population's exposure (especially of women, children and aging) to diseases related to hygiene or other transmitted by water, such as diarrhea, amebiasis, cholera, gastroenteritis, etc.

On the other hand, water resources play different key functions for the development of the country: the generation of hydroelectric energy (15% of the total electricity consumed), drinking water, irrigation and drainage, among others, have been affected by extreme events (Berigüete, 2015). Additionally, the occurrence of pests and diseases (such as dengue, cholera, malaria, etc.) and the modification of biophysical conditions (changes in temperature, humidity, rainfall, wind, etc.) are also consequences of climate changes that affect the availability and quality of water resources (Hatfield and Prueger, 2015).

Given the multiple uses of water, addressing problems of adaptation to the challenges posed by climate change is not only for those responsible for managing water, nor can they be solved by acting in isolation. Multisectoral and multidisciplinary collaborative responses are needed. However, given that a substantial proportion of the population still depends directly on agriculture for their livelihood, and that in many places people do not have drinking water, it is particularly important to observe the relationship between water resource management and territorial planning.

It is also important to treat water resources as a natural resource in tandem with forestry and the direct use of land, rather than a commodity, as this undermines its prudent use. Not only does the availability of water resources affect socioeconomic conditions, but also variations and especially extreme events (ie, floods and droughts) present a serious risk and a real threat to national growth and development (ie, increase in production costs).

- Socioeconomic Vulnerability

For 2016, the Human Development Index (HDI) of the Dominican Republic was 0.722, placing the country in a high development (position 99). However, despite the country's progress (fruit of more than 50 years of economic growth), the 2016 Report indicates that if this value is discounted by inequality, the HDI falls to 0.546. Also, the threats of climate change may overshadow the achievements made by the country in its current development trends (United Nations Development Program, 2015).

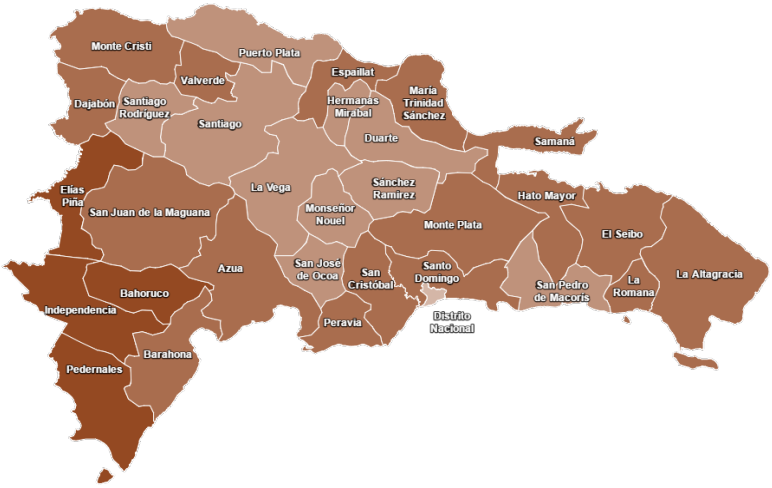

Figure 7: Human Development Index by Province
Source: United Nations Development Program, 2017.

An analysis included in the technical report "The Economics of Climate Change in Latin America and the Caribbean: Paradoxes and Challenges of Sustainable Development" indicates that, for the small Caribbean islands, the challenge of climate change is particularly formidable, due to its geographical, biological and socioeconomic characteristics. For example, some of these islands are on routes typically taken by hurricanes, and a large part of the population and its economic activities are located in coastal areas.

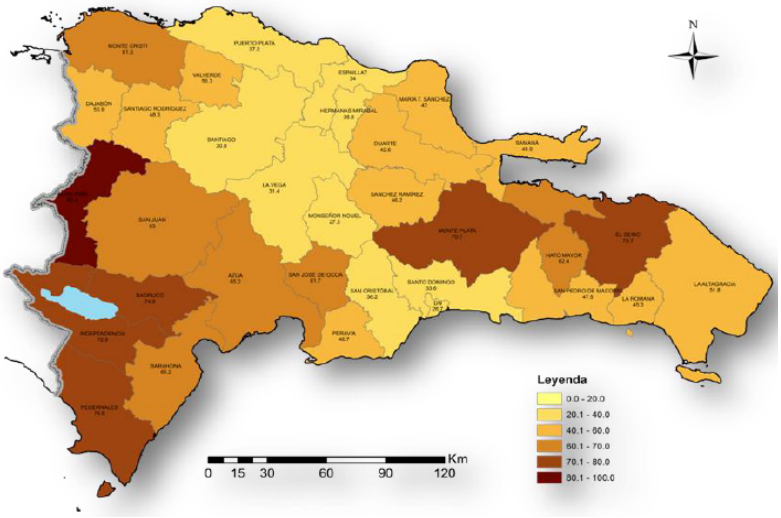

Figure 8: Percentage of Poor Households by Province
Source: (Morillo P., 2014).

Additionally, the region is highly dependent on only a few types of economic activities, such as tourism and agriculture, which are particularly sensitive to climate conditions (Economic Commission for Latin America and the Caribbean, 2015). As almost 50% of

households live in poverty, climate vulnerability is a significant development challenge. Studies on the interrelation between climate change and multidimensional poverty indicate that the Dominican Republic ranks 33rd among the 100 countries most at risk due to climate change (Yohe et al., 2006).

- Adaptation Challenges

For the Dominican Republic, the main national priorities are related to achieving an appropriate and efficient adaptation (Dominican Republic, 2012). In this context, the National Action Plan for Adaptation to Climate Change in the Dominican Republic (PNACC-RD) identified water resources, food security, agriculture and public health as the sectors most vulnerable to stress climate change (Secretary of State for the Environment and Natural Resources, 2008).

Evidence suggests that the impacts of climate change on health are transmitted through various mechanisms, such as heat waves, natural disasters caused by extreme events and infectious diseases. The application of predictive models indicates that climate change increases the number of cases of malaria, dengue, leptospirosis, zyka and gastroenteritis, in relation to the baseline (Economic Commission for Latin America and the Caribbean, 2013c). This generates a variety of economic expenses such as lost productivity, increases in hospitalization and medicines. These costs can, however, be reduced by implementing measures to improve primary health care, water quality and sanitation.

Agriculture is particularly sensitive to weather and hydrological conditions. The results of analyzes carried out on specific products vary greatly and have a high degree of uncertainty, with rice productivity, for example, between a 3% decrease to an increase of 2% by 2050, according to the climate change scenario used. A decrease of between 1% and 30% is expected for crops such as cassava, plantain, sweet potato and tomato by 2050, according to the climate scenario on which the projections are based (Economic Commission for Latin America and the Caribbean, 2013).

The decreases in yields will also have negative implications for jobs in the agricultural sector and for food security, as well as potential price increases that would, of course, have a disproportionate impact on the poorest, increasing the imbalance in the external sector. Some adaptation actions have been proposed (i.e., water conservation schemes and early warning systems) that have other positive co-benefits as well (Vergara et al., 2013).

The decrease in the duration of the rainy season experienced (6 months in the past 36 months) and the total volume of rainfall have caused the decline in production, often associated with the lack of water. Acute droughts are identified as the most significant risk in the medium and long term (Arenas, 2016). The drought of 2014-2015 caused damages that still have to be calculated[2]. Due to the climatic impacts accumulated in the poorest areas, exacerbated by the accumulated social debt, it is reasonable to conclude that an immediate adaptation must focus on water, agriculture and health.

[2] A full analysis of such drought and its impacts is included in "Drought Boosts Science in Dominican Republic". Available at: http://www.ipsnews.net/2016/01/drought-boosts-science-in-dominican-republic/.

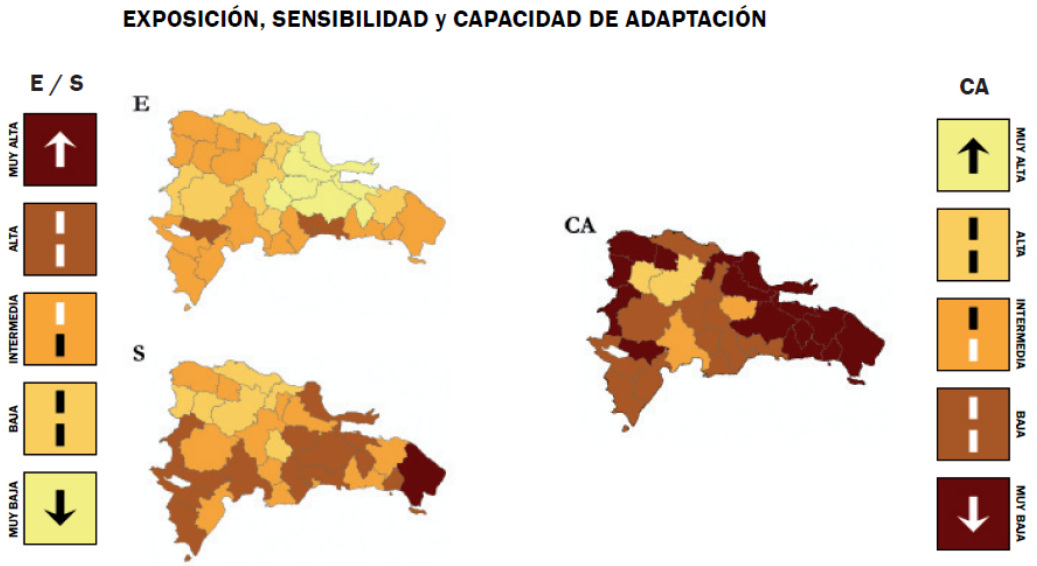

Figure 9: Vulnerability Map of Water Resources by Province
Source: (Izzo et al., 2012)

On the other hand, unsustainable forest practices and high rates of deforestation amplify the impacts of climate change, manifested in the form of: shortage of fresh water, desertification, loss of soil fertility, loss of agricultural productivity and increased sensitivity to human and natural risks (Secretary of State for Environment and Natural Resources, 2008).

- Area Object of Intervention

The study *Critical Points for the Vulnerability to Variability and Climate Change in the Dominican Republic and its Adaptation to it*, which analyzes climate vulnerability as a function of exposure, sensitivity and adaptive capacity in priority sectors: tourism, drinking water, agriculture, protected areas, energy and human settlements; provides the first map of the multidimensional vulnerability to climate change in the country and province (Izzo et al., 2012). From this map (and with the support of other sources), the following parameters of the San Cristóbal Province have been analyzed:

Table 2: Critical Points Related to Climate Change in the San Cristóbal Province

Global Vulnerability		Poverty	HDI	Vulnerability by Sector					
Present	Future			Agriculture	Coastal	Tourism	Energy	Settlements	Water
High	Very High	36.2%	0.441	Very High	High	Medium	Very High	High	Very High

Based on the National Bureau of Statistics, 2014; Izzo et al., 2012; Berigüete, 2014b.

As a result of an analysis of the vulnerability included in said study, as well as the expected climate changes, and the adaptive capacity in general, the integral management of water resources has been selected for this proposal. As water is a priority and transversal sector, more synergies can be potentially created (as in agriculture, gender, livelihoods, tourism, etc.).

Similar to other provinces of the Dominican Republic, and in general terms, San Cristóbal has a medium-high degree of exposure to climate variability and climate change, characterized by an increase in temperature and reduced and erratic rainfall that, when they add to a low socioeconomic development and based on non-successful economic models, produce greater vulnerability and high opportunities for adaptation to climate change, mainly in the water sector.

- General Context of the Objective Area

San Cristóbal has a population of 0.57 million inhabitants. According to the last National Household Survey of Multiple Purposes, 36.2% of the population has an income below the upper poverty line, while 6.4% is below the extreme poverty line (National Bureau of Statistics, 2014). Poverty is predominantly severe in rural areas, which has more than 82% of the poor. In six of the fourteen municipalities of the province, more than 50% of the people live in poverty.

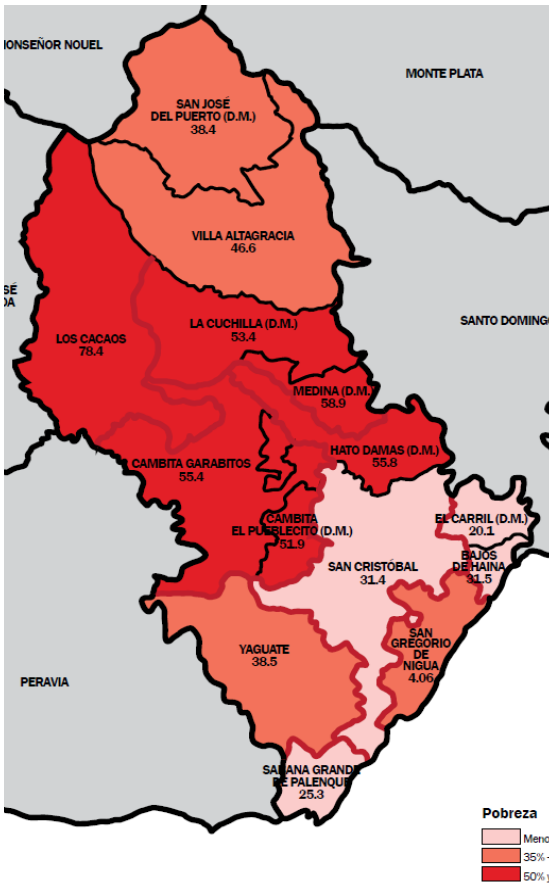

Figure 10: Poverty in the Municipalities of San Cristóbal
Source: National Bureau of Statistics, 2014

Comparatively, San Cristóbal shows high rates of school attendance for all ages, which demonstrates a return of capacity development (creation of new ones and strengthening of existing ones) through formal educational programs. This is an important factor in the ability to adapt to climate change. According to official statistics, 88% of the population is literate.

The dominance of men over women, in terms of ownership of land and other assets, access to and control over resources, and in decision-making, is almost absolute. In addition to low access to land, women also have limited access to formal employment in non-agricultural activities (43.3%), and within the public administration system (28.2%). All these coercions imposed on women tend to limit their awareness of their opportunities, participation and development in a general sense.

The current situation of the ecological belts of San Cristóbal can be described, in terms of attributes of the resources (water, agriculture, minerals, energy and waste), as a factor that increases risks and vulnerability. The state of agriculture in the Province is characterized by the availability of land, relative advantage for the production of certain crops, and the potential of livestock production still unexploited. Despite showing a certain tendency towards commercialization, subsistence agriculture remains prevalent, causing conflicts of use with water for human consumption.

The total territory of the province is approximately 1,265.77 km2, representing 2.6% of the national territory. According to the *Atlas of Natural Resources*, the agricultural lands currently in use are 671.5 km2 and there are 25,000 m2 (2012) dedicated to agriculture under a controlled environment. The average land tenure is 5.8 hectares. The forest cover is significant, covering 554.2 km2 (2012).

A significant proportion of the farmland has soils with poor physical properties and low organic matter content. Relatively good soils are underground water laterites, which tend to be limited in depth by slabs. Soils are very susceptible to erosion due to the thin vegetative layer and the torrential nature of poorly distributed rainfall. There is limited use of soil management practices (ie fertilizer use, water management, etc.). These results, under these adverse conditions, cause low productivity in crops and livestock.

San Cristóbal has received a significant public investment in recent years. However, the Province still has an underutilized wealth that could support a modernization program of intensive agriculture. This includes a network of watersheds with very fertile areas (ie, Haina, Nigua and Nizao). These areas can become zones of greater agricultural production of different crops more resilient that also can be produced and commercialized competitively during longer seasons, in comparison with the current crops. In the face of a planned and sustained increase in agricultural development, it is understood that the availability of potable water should also be increased.

In 2010, the percentage of households that owned livestock was close to 51% (pigs, goats, cows, chickens, etc.). Although it is generally higher than in the rest of the country, this amount of cattle per household is modest, compared to land dedicated to agriculture. Also, there is a visible development gap between the urban and rural areas of the province, with considerably higher levels of poverty in rural areas. Almost all rural communities do not have potable water systems or adequate sanitation systems, and their economic systems are highly dependent on agriculture (National Bureau of Statistics, 2012). This causes conflicts of use for drinking water, irrigation and livestock.

- Impacts of Climate Change in the Area

In terms of vulnerability to climate change and adaptation needs, water availability is the most important area for public health, agricultural production and livelihoods in San Cristóbal Province. There is a clearly articulated need to counteract the negative impacts of climate change on water resources and livelihoods. Also, it is necessary to observe the effectiveness of the use of water. Likewise, the ability to manage water to cope with floods and droughts is necessary, in order to protect the population, their livelihoods and development.

According to the different climatic scenarios proposed in the National Communications, it is expected that all regions of the Dominican Republic experience a wide variety of temperature variations. One of the greatest influences of climate change on the environment has been desertification. According to the Ministry of Environment and Natural Resources (Secretary of State for Environment and Natural Resources, 2007), 70% of the total land of the Dominican Republic is prone to desertification (~ 34,000 km2), 40% (~ 20,000 km2) is in the southwest region, and tends to increase, since recent assessments show a decrease in precipitation (UNCCD, 2012).

Climate change is expected to have an impact on agricultural production, increasing pressure on water resources and intensifying conflicts with water for human consumption. Agriculture in San Cristóbal is predominantly rain-based, with less than 30% of irrigation potential been developed. Approximately 80% of rainfall occurs between June and August-October, and excess soil moisture is found during these periods. Both the onset and the cessation of rainfall are irregular, and the temporal and spatial variability is high. Even within the regular humidity during the year, from 14 to 17 drought days per month are common from November to April (ONAMET, 2016). The potential evaporation is close to 1,600 mm per year. In most areas, most soils have a medium to low retention capacity, due to their nature, texture and content of organic matter[3]. The high rates of surface runoff during the rainy months cause the accumulation of sediment in water storage facilities, such as small dams and community holding ponds. The high rates of evaporation in the dry and hot season, the sedimentation caused by erosion and the clearing of trees to make farms, contribute to reduce the capacity of water retention and the rapid drying of ponds and retention elements.

On the other hand, flood events are most relevant for the municipalities in the southernmost part of the San Cristóbal province (coastal areas) and for the northernmost municipalities (mountain slopes), partly due to impacts of climate change in the form of extreme rainfall. Floods result in loss of crops, waterborne diseases and loss of life.

[3] *National Action Program to Combat Desertification and Drought of the Dominican Republic and National Strategy for the Sustainable Management of Soils in the Dominican Republic. Ministry of Environment and Natural Resources (2015).*

In this context, the Program will support existing efforts (and promote and motivate the development of others) by supporting communities to rehabilitate and improve their drinking water works, storage tanks and retention elements, to increase the availability of water for domestic use, and equipping communities with sanitation systems. Reforestation plans will also receive support to reduce sedimentation in small retention ponds and dams, helping to reduce erosion.

Trends of Climate Change in the Project Area

- Climate Impacts on Water Resources

It is expected that climate change exacerbates the current situation of the San Cristóbal province, due to its impact on water resources and, therefore, also on the programs and activities of the water-dependent sectors, such as agriculture and livestock. According to relatively recent studies by the World Bank (World Bank, 2016b) and FAO (FAO, 2017), which include information related to the climate change scenarios on the water resources of Haina, Nizao and Nigua (San Cristóbal's largest watersheds), they indicate that:

– Runoff or discharges in the three basins are sensitive to changes in precipitation and temperature and, therefore, to climate change. A change of 15% in precipitation or a 1 ° C increase in temperature could cause a reduction in runoff greater than 35%[4];

– The climate change scenarios, using simulations, indicate reductions in flows between 14-24% and 32-46% for 2020 and 2050 respectively;

– Climate change could cause a reduction in the recharge of groundwater between 8 and 15% by 2030, and from 29 and 32% by 2070, although this latter value has not been conclusively stated in the Third National Communication);

– The demand for water for irrigation could also be significantly affected by climate change. The staff of INDRHI and the Ministry of Agriculture consider that increases in the demand for irrigation water will be from 40 to 60% by 2030, and even from 85 to 95% by 2050, and

– The climate scenarios included in the Third National Communication show that the three basins were marginally vulnerable in 1990, will be vulnerable (water stress) in 2030 and will be extremely vulnerable (water scarcity) from 2050 to 2070.

The expected impacts of climate change in San Cristóbal (and other provinces in the southwest of the country) will have a severe impact on the livelihoods of rural communities due to their high dependence on sectors affected by climate such as agriculture and livestock. Therefore, there is a need to minimize the impact of climate change on traditional livelihoods through the provision of alternatives and diversification. Under the proposed

[4] This impact is considerably larger than expected - under the same premises - in other significant watersheds of the country, such as the Yaque del Norte or Yuna, in which the potential decrease would go from 18 to 22%.

project, some Adaptation Fund resources will be invested to implement a component of diversifying the livelihoods of the traditional ones (particularly rainfed agriculture), and to be able to create independent, profitable and more resilient sources of income for the communities. This is crucial, as forest and agricultural safety nets are lost due to the loss of forest cover and other factors related to poverty.

Despite the fact that the population of the San Cristóbal province exhibits a high literacy rate (88% of the population), the province still lags behind many others in terms of educational indicators. This has a negative impact on local capacity to adapt to climate change. According to the most recent Survey of Households of Multiple Purposes (ENHOGAR), the province has a household size of 5.6, one of the highest in the country (National Bureau of Statistics, 2016).

Approximately 33% of households in San Cristóbal have access to piped water. In rural areas, most households obtain water from wells or natural sources (rivers, streams, rainwater, underground storage, ponds, dams, etc.). This demonstrates the vulnerability of household water supply to the impacts of climate change as the temperature increases and the amount of rainfall decreases. With respect to other social services, almost 15% of households in the province depend directly on wood as a fuel source for cooking, and 49% do not have access to street lighting. More than 60% of households do not have a formal solid waste collection service and 57% do not have formal toilets (in most of the country, wastewater and solid waste are usually dumped into rivers and streams without an efficient pre-treatment) (National Statistical Office, 2012). Since most agricultural and livestock activities in San Cristóbal take place in very poor areas, it is likely that the projected trend of climate change in the province will have serious repercussions on the livelihoods of the communities, which will be exacerbated by poverty, lack of territorial planning, and conflict of land and water uses.

- Impacts and Drivers of Climate Change

Much of the poverty in the Province of San Cristóbal is induced by risks and vulnerability. This exposure to risks and vulnerabilities is determined by a series of factors, ranging from natural, social and human-made causes[5]. These include -among others- the following:

Risks and vulnerabilities induced by climate: About 72% of the rural population of the Province of San Cristóbal depends on unimodal agriculture based on rainfall for their food, income and means of subsistence. Therefore, events such as droughts and floods have multiple effects on the adaptation habits of people. With climate change, it is expected that the frequency, incidence and intensity of droughts and floods will increase and, therefore, deteriorate the viability of survival strategies over time. This could cause abandonment and migrations.

[5] This does not include the lack of mainstreaming of poverty-environment links and climate change in territorial planning tools and land use plans. This represents an important challenge for the Dominican Republic, as indicated in the latest country profile of the UNDP-UNEP Poverty-Environment Initiative.

Limited opportunities for non-agricultural activities: The Province depends to a large extent on agriculture, livestock and some forestry activities, with very few opportunities for non-agricultural activities (except for the limited jobs existing in the city, in areas such as free trade zones and services, which causes a large-scale migration to Santo Domingo). The share of family income derived from non-agricultural activities is still significantly low-medium, compared to the rest of the country and other areas with industrial development (such as San Isidro, Santiago, La Romana, San Pedro or Herrera) or mining activity. For four to five months in the year, the majority of the agricultural population of San Cristóbal has no alternative or complementary means to secure their livelihoods, since the infrastructure to support other activities is very underdeveloped or does not exist.

Although small farmers usually participate in domestic initiatives or agricultural micro processing, such as coffee, onion, corn, coffee and coconut, the markets for these products are underdeveloped, due to limited production due to lack of technology and inefficient commercial practices. Therefore, these small-scale activities require additional support to drive growth and local business development. In the case of larger plantations (such as sugar cane and oranges), these are usually intensive annually, but each dead season means there is no income for farmers. The livestock sector, which is seen as the alternative to provide alternative sources of income, is also very underdeveloped due to limited investments in that sector. As a result, opportunities to supplement food security and income worthy of subsistence agricultural activities (rainfed-based) during the dry season are limited.

Weakening of traditional safety nets: mutual support initiatives, community savings, and remittances from friends and family members living outside the country (mainly in the US and Europe) once served as an important source of food, income and complementary means of subsistence for families in San Cristóbal (as in the rest of the country). However, due to political, social and economic pressures, these traditional mechanisms of safety nets have weakened, which has increased the exposure of the poor, especially women, children and the elderly, to greater, and increasingly prolonged, vulnerabilities induced by poverty. Incidentally, the risk exposure of these subcategories of the population to poverty-induced vulnerability is greater, because they face considerable cultural and institutional obstacles to accessing productive resources such as land, credit and other support services for the generation of agricultural income and non-agricultural.

Although the focus of the project is to increase access to potable water and sanitation services, through conservation and reforestation activities, ongoing income generating activities will be developed in the beneficiary communities, such as planting fruit trees and implementing agro-forestry. Efforts to train community members in other marketable skills will also help them reduce their dependence on rainfed agriculture and conventional livestock, reducing their vulnerability to climate impacts and improving the quality of life of their families.

- Adaptation Challenges and Potential Solutions

Climate change presents societies with a variety of new challenges, especially in the poorest areas, as changes in the average temperature affect food productivity and water availability, causing another burden of malnutrition, diarrheal diseases and other infections by way of water and/or air (Huq, 2014). The water resources and water supply systems of the Dominican Republic are vulnerable to current weather patterns, their variability, and anticipated droughts and floods. Similarly, the productive sectors (agriculture, forestry, etc.) that sustain the livelihoods of the majority of the population, especially in rural areas, are also severely affected by weather patterns that affect water resources and your supply

Both vulnerability (natural and induced) and adaptive capacity are unequal and, in many cases, the most vulnerable individuals and communities are the least able to adapt. This gives more shape to the scale and types of adaptation actions required in response to the nature and context of climate vulnerability. The main problem that the proposed project must address, and that requires adaptation, is the reduction induced by climate change of water availability, the increase in the unpredictability of water resources, and the negative impacts associated with the livelihoods of the rural communities of the included communities.

In such circumstances, preferred solutions for adaptation must address climate impacts on the availability of drinking water and measures that reduce the vulnerability of the immediate sectors (agriculture, livestock, forestry) that support livelihoods in poor communities.

Although the consequences of the effects of climate change on water have been well established (Dominican Republic, 2012), developing countries still do not adequately manage their understanding of how to deal with potential impacts at the national, regional and local levels. This is due, among other factors, to the limited research, the limited promotion of opportunities, and the scarce investment that is made to generate the necessary knowledge for adaptation and increase the resilience of systems - natural or human - against threats real or expected climate (Berigüete, 2015).

In-depth knowledge is needed to address the underlying causes of the vulnerability of water resources, in order to take adaptation measures and appropriate interventions. Adapting water management systems to ensure regular supply and distribution under climate change, and reducing the vulnerability of local communities and their livelihood activities, remains a major challenge throughout the Dominican Republic. Natural disasters such as floods, droughts and forest fires that have occurred in several areas of San Cristobal in the last two decades, increasingly frequent and intense, have led to seasonal stress to the poorest people. Something similar is attributable to diseases related to water and sanitation.

The adaptation actions considered by the Program will focus on the main causes of vulnerability identified in the Province, and will include the following key elements:

a. Planning of the management of water resources considering the impacts of climate change;

Although the Government has invested in important watershed development programs, such as the Plan for the Sustainable Development of the Yaque del Norte River Basin, for example, it does not consider the impacts of climate change and the vulnerability of the sectors and communities that depend on the river as its main source of water. Currently, there are only very general management plans for the three largest basins, but there is a lack of plans for the small basins and tributaries used directly by local communities and, that is, there is a general lack of early warning and rapid response systems, as evidenced by the floods at the end of 2016[6]. Due to the lack of resources and capacities, both for the main basin and for the sub-basins, climate change has not been incorporated into the current planning of water resources management, nor the effect of this on public health.

The importance of the interventions of the proposed Program is, therefore, to ensure that water, as a natural resource, can provide - in a sustainable manner - the range of goods and services necessary for social, economic and environmental adaptation. Therefore, some of the proposed measures focused on the underlying causes of the vulnerability of communities (and the creation of links with key institutions and policy makers), and that affect their capacities for adaptation to climate change, are offered considering them to be the main sources of vulnerability identified above.

The Program considers important the improvement of the current plans of management of the potable water (in the places where they are available), the punctual actions of conservation and / or reforestation in small sub-basins, and to share information with the institutions that work in the integration of climate change in current and future water management plans for the main basins and sub-basins. Although measures for medium and long-term adaptation are considered as priorities, the resources of the Program will be used to develop community projects for water management, especially for human consumption and basic sanitation, taking into account future climate change, and its eventual linkage to high-level management plans for large basins (bottom-up approach).

In order to increase the resilience of communities against the adverse impacts of climate change and its variability through the management of water sources, concerted and synergistic efforts will be made with the government and municipalities to achieve integrated management of resources water resources that include issues of adaptation to climate change. This is considered a good practice and an effective way to maximize the quality and quantity of water to meet the needs of water for consumptive use and aquatic ecosystems, by integrating decision-making on water and land use by the national agencies.

[6] In November 2016, four weeks of prolonged rain, flooding and landslides affected the north of the Dominican Republic, causing more than 20 deaths, displacing more than 20,000 people, isolating 130 communities, and causing severe damage to homes, hospitals, roads and communication systems. The damages of these floods to agriculture and infrastructure were approximately US $ 5.0 billion. The disaster forced the government to decree a state of emergency to channel resources to the affected areas, which were practically the entire north, northwest and northeast of the country.

In this case, AF resources will help institutions implement long-term water resources planning and management, which is an effective means of increasing resilience to the impacts of climate change. In this context, the Program could generate a greater impact at the national level, with the possibility of being replicated in other provinces and / or countries.

The integration of adaptation into integrated water resources management will help rural communities (which are often the most vulnerable in society) to respond in a timely manner to disasters related to climate change. In a more practical way, the Program will resort to various options for the adaptation of water management strategies (in order of preference), such as:

1. Maintain water supply more efficiently;

2. Adopt innovative measures to take advantage of water, especially for human consumption;

3. Increase water storage and improve availability and quality;

4. Harness the potential of groundwater; and

5. Improve the management of micro-watersheds and restore ecosystems through the protection of watersheds and buffer zones.

This strategy adopted by the Program is based on the four principles formulated by the *International Conference on Water and the Environment* (Dublin, 1992), which states that: (i) Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment; (ii) Water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels; (iii) Women play a key role in the provision, management and safeguarding of water; and (iv) Water has an economic value in all its competitive uses and should be recognized as an economic assest.

This strategy is also contemplated in the SDGs of the Dominican Republic's 2030 Agenda, which promotes intersectoriality for the achievement of goals and social participation. With this project we are directly impacting: (i) SDG 6 (water and sanitation); (ii) SDG 15 (action by Climate); (iii) SDG 2 Zero Hunger; (iv) SDG 5 Gender equality (promoting women's participation in productive activities and participation decisions of the board of directors of their ASOCAR and improvement of the quality of life and of their time that they previously used to look for water); and (v) SDG 3 Health and Wellbeing (reduction of water-borne diseases when increased safe water management and parasitosis due to lack of sanitation). Indirectly the Program would be contributing to: (i) SDG 1 End of poverty; (ii) SDG 11 Sustainable cities and communities; (iii) SDG 12 Responsible production and consumption (of water and natural resources); and (iv) SDG 10 Reduction of inequalities (rural vs urban, men vs. women).

b. Community participation in water management planning and community capacity for the implementation of water resources management activities and to reduce vulnerability to the impacts of climate change on community livelihoods.

There are a limited number of communities that benefit from a reliable water supply in San Cristóbal[7]. As in other parts of the country, historically there is a limited development of human capacity, related to high levels of poverty and very limited financial resources to invest in agricultural systems, management techniques and water capture and storage infrastructure. Also, there is a poor knowledge base and effective capacity for water capture, management and conservation, when addressing climate-induced water scarcity. Management planning and implementation is required to expand the number of beneficiaries and improve the resilient management of water resources in the communities of San Cristóbal, since this problem increases the conflict of use of the resource to meet human needs. This aspect will be covered by the Program.

To establish community plans for the supply and management of the various sources of water supply, for the scarcity of resources under conditions of climate change, it is crucial to achieve this in a large number of communities. It is important to emphasize that this will require financial support for the operationalization of the community plans, as well as for the improvement of the infrastructure for the collection, storage and safe and secure distribution of water. Integrating adaptation into community water management planning will help the most vulnerable to respond in a timely manner to climate disasters and improve the resilience of water supply sources, as noted above.

Given the predominance of groups of small landowners, adequate coordination systems will be established so that water management planning contributes to increasing their profitability and reduces transaction costs. As a result, the competitiveness of agricultural products in the market will be improved according to shared risk management measures, and the capacity to manage water resources. Wherever possible, emphasis will be placed on building, strengthening and developing the capacities of existing community organizations, taking advantage of existing institutional arrangements (such as the Community Associations of Rural Aqueducts -ASOCARES- for example).

c. Diversification of the livelihoods of local communities as safety nets in the face of the impacts of climate change.

There is an excessive dependence on the provision of rainwater for agriculture and livestock, which makes communities vulnerable to climate change, which is further complicated by the limited capacity to capture, manage and conserve water. Due to current erratic rainfall patterns, there is limited capacity to increase productivity and improve the capacity for diversification of livelihoods. In addition, agricultural practices can be adapted to take advantage of any possible improved water supply, but also to be more resilient to low water availability, moving away from reliance on rainwater and passing through to

[7] Diversification of livelihood options will be supported in activities that do not depend on rainfall. This may include fisheries, food processing, small ruminants, plant and nursery nurseries, handicrafts, etc.

protect micro-basins. Significant financial resources and improved capacity to provide alternative knowledge and means to livelihood activities, such as agro-ecological practices, are needed.

In relation to this particular, the strategies to consider include:

1. Diversification of livelihoods. It is crucial to improve the techniques of collection, treatment, storage and conservation of rainwater by local communities, since these measures, after meeting the demand for human consumption of the communities, and if there are surpluses, have the potential to create opportunities to diversify livelihoods by addressing climate risks in an area that currently relies heavily on rainfed agriculture. These adaptation solutions have a particular focus on supporting livelihood options for women, who are often the most vulnerable to climate change.

2. Improve water supply systems that improve agricultural processes. Once the demand for water for human consumption is assured, small-scale irrigation schemes and other measures such as planting water will be encouraged to provide adaptation solutions that improve the productivity of the intervened zones and thus improve the livelihoods of the object communities. This is particularly important to achieve long-term sustainability, beyond the Program.

3. Improvement of agricultural techniques. Encourage, under conservation and reforestation activities, the use and development of agroforestry techniques and approaches that are more favorable than those currently used in future water availability scenarios. This includes, among others, the use of seed varieties that allow adaptation to a changing climate and the adoption of fast-maturing varieties that ensure production during conditions of increased temperature.

d. Improvement of institutional and community capacity to face climate risks.

Currently, the knowledge base of the impacts of climate change on water resources at the community level is very weak to support institutional processes and development, from a regional to local institutional level. Increasing the knowledge of institutions to support measures on the ground (in terms of water resource management and livelihood diversification) is one of the relevant solutions included in the Program. Building the capacity of communities, organizations and institutions to address climate change will also provide sustainability, acceptance and empowerment. This aspect has been cited as key to the replication of the Program.

The development and dissemination of knowledge products generated in the context of the program, especially those related to community-level water management and alternative livelihood options, as well as the strengthening of institutional capacity through hands-on learning, are crucial steps that will be carried out to increase the adaptability and replicability.

e. Promote management systems that favor the supply of services to contiguous agricultural fields.

To improve the productivity of the fields and the efficiency in the use of inputs, products and other services, land use planning and management systems that provide services to contiguous agricultural fields will be promoted. There are some institutional regulations for cutting down trees in riverine areas, but the application remains a challenge. Through the dissemination of good practices, pilot interventions and the incorporation of decision makers to dialogue with communities, the program can support key institutions to enforce such regulations (i.e. provide livelihood incentives to communities for the reforestation or for payment for environmental services). Raising community awareness during the implementation of activities will strengthen the value of ecosystem services to improve livelihoods and reduce disaster risk. In addition, during the realization of the soil viability analysis for forestry interventions of the Program, information will be provided on the suitability of the soil within the target communities. This information will help farmers and authorities to better plan land use and will be an instrumental tool to prevent the indiscriminate destruction of land.

f. Adaptation of agricultural practices

The adoption of favorable agricultural / forest practices will be promoted to take advantage of any possible improved water supply, but also to be more resilient to water scarcity conditions, away from dependence on rainwater. For example, you can look for lessons from other areas (probably drier) or from successful initiatives, where water availability results in better agriculture (such as achieving higher yields, more resistant crops and less demand for water).

- Barriers Identified to Potential Solutions

The persistence of risks and the exacerbation of vulnerability in San Cristóbal (as in many other places in the Dominican Republic) are also derived from an intricate network of causal factors that have their roots, in many cases, in historical and contemporary failures of the development policies. Central to these, some of the main barriers that limit the implementation of potential adaptation solutions are fundamental. Addressing these barriers will constitute the general change stimulated by the Program, in order to reduce vulnerability and increase the resilience of the beneficiary communities.

Some of the barriers to the expected results, in the provision of preferred solutions for adaptation, are the following:

a. Better planning and management of water resources taking into account the impacts of climate change on surface and groundwater sources.

Limited institutional capacity in the integration of climate change in the planning and management of water resources in San Cristóbal. The attention on climate change in the Dominican Republic has gained momentum, both at the highest political level and across sectors and regions. At the political level, adaptation to climate change is included in the Dominican Constitution (Dominican Republic, 2010) and the main national development policies, in particular, the National Development Strategy, coordinated by the Ministry of

Economy, Planning and Development (MEPYD). The Ministry of Environment and Natural Resources and the National Council for Climate Change and CDM (CNCCMDL) are the main institutions for climate change and the activities of the UNFCCC in the country, and are responsible - together with the MEPYD - for coordinating the National Climate Change Policy (PNCC). Other institutions, such as the Ministry of Higher Education, Science and Technology (MESCYT), are financing some research on climate change carried out by local universities. Other ministries have developed their own sectoral policies on climate change and to increase resilience (such as the Ministry of Public Health, the Ministry of Energy and Mines, the Ministry of Agriculture, and the Ministry of Public Works and Communications).

At the implementation level, the Ministry of the Environment and Natural Resources is the main entity for government coordination of activities on adaptation to climate change (as the CNCCMDL does in mitigation), the UNFCCC and some other environmental conventions ratified by the Dominican Republic. Within the Ministry, a Department of Climate Change has been established. The capacity of these and other institutions to incorporate climate change into their activities is being addressed through programs and projects supported by international organizations (such as JICA, USAID, AECID, World Bank and UNEP). However, the detailed technical capacity to respond to specific climate-induced problems, in particular the development and implementation of solutions on the ground, such as those related to water resources, food safety and resilient livelihoods, it is still low. For example, there is a lack of climate change projections and impact analysis for the Yaque del Norte, Yaque del Sur, Yuna and Artibonito river basins, which are crucial for managing the impacts of climate change on water harvesting and the vulnerability of the sectors and communities that depend on it for their water supply (almost the entire population of the country).

Through dialogue and cooperation with key government institutions, AF resources can be catalyzed from other funds and / or create synergies with other ongoing programs in the country, and thus contribute to increasing institutional capacity and increasing community resilience in the San Cristóbal province facing the problems induced by climate change related to water resources and livelihoods. The Program is expected to achieve this through the key institutions (government agencies and local organizations) with the full participation and involvement of local communities in adaptation activities, as well as generating knowledge products and dissemination mechanisms to assist in the future understanding of the problems and implementation of solutions.

Limited capacity to manage cross-border sources of risks and vulnerabilities. Much of San Cristóbal shares common borders with neighboring provinces (ie, Peravia, San José de Ocoa, Monseñor Nouel, Monte Plata and Santo Domingo), which means that there are potential vulnerabilities outside the province as a result of the cross-border use of water resources. There are documented cases of floods triggered by weak coordination in watershed management (across territorial and / or institutional boundaries). Following the transboundary nature of the province's watersheds, this could represent a barrier to the implementation of some adaptation measures, including the activities of neighboring provinces aimed at increasing their own resilience[8].

[8] For example, during the intense rains of November 2016, the opening of the Taveras Dam in Santiago resulted in a massive flood for the provinces of Santiago Rodríguez and Monstecristi, which are located downstream from the dam. Losses in agriculture and productivity due to this action have been estimated in the DOP 1.2 Billion.

This type of problems can be addressed, at least partially, by the Program, using the currently established regional institutional platforms, such as the Commonwealth of Mother of the Water Municipalities between Jarabacoa, Constanza, Jánico, San José de las Matas and Monción, as well as INDRHI (National Institute of Hydraulic Resources), EGEHID (Dominican Hydroelectric Generation Company), COE (Emergency Operations Center), ONAMET (National Office of Meteorology) and the Ministry of Agriculture, monitoring changes in river basins, providing critical data and knowledge products for the shared management of water bodies throughout the region.

The program will help key institutions and communities to improve their capacities and coordination mechanisms to better manage transboundary risks. Increasing the capacity of local communities to capture and store water for human consumption will also provide opportunities for the diversification of livelihoods during periods of water scarcity, such as the production of fruit trees, organic agriculture, production of timber, etc.

b. Resilient climate management of water resources by communities

Poor rural communities and local organizations currently lack incentives and preparedness to manage and provide better oversight of the management of natural resources, especially water resources, and particularly water for human consumption. The risks and vulnerabilities of communities are often aggravated by the increase in human-induced disasters caused by poor resource management, which sometimes degenerate into conflicts. In fact, San Cristóbal has been the seat of most of the recurrent cases of conflicts over land ownership in the Dominican Republic (two examples being the lands of the Rio Haina and Catarey sugar mills). The consultation record, developed as a support material for the development of this proposal, reveals that water resources are also a source of conflicts between communities and farmers, especially for the dilemma of water for human consumption vs. agricultural-livestock use vs. the recreational

The vulnerability of the income of the communities of San Cristóbal is accentuated by the limited investment for the development of the agricultural infrastructure. Incidentally, the scarce investment in the construction of small dams, storage tanks, retention structures, and to make a judicious management of watersheds, negatively affects the capacity of many areas to produce food for domestic consumption and the market. This has also led to situations in which mismanagement of water resources has contributed to increasing risks and vulnerabilities to climate-induced disasters. For example, high rates of surface water runoff during the rainy season drag the already fragile and depleted soils, causing flash floods associated with sudden and heavy downpours that affect biodiversity and ownership of areas trapped in their trails. This is a risk to the short and long-term security of the livelihoods of the communities located in the drainage routes of major rivers such as Nizao, Haina and Nigua.

c. Greater diversification of the livelihoods of the communities.

There is a general knowledge gap about the potential of integrated water management as a vector to achieve alternative livelihoods that serve as a safety net for rural communities. Likewise, there is a deeply rooted culture in which communities remain rooted in rainfed agriculture as a means of subsistence, not seeking other opportunities for economic progress. There is a national recognition that agriculture is a vehicle for economic growth and poverty reduction[9]. However, the decrease in agricultural production and productivity for food and cash crops, show an excessive dependence on rainfed agriculture, along with the decrease of soil fertility and non-sustainable agricultural practices (such as slash and burn, agricultural migration, etc.). These local factors are aggravated by inefficient policies and inadequate investments that do not translate into support systems for agricultural infrastructure, such as the protectionism of some items, which do not promote efficiency or diversification.

d. Increased knowledge and local capacity for the management of water resources and diversification of the livelihoods of communities.

The most important asset for the development of any country is its human resources. Unfortunately, the quality and potential of a large base of human resources in San Cristóbal (and the rest of the country) have remained underdeveloped and untapped, due to limited investment in the provision and access to a good quality education and other capacity building development programs at all levels. After 85 years of its creation, San Cristóbal is still lagging behind many other provinces, in terms of educational development, and despite the fact that people embraced education as the way to achieve social mobility and out of poverty, and from the late start and the current limitations of the Dominican education sector. The proposed Program will help address this barrier, through a range of capacity development activities and knowledge generation by communities and local and provincial organizations, with emphasis on the use of concrete demonstration actions that allow a practical learning process. This is crucial for the sustainability of the actions implemented.

Removing the mentioned barriers is part of the expected results according to the solutions considered:

Table 3: Barriers to Achieving Preferred Solutions

Solutions Considered	Identified Barriers
Improved planning and management of water resources taking into account the impacts of climate change on surface and groundwater sources.	Limited institutional and community capacity to integrate climate change in the planning and management of water resources. Limited capacity to manage sources of transboundary risks and vulnerabilities (with other provinces or with other communities).

[9] Inauguration speech by President Danilo Medina, August 16, 2012. This declaration initiated the "surprise visits" program where communities and producers are encouraged to formalize in order to receive soft loans from the government to finance their activities. This program has mobilized PDO 33.8 bn in 5 years.

Intelligent and resilient management of water resources by the communities themselves.	Lack of incentives and preparation to manage and supervise the management of natural resources. Income vulnerability accentuated by limited investment in the development of community infrastructure.
Greater diversification of the livelihoods of the communities through better water services and the development of agroforestry.	Lack of knowledge about alternative livelihoods that serve as safety nets for communities. Deeply rooted cultural beliefs in which communities remain rooted in rainfed agriculture as their only means of subsistence.
Improvement of institutional and community capacity to face climate risks.	The quality and potential of human resources are still developed and many are still untapped due to limited investment in the provision and access to quality education and other formal and informal capacity development programs at all levels.

Based on McSweeney et al., 2015; Christensen et al., 2007

- Other Adaptation Challenges

San Cristóbal has a high degree of vulnerability, due to the large number of human activities within the protected areas (272.62 km^2, 22% of the area of the province). In most cases, human activities are incompatible with the protection measures established by laws and regulations (such as extraction of river materials, subsistence agriculture in forested areas, etc.).

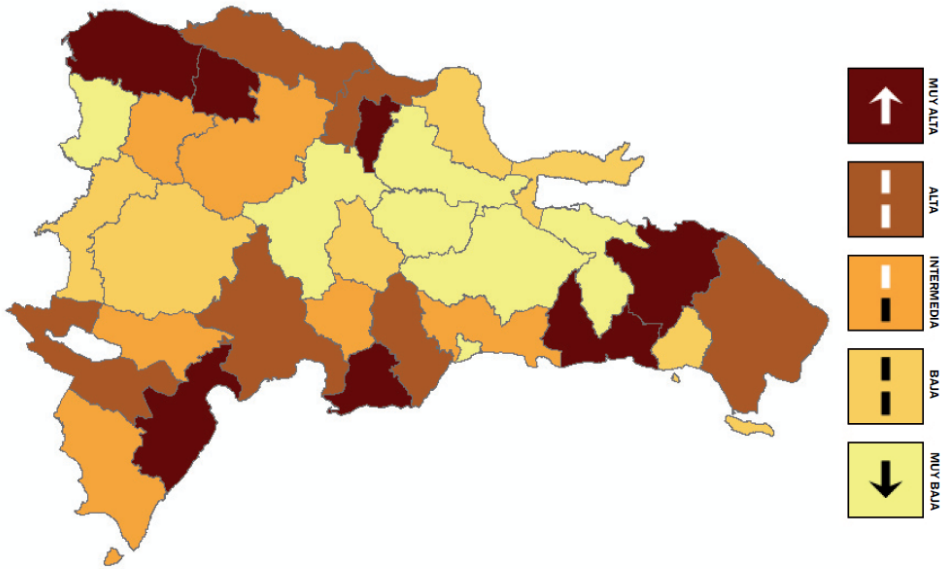

Figure 11: Vulnerability of Protected Areas by Province
Source: Izzo et al., 2012

According to the latest pollution index (Blacksmith Institute, 2015), San Cristóbal is one of the most polluted places in the world, due to the enormous industrial and chemical activity existing in the municipality of Bajos de Haina (typically referred to as a "Dominican Chernobyl"). Other impacts related to climate have been identified, such as biodiversity loss, sea level rise, desertification in some areas due to human effects, and the degradation of natural habitats.

Problem Addressed

The proposed Program seeks to address the negative impacts that expected variations in temperature and precipitation will have on San Cristóbal, in terms of water management, due to the greater number of warmer days, longer dry periods, increased drought events, and greater intensity of rainfall in shorter periods of time. These climatic threats will increase the vulnerability of the rural population, especially that of small producers and the poorest households. This vulnerability is aggravated by other underlying factors: the heavy dependence on rainfed agriculture; greater soil degradation due to intensive use and monoculture; soil and water conservation practices that are still insufficient; high levels of poverty and lack of access to opportunities; deforestation and degradation of areas; and the lack of adequate water supply and sanitation services.

The proposed Program will address specific climate threats that affect available water resources and management in specific areas. These threats include variations in temperature and rainfall patterns, increases in extreme weather events (such as storms and hurricanes), increased severity of droughts, lack of resources and capacities to manage water resources, and deterioration of public health. The program will have other positive impacts on the most vulnerable populations of the province, namely, small producers and vulnerable communities, which are the target population of the program. The program focuses on drinking water and sanitation, and its links to public health, reforestation, livelihoods and people's well-being.

Table 4: Target Areas of the Program

Zone	Included Communities	Beneficiary Population	Poverty	Vulnerability
El Caobal	1. El Caobal 2. Cuco 3. Delgado 4. Puyenes 5. Los Mosquitos 6. La Yaguita 7. Domingo 8. Peleopoldo 9. Los Pinedas	15,500	41.4%	Alto
Loma Verde	10. Loma Verde (parcial)	3,500	72.6%	Muy Alto
Castaño	11. Castaño 12. Los Jesús 13. Nuñez Abajo 14. Los Mejías	3,250	76.3%	Muy Alto

	15. Vietnan 16. La Cuaba 17. La Cuabita 18. Loma Verde (parcial)			
Los Algarrobos	19. Los Algarrobos 20. Ochoa	900	82.2%	Muy Alto
San Francisco	21. San Francisco	500	84.2%	Muy Alto
Arroyo Higüero	22. Arroyo Higüero	450	84.6%	Muy Alto
El Fundo	23. El Fundo 24. Toronja 25. Esperanza 26. Juanita 27. Medina Abajo 28. La Sabana 29. Pachín 30. Juliana Abajo.	200	90.4%	Muy Alto
TOTAL	**30**	**21,300**		

Based on the National Office of Statistics, 2014; Izzo et al., 2012.
Confirmed during the field visits of March 2018.

Based on consultations with executives from key government institutions, the Program's efforts focus on the poorest municipalities of San Cristóbal, especially those where there is no adequate potable water and sanitation service, or where the level of these services is compromised by the effects of current and anticipated climate change. At the community level, interventions have been defined on the basis of aspects such as vulnerability, population, poverty, social cohesion and cost-efficiency, and where it can be clearly demonstrated that there is no duplication of efforts.

Program Objectives

Water is a transcendental aspect within the thematic priorities and cross-cutting themes of the development agenda of the Dominican Republic, due to its effects on public health and rural livelihoods. Integrated water resources management, which takes into account climate change, especially in river basins, sub-basins and other sources of water supply for rural communities, is a requirement for any intervention related to water with which you want address the impacts of climate change and the vulnerability of communities. Therefore, inter-sectoral and inter-community coordination is essential to address climate impacts in multiple sectors and regions of the country, to improve the efficiency of water collection and distribution, reduce losses and waste of water, and to lessen the effects of diseases related to water.

The Program is designed to support the implementation of national priorities for adaptation to climate change, as described in the National Adaptation Action Program of the Dominican Republic (PNACC-RD), as well as those highlighted in the Third National Communication to the UNFCCC. Of the ten priorities listed in the PNACC-DR, with the support of the Adaptation Fund (AF), the Program will work directly for priorities (a) and (c) and will contribute to priorities (d) and (g):

- Priority (a): water resources[10].
- Priority (c): agriculture and food security.
- Priority (d): public health[11].
- Priority (g): settlements and infrastructure.

In addition, the Program also aims to address the adaptation to climate change in the most vulnerable areas of San Cristóbal, especially from the findings and recommendations included in Critical Points for the Variability and Climate Change Vulnerability in the Dominican Republic and its Adaptation, related to the management of water resources, food security and more resilient means of subsistence. The Program will also seek to support the implementation of the National Climate Change Policy (PNCC), which provides strategic guidance and coordinates the issues of climate change in the Dominican Republic. To address the problems of adapting to climate change in the country, the management of natural resources, agriculture and food security, and disaster preparedness and response, have been identified as part of the thematic areas of the PNCC.

The main objective of the program is to increase the resilience and capacity to adapt to climate impacts and risks on the water resources of rural communities in the Province of San Cristóbal and contribute to the diversification of their livelihoods. This objective will be achieved through key results focused on improving access to potable water and sanitation services, with reforestation activities in line with a correct planning of land use, and increasing institutional and community capacity and coordination for integrated management of water that supports other uses of water resources, especially for the diversification of the livelihoods of rural communities.

In the field, the Program will implement the recommended measures in the Critical Points for the Vulnerability to Variability and Climate Change in the Dominican Republic and its Adaptation to the same and the National Action Plan for Adaptation to Climate Change of the Dominican Republic, aligned with the main policies of the country, such as the National Development Strategy. The total target population, beneficiary of the program, is approximately 25,000 people. The short name of the program is "#ClimaSanCristóbal" (a simplified expression for the words Climático and San Cristóbal).

The objective of this Program is to increase resilience to climate change through immediate and long-term adaptation measures, implementing specific rural development projects. These products are organized according to the components of the Program and their expected results:

[10] Consistent with the observations of Vulnerability and Adaptation of the Dominican Republic to Climate Change in Water Resources. Secretary of State for the Environment and Natural Resources (2000).
[11] Other implications are included in Vulnerability and Adaptation to Climate Change for Malaria and Dengue using Regional Scenarios and the MACVAH / AREEC Model. SEMARENA / UNDP (2007).

Component 1: Implementation of water resources management activities at the community level

Result 1: climate resilient water resources management has been implemented in 30 small rural communities of San Cristóbal.

Component 2: Creation and development of capacities to manage climate-related risks

Result 2: greater technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs in accordance with their respective competencies.

The Program will follow existing interventions at the community, municipal, provincial, regional or national levels (as appropriate), seeking to expand successful initiatives, leveraging lessons learned, and creating more synergies of capacity building at all levels of government using a bottom-up approach. This will avoid possible gaps and / or duplication of interventions using the top-down approach[12].

Based on the experience of the participating institutions, the Program addresses key vulnerabilities of identified areas with respect to water resources management (Berigüete, 2015) and will contribute to the immediate and long-term development, and the resilience needs of communities, households and vulnerable farmers, with a particular focus on vulnerable groups: women (especially single mothers), the elderly, children, youth and people with disabilities. In addition, the Program is aligned with the recommendations of the Nairobi Work Program of the UNFCCC (UNFCCC, 2010) and the relevant scientific evidence available on the impacts of climate change, vulnerability and adaptation on water resources, potable water supply, and food security. (Niang et al., 2014; Porter et al., 2014).

Components and Financing

Table 5: Program Components and Financing

Program Components	Concrete Products	Exepcted Results	Cost (US$)
1. Implementation of water resources management activities at the community level	1.1 Community plans for drinking water supply and sanitation, for 30 communities to incorporate the risks related to climate change, have been developed.	Water management resilient to climate has been implemented in 30 small rural communities of San Cristóbal	113,445.00
	1.2 The supply of drinking water under climatic impacts (i.e., droughts, heat waves, etc.) in 30 rural communities has increased.		6,417,630.00

[12] Some relevant actions are those suggested in *Vulnerability and adaptation to climate change: Initial diagnosis, progress, gaps and potential lines of action in Mesoamerica* [chapter for the Dominican Republic], prepared by the Inter-American Development Bank (2010).

	1.3 Measures for water conservation under climate impacts (i.e., management of micro-basins and re-afforestation plans, etc.) for 2,722 hectares have been implemented.		1,668,925.00
COMP. TOTAL 1			**8,200,000.00**
2. Capacity building and capacity building in key institutions and communities to manage the risks related to long-term climate change	2.1 A set of manuals and other materials on best practices in drinking water management and sanitation, including a fully operational website, have been developed.	The technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs, in accordance with their respective competencies, has increased.	44,000.00
	2.2 A Provincial Committee on Adaptation to Climate Change of San Cristóbal has been established.		32,000.00
	2.3 A learning and systems platform to integrate the risks related to climate change in community water resources management and livelihood activities has been institutionalized in 30 communities.		102,000.00
COMP. TOTAL 2			**178,000.00**
3. Program execution costs			795,910.00
4. Total program costs			9,173,910.00
5. Fees of the Implementing Entity for the management of the Program Cycle			779,782.35
Amount of Funding Requested			**9,953,692.35**

Program Calendar

Milestones	Dates
Submission of the Full Project Proposal to AF	August 2018
Approval of the Project Proposal by AF	October 2018
Start of Project / Program implementation	January 2019
Interim evaluation	January 2021
Closure of the Project / Program	January 2023
Final evaluation	January 2023

PART II: JUSTIFICATION OF THE PROGRAM

Description of the Components

The components of the Program have been designed to provide comprehensive solutions and manage the expected risks and uncertainties of climate change in the target communities in the province of San Cristóbal. The components are based on a set of specific projects and a series of interrelated actions. The links between the components considered constitute: a) the creation and / or strengthening of community planning for the management of water resources with a focus on drinking water and sanitation issues; and b) the increase in the organization and capacity of the communities to carry out water resources management activities addressing climate impacts. In this process, some activities (which can achieve synergies with others already planned) will be carried out to strengthen the capacity of relevant key institutions in relation to water resources management and climate change (at the individual, organizational level, processes, cooperation and learning). This will contribute, later, to extend the results and impacts of the Program to other communities within the San Cristóbal Province, and to other provinces of the Dominican Republic.

Additionally, the benefits of water resource management with a community-based approach provide emerging opportunities to diversify rural livelihoods and to increase resilience to climate impacts. The information and knowledge generated during the implementation of the Program will be used to strengthen the capacities of communities, local organizations and institutions, sharing lessons learned with other communities and through better coordination among water users (both domestic and agricultural) and the institutions.

All the activities to carry out the water resources management component (diagnosis, planning, potable water supply projects and sanitation systems, and reforestation programs) are based on the specific conditions of the communities identified. This identification was made based on pre-existing information from the institutions, visits to places with greater vulnerability, and as a result of local consultations. Professionals from the key institutions, participants in the consultation processes, and community actors interviewed during the field visits, have also proposed additional criteria to select the beneficiary communities and to maximize the interventions of the Program. They have also proposed possible candidates for local committees.

Once the available information, the technical criteria, and the information obtained in-situ were correlated, and to maximize the program's impacts, the following criteria were established to select the beneficiary communities:

1. Poverty: Communities with 50% or more of households considered poor have been prioritized (according to household income and other deprivation measures);

2. Population: Priority has been given to communities with a population of at least 500 people;

3. Reasonableness: The availability of natural capital (ie, land for forests, groundwater potential for drilling, etc.) to implement the activities described in this Proposal;

4. Commitment and Participation: The communities included expressed their commitment to participate actively in all aspects of the Program and co-finance some of the activities (i.e., labor, land for works, counterparts in kind, creation of ASOCARES, etc.);

5. Sustainability and Replicability: Refers to the communities where the Program, in the opinion of the professionals and technicians of the institutions, has a better opportunity to sustain its long-term actions and / or to be replicable in other areas of the Province, or also in other provinces of the country.

6. Inclusion: Determined by the presence of groups of women and / or women leaders in the community, and of young leaders as well, or the positive attitude of these to be formalized with the support of the Program.

7. Consistency: Based on verification that the proposed interventions and community culture are compatible. This was determined by selecting each intervention (on a case-by-case basis).

The Program contemplates that additional criteria can be added during the inception workshop, to completely capture other problems that may increase the vulnerability of different groups in the community, such as housewives, land owners, women and youth, farmers, etc. This inception workshop will bring together key stakeholders, including organizations that particularly represent community associativity (i.e., producer groups, neighborhood boards, local NGOs, and vulnerable groups). This activity will ensure, together with the communities, that the design of the Projects has not omitted any important aspect in relation to the communities most vulnerable to the impacts of climate change, especially those that have never received prior support.

Using the selection criteria described above, institutions and communities have been asked to indicate a short list of potential vulnerabilities that could be included in the Program[13]. This was complemented, taking advantage of the pre-existing plans and the experience of the professionals and technicians working in the key institutions (INAPA, MARN and IDDI), in the communities and municipalities, looking for coincidences with the points of view expressed in the evaluations and the community. For these purposes, a summary of the classification of prioritized communities during field research was prepared. Next, each of the communities of the prioritized short list was visited to carry out more field evaluations before finalizing the 30 communities that will pilot the program.

[13] A preliminary evaluation of communities that could be potential beneficiaries of the program is included in Report 1: Pre-Identification of Beneficiary Communities v.2, prepared by the Brightline Institute. [Appendix A]

This multiple consultative approach with the communities, with particular emphasis on obtaining the views of the most vulnerable groups and potential beneficiaries, and the identification of pilot communities for the implementation of the Program, has established an effective cost-benefit relationship of the AF funds. An alternative would have involved adopting a more prescriptive approach for the implementation of water management measures, which is not driven by management planning at the community level or by the site of execution. This approach implies the risk of implementing measures that are not appropriate for a particular local context and that omit the particular conditions of some vulnerable groups. Similarly, a "one size fits all" approach might have been proposed, but such an approach would have a high risk of leading to inappropriate solutions and offering piecemeal solutions, with a high probability of redundancy after the end of the program. A last alternative approach would have been to focus on solutions at the household level. This would not generate great benefits and offer less value for money than a response at the community level, so it is discarded.

Component 1: Community-level implementation of climate resilient water resource management activities

By capitalizing on available information related to water resources management planning, under Component 1 the Program will focus on improving community-level participation in the planning and implementation of climate resilient water resource management activities (Ministry of Environment and Natural Resources, 2008). Currently, the participation of communities, and in particular of women and young people, in the planning and decision-making processes is very limited, resulting in a lack of transparency and inequity in the access and distribution of water resources. The program has chosen a participatory approach for the management and development of water resources, distributing responsibilities among communities and using techniques that achieve short-term profitability and long-term sustainability. This is in line with the Government's efforts to achieve a more decentralized approach to climate risk management.

Integration options for the management of water resources in communities have been identified and evaluated, and they have been "tested" before their implementation. This has required monitoring and reviewing these options and their effectiveness[14]. After carrying out this exercise, and based on the relevant knowledge of the key institutions, it has been possible to establish that the interventions of the Program will guarantee:

– Integrate the management and development of water resources in environmental management at the community level, and thus achieve the sustainability of water resources in quality and quantity, as well as their resilience;

[14] The Government of the Dominican Republic, through INAPA, has received funding from the Inter-American Development Bank (IDB) and the Spanish Cooperation Fund for Water and Sanitation in Latin America and the Caribbean (FECASALC) to execute rural water supply projects drinking water and basic sanitation. Projects already executed within these initiatives have been taken as a model to "test" the eventual efficiency of the interventions proposed by the Program and to establish indicators of the expected impacts on their execution.

- Strengthen and support the sustainability of existing community management, as well as the operation and maintenance of current facilities, in order to safeguard the investments already made;

- Strengthen community organizations so that they assume a central role, supporting community management of water works carried out, and maintaining the integrity of aquatic systems.

Result 1: Climate resilient water resources management has been implemented in 30 small rural communities of San Cristóbal.

Specific products expected from Component 1 are:

1.1 Community water supply and management plans are developed for 8 municipalities to incorporate the risks related to climate change

Recognizing that water is a limited and vulnerable resource due to its multiple uses, developing a community water management plan is crucial. Under this result, therefore, the Program will work with at least 30 rural communities of San Cristóbal to develop water management plans at the community level. The establishment of a plan for water supply and management is expected to empower local communities, provide an enabling environment to address the diversification of their livelihoods, and allow them to take personal actions to reduce vulnerability to climate change. These community plans will be integrated into the basin and sub-basin plans developed and / or strengthened by the Program, in cooperation, collaboration or synergy, with government institutions.

This component will begin with a critical review of existing community structures / organizations with the capacity to develop and implement water supply management plans, and will be carried out for each community to ensure that the optimal institutional agreement is adopted, as in, for example, communities where INAPA supports the Community Associations of Rural Aqueducts (ASOCARES) and the INDRHI is doing the same with the Irrigation Boards. Such structures are already in operation, and are likely to provide an effective institutional mechanism for planning water management in the community. In other communities, well-established local water and sanitation organizations could play this role. In order to strengthen the program's gender equity approach, it was established that women represent 50% or more of the members of the committees that lead the planning process. A participatory methodology will be used within the planning process, to achieve high levels of participation of particularly vulnerable groups.

The options for integrating the management of water resources in the communities have been identified and evaluated prior to their implementation. This reduces the costs of monitoring and reviewing these options and their effectiveness. Likewise, special emphasis has been placed on ensuring that interventions integrate the management and development of water resources to environmental management at the community level, and that these ensure the sustainability of water resources in quality and quality, as well as

the resilience of these in the face of climate change. The processes of developing plans and achieving institutional agreements are based on the learning of successful initiatives related to water planning and management that have been carried out in other communities of the Dominican Republic. These initiatives include those carried out by civil society and / or international cooperation, those implemented by the European Union (Sanitation of Marginal Urban Communities -SABAMAR), and Catholic Relief Services (Water +)[15].

Using the resources provided by the AF, the Program will subsequently support the implementation of community water management plans through the provision of infrastructure and other physical interventions, along with training and technical support (these interventions are detailed in Products 1.2, 1.3 and 2.3 below). As part of the follow-up to the interventions, the communities will be visited regularly by personnel from key agencies, such as the Ministry of Environment and Natural Resources, INAPA and IDDI, as well as experts and technicians recruited under the Program. These visits will help with the continuous monitoring of the implementation of the management plan and will continue to provide more impetus and motivation to the communities' efforts for the correct management of water and the watershed.

The community management plans will address the long-term sustainability of the measures implemented under the plan and, in particular, the establishment of a mechanism to ensure the long-term maintenance of the infrastructure. The exact nature of these mechanisms will be included in the agreements to be concluded with community organizations, in a transparent manner and on a project-by-project basis. In all cases, communities will be required to establish maintenance funds, either by charging for the use of water resources, or by using part of the funds generated by livelihood diversification activities supported by the Program. This approach has been successfully tested in other areas of the Dominican Republic[16].

Within the plans developed in this Product, potential works will be identified that conserve the natural character and functioning of the water system (ie, retention elements, dams / reservoirs, regulation and / or storage tanks, rain collection, irrigation, etc.). Although the project will not generate this infrastructure, it will make this information available to communities to facilitate decision-making, avoid conflicts of use, and make their livelihoods more resilient.

[15] A key aspect of the success of these projects, among others, has been the holding of regular meetings with those community institutions that have achieved a better planning and implementation of water management. After these experiences, when key government institutions conduct exchange and learning events, nationally and internationally, they usually invite the representatives of those communities or the beneficiaries.

[16] Two interesting case studies related to this approach are: (1) an IDDI program to support neighborhood foundations in providing garbage collection and sanitation services in the slums of Santo Domingo; and (2) the Pro-Natura collective savings initiative in Loma La Humiadora, where common resources are used to protect natural water sources. In both cases, the profits are reinvested in the needs of the community and are used to finance other activities, ensuring the long-term sustainability of these programs and giving communities the opportunity to invest in their self-development.

1.2 The supply of drinking water under climatic impacts (i.e., droughts, heat waves, etc.) in 30 rural communities has increased.

Under the impacts of climate change, ensuring that communities have an adequate supply of potable water throughout the year is crucial, but it is a great challenge. To achieve this, the Program will carry out activities that mobilize participation, planning and community implementation of practices aimed at the use of drinking water in a rational and cost-effective manner, and the reduction of environmental pollution caused by the poor disposal of wastewater. The applicable water quality norms, regulations and standards will be important to ensure that human activities do not have an adverse impact on water availability in the medium and long term.

The construction and rehabilitation of water collection facilities (i.e., intake works, well fields, etc.), storage and regulation tanks, and drinking water and wastewater treatment systems are also contemplated. Although it was not considered necessary during the identification and design phase of the individual projects, other traditional technologies and systems (such as works that collect rainwater) were identified, which could be adopted by the communities and the agricultural and livestock producers, taking advantage of the water availability that the Program ensures (under Product 1.3). These and other interventions will be identified with communities and other interested parties seeking to ensure water availability throughout the year, including in times of drought, reducing, avoiding or eliminating conflicts of water use in communities, and directly supporting potential activities of diversification of livelihoods, possible with the support of the Program.

The following table summarizes the characteristics of the planned facilities and infrastructure.

Table 6: Characteristics of the Proposed Infrastructure Projects

System	Description of the Components
El Caobal	- Source: Rio El Duey - Job at Source: Splice from line of adduction Ø30 "L.J. (existing), Aqueduct Sto. Dgo. - Pipe: Ø8 "PVC (existing) - Pumping Station: Cisterna in Reinforced Concrete - Capacity: 144 m^3 - Two (2) 30 HP vertical shaft pumps - Cyclonic mesh fence (existing) - Impulse Line: Ø8 "PVC (existing), L = 1,945.84 m Ø6 "PVC (existing), L = 1,455.60 m - Treatment: Simple Chlorination - Storage: Surface Regulator Tank in Reinforced Concrete - Capacity: 300 m^3 - Matrix Line: Ø8 "PVC (SDR-26), L = 32.18 m (to be placed). - Distribution Network: Ø4 "PVC (existing), L = 1,473.12 m Ø6 "PVC (SDR-26), L = 2,165.20 m Ø4 "PVC (SDR-26), L = 4,856.00 m Ø3 "PVC (SDR-26), L = 8,360.00 m - Type of System: Gravity - Pumping - Total connections: 796 urban units, 417 existing units and 379 units to be installed
Loma Verde	- Source: Subterranean water (located in the sector of Los Jesús) - Well Fields: two (2) units: an existing one to be rehabilitated and a new one to be built. - Impulse Line: Ø6 "PVC (SDR-21), L = 956.08 m

	- Treatment: Simple Chlorination - Storage: Surface Regulator Tank in Reinforced Concrete - Capacity 150 m^3 - Matrix Line: Ø6 "PVC (SDR-26), L = 30.60 m - Distribution Network: Ø4 "PVC (existing), L = 734.36 m Ø3 "PVC (existing), L = 736.00 m Ø6 "PVC (SDR-26), L = 392.63 m Ø4 "PVC (SDR-26), L = 873.78 m Ø3 "PVC (SDR-26), L = 2,579.19 m Ø2 "PVC (SDR-26), L = 51.30 m - Type of System: Pumping - Total connections: 300 rural units
Castaño	- Source: Groundwater - Job at Source: Well Fields with pumping station Niche for control panels Pumping equipment Mesh fence cyclonic - Impulse Line: Ø6 "PVC (SDR-21), L = 1,116.61m - Treatment: Simple Chlorination - Storage: Elevated Regulator Tank 12m in Reinforced Concrete - Capacity: 150m3 - Matrix Line: Ø6 "PVC (SDR-26), L = 60.00m - Distribution Network: Ø4 "PVC (SDR-26), L = 1,422.55 m Ø3 "PVC (SDR-26), L = 3,932.21 m - Type of System: Pumping - Total connections: 347 rural units
Los Algarrobos	- Source: Groundwater - Job at Source: Well Fields with pumping station Niche for control panels Pumping equipment Mesh fence cyclonic - Impulse Line: Ø4 "PVC (SDR-21), L = 1,628.00 m - Treatment: Simple Chlorination - Storage: Elevated Regulator Tank 10m in Reinforced Concrete - Capacity: 65 m3 - Matrix Line: Ø4 "PVC (SDR-26), L = 59.44 m - Distribution Network: Ø4 "PVC (SDR-26), L = 313.65 m Ø3 "PVC (SDR-26), L = 4,430.00 m Ø2 "PVC (SDR-26), L = 100.00 m - Type of System: Pumping - Total connections: 160 rural units
San Francisco	- Source: Noria San Francisco - Job at Source: Capture box in the channel (to rehabilitate) - Adduction line: Ø3 "PVC (SDR-21), L = 196.15 m Ø3 "Steel, L = 52.00 (for the crosses) - Treatment: Simple Chlorination - Storage: Surface Block of Concrete Blocks - Capacity: 45 m^3 - Matrix Line: Ø3 "PVC (SDR-26), L = 140.53 m - Distribution Network: Ø3 "PVC (SDR-26), L = 1,402.91 m - System type: Gravity - Total connections: 40 rural units
Arroyo Higüero	- Source: Arroyo María - Job at Source: Capture box in the channel (to build) - Adduction line: Ø4 "PVC (SDR-21), L = 635.00 m Ø3 "Steel, L = 652.00 m Ø3 "PVC (SDR-21), L = 1,167.27 m - Treatment: Simple Chlorination. - Storage: Elevated Regulator Tank 10m in Reinforced Concrete - Capacity: 45 m^3 - Matrix Line: Ø4 "PVC (SDR-26), L = 308.00 m.

	- Distribution Network: Ø3 "PVC (SDR-26), L = 820.00 m Ø2 "PVC (SDR-21), L = 60.00 m - System type: Gravity - Total connections: 85 rural units
El Fundo	- Source: Arroyo María - Job at Source: Capture box in the channel (to build) - Adduction line: Ø4 "PVC (SDR-21), L = 635.00 m Ø3 "Steel, L = 652.00 m Ø3 "PVC (SDR-21), L = 1,167.27 m - Treatment: Simple Chlorination. - Storage: Elevated Regulator Tank 10m in Reinforced Concrete - Capacity: 45 m^3 - Matrix Line: Ø4 "PVC (SDR-26), - Distribution Network: Ø3 "PVC (SDR-26), L = 820.00 m Ø2 "PVC (SDR-21), L = 60.00 m - System type: Gravity - Total connections: 85 rural units
TOTAL	**7 PROJECTS**

Ø = diameter of the pipe; L = length of the pipe; PVC = Vinyl Chloride;
SDR = Standard Dimension Ratio (relationship between the nominal diameter of the pipe and its thickness)

1.3 Measures for water conservation under climate impacts (i.e., management of micro-basins and re-afforestation programs, etc.) for 2,722 hectares have been implemented

In many areas, deforestation in watersheds and on riverbanks has reduced soil capacity to retain flood and runoff waters, and has also led to increased soil erosion. In Output 1.3, the Program will carry out re-afforestation and conservation activities, aimed especially at the communities that surround the watercourses that feed the proposed systems, in support of the community water management plans (Product 1.1). Each reforestation program has been designed by professionals from the Ministry of Environment and Natural Resources, and responds to a correct planning of land use, to the needs of the proposed Projects, the expectations of the producers and owners of the land, the potential economic return for communities, and the prospect of making local livelihoods more resilient.

Table 7: Characteristics of Proposed Re-Afforestation Projects

Forectry Projects	Included Projects	Total Area (Hectares)	Comments
El Caobal	- El Caobal	1,532	Reforestation
Loma Verde	- Loma Verde	405	Conservation
Castaño – Los Algarrobos – San Francisco	- Castaño - Los Algarrobos - San Francisco	683	Conservation
Arroyo Higüero	- Arroyo Higüero	27	Agroforestry with Fruit
El Fundo	- El Fundo	75	Fruit
Total Conservation		1,607	
Total Reforestation		1,115	
Total Area of Projects		**2,722**	

For Re-afforestation programs, a set of potential varieties of planada has been prescribed. This list gives priorities to native / endemic varieties and commercial crop trees. Currently, several projects with foresters with characteristics similar to those proposed are being implemented in the Dominican Republic, such as programs to plant trees in river banks in places such as Valle Nuevo and Sierra de Bahoruco. Many others are being implemented by the private sector (i.e., Manuel Arsenio Ureña, S. A., CONCADOM and Banco Popular) and civil society organizations (i.e., Fundación Tropigas, Plan Sierra, Sur Futuro, etc.). All these projects have demonstrated the importance of having a local supply of seedlings, an issue that can become an alternative livelihood for community entrepreneurs, producer associations, or the community in general.

Achieving a sustainable management of water resources and guaranteeing the reliability of supply requires measures to capture, conserve and control water quality. This is crucial to ensure sustainable and equitable exploitation and use, so that it maintains biodiversity and the quality of the environment for future generations. The activities for the realization of this product will include the establishment of appropriate baselines to determine the effectiveness of the current measures of water conservation in the Province. In the same way, quality control measures will be evaluated.

The design of forestry projects includes training in water conservation and quality control measures. There will be specific activities of direct support to the communities to implement water conservation measures and quality control. Support will be provided for the implementation of conservation tillage techniques in the beneficiary communities. The installation of small facilities to collect rainwater or underground sources will be established[17]. The design and construction of new contour lines will help reduce runoff will also be done as a conservation measure.

Summary of Component 1: to improve water infrastructure, a preliminary assessment of key local entities and / or empowered community organizations of their water management structures (community associations, neighborhood councils, women's groups, etc. small farmers, social entrepreneurs, micro-entrepreneurs, etc.) to produce, with them, local data on climate vulnerability and the main risks in areas of program intervention. In such areas, measures will be implemented to use new water sources and / or to care for and update existing sources, both at the household level and at the community level.

At the domestic level, the interventions involve integrated projects for the supply of drinking water (collection, storage, treatment, distribution and disposal). Such systems include well fields, pumping stations, storage and regulation tanks, chlorination treatment, filter wells, and training to monitor water quality. At the community level, this component will identify potential rainwater collection and storage facilities to reduce potential conflicts of use, support agricultural infrastructure, and make rural livelihoods more resilient.

[17] A success story that has served as a model for the design of this Product is the *Cultivating Good Water* program, currently implemented by the Ministry of Energy and Mines in poor communities in the southwest of the Dominican Republic. This program works with communities to strengthen their values and build a culture of sustainability with an emphasis on water conservation and the water-energy-soil-climate nexus.

As the Program will invest resources to build and operate the facilities, and to enable the communities to make correct use of water resources in the long term, the repair and maintenance strategy is a crucial aspect. This strategy will be included in the community water management plans, taking advantage of the lessons learned from existing projects. To ensure the correct execution of the strategy, it will also include the training of the communities on how to carry out repairs and maintenance. However, to achieve a sustainable management of the water resources that guarantees the supply, measures for the capture, conservation and control of water quality are required. This is essential to ensure sustainable and equitable exploitation and use, in a manner that preserves biodiversity and the quality of the environment for future generations. The activities for the realization of this product will include the establishment of appropriate baselines to determine the effectiveness of the current water conservation measures in each zone.

With this component, the Program will reduce the pressure on water and forest resources in the intervention zones, avoiding deforestation and soil erosion. The implementation of agroecological practices of added value and the monitoring by the community committees ensure the sustainability of said actions. As the forestry activities are centered in the middle and upper area of the identified micro-basins, the protection of existing water resources and the creation of alternative sources of income for the people and communications involved are guaranteed. It is expected to achieve various synergies with public institutions and local NGOs that are developing agribusiness in these areas.

The expected result of Component 1 is related to the development and implementation of climate resilient water resources management for at least 30 small rural communities of San Cristóbal. These communities will be included in the governance structures of the Program in order to create other benefits and identify possible synergies (livelihoods, food security, public health, etc.).

A total budget of US $ 8,200,000 is estimated for Component 1.

Component 2: Capacity building and capacity building in key institutions and communities to manage the risks related to long-term climate change

The Dominican Republic still faces significant challenges in terms of the quantity and quality of data, information and relevant technical capacity to implement climate change adaptation at the community level. Despite recent advances and the growing number of scientific, technical and economic studies carried out to date, there are still significant gaps in terms of climate impacts, socio-climatic vulnerability, effectiveness of actions, and planning of climate adaptation (a national, provincial, municipal and community level). In this context, the Program proposes a technical and institutional capacity-building component for the planning of adaptation to climate change at the level of vulnerable communities; both with a perspective of adaptive capacity building / long-term policy development and short-term climate risk management. In particular, this includes the participatory development of on-site adaptation actions for water management, the development of contingency plans, early warning systems, and climate risk management.

Another approach will be to strengthen the interactions between relevant actors for adaptation to climate change: government, meteorological services, agricultural / livestock sector, research institutions, national and local government, media, and poorer local communities.

The results of this component include a strategy to systematize the effective communication of the products and results of the Program, include more support from the key institutions at the field level and disseminate good practices and lessons learned from Component 1. In addition, a Provincial Climate Change Adaptation Monitoring Committee (PCCAMC) has been included. This Committee will be a collaborative management structure to ensure the sustainability and long-term replicability of the Program, to address unforeseen interventions and other future projects that are focused on the community, strengthen the implementation of relevant policies, and mainstream climate change and the gender to all the plans, activities and municipal and provincial projects.

Result 2: The technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs, in accordance with their respective competencies, has increased.

The specific results expected from Component 2 are:

2.1 A set of manuals and other materials on best practices for community water management is developed, including a fully operational website

The Program will dedicate resources to activities to document and share knowledge and experiences, and especially how to use the information and data of the Program to inform people, strengthen decision-making, and enhance its replication throughout the country. To facilitate this, a communication strategy will be developed and different forms of dissemination of information will be used, such as social networks, infographics, documents, articles, dissertations and presentations. The experience of previous development projects has shown that bringing together the participants of the community on a regular basis is an effective mechanism for the exchange of knowledge, so this model will be adopted.

The includes approaches that will be used to target different sectors of society, including special consideration to optimize communication for young people, the elderly, children and women, including those who can not read or write. Some materials will be in English as well.

Program staff, professionals and technicians from key institutions, as well as hired consultants and consultants, will be continuously involved with the community to provide technical assistance on water resources management, provision of potable water and sanitation services, re-afforestation, adaptation to climate change and increase of domestic and community resilience. To this end, proven approaches will be used, such as community training, regular visits, training / demonstrations in the field, and visits to other successful projects. Investing in community training and giving them the opportunity to gain practical

experience (especially for younger people) will help form a group of "community agents" capable of appreciating and implementing climate change adaptation, both in aspects such as community water management and access to water resources. This new class of community agents will be in a position to extend similar support to other communities that are not directly included in the Program. The modality of involving people in the community as community agents to produce / support activities under the Program is described in more detail in the Implementation Arrangements section[18].

2.2 A Provincial Committee for Adaptation to Climate Change established in San Cristóbal

As the Program proposes to coordinate and contribute to other national and regional efforts for climate change adaptation, disaster risk management and resilience building, there is an anticipated need to monitor compliance with policies and coordinate actions at the regional level. To maximize the overall impact, the Program stipulates the establishment of a Provincial Climate Change Adaptation Monitoring Committee (PCCAMC). Initially, the establishment of this committee will be supported to meet the objectives of the Program, but with a broader vision of supporting the identification of other needs for adaptation to climate change and the implementation of solutions for the benefit of the most vulnerable people and sustainable development of the San Cristóbal province.

Because the composition and mandate of the PCCAMC will have implications beyond the project, one of the first activities of the Program will be to initiate a multi-stakeholder consultation process to develop and agree on the terms of reference of the Committee considering the existing coordination bodies at the municipal and community level. The idea behind the PCCAMC is, in the first instance, to strengthen the existing organisms and coordinate their actions towards adapting to climate change at the provincial level, and to promote the inclusion of these structures at the highest levels of national policy and in decision-making (in terms of access to government resources and assistance for adaptation needs and other development challenges). This committee could be the first national model for the integration of civil society, the private sector, government agencies and communities, in coordinated efforts to adapt to climate change and increase resilience at the provincial level.

The PCCAMC will be used to integrate the activities, products and results of the Program into regional / national planning processes, to strengthen public policies on adaptation to climate change for the benefit of the most vulnerable populations of San Cristóbal, and to facilitate access to the national budget for the replication of the Program in other communities and provinces in the country. In addition, this Committee can provide long-term support to the activities of local communities through the development of future platforms to scale up the activities carried out within Components 1. The PCCAMC will meet at least 3 times per year, but this frequency could be changed as possible or necessary.

[18] In the Dominican Republic, there is significant experience with this approach. For example, in cases of agricultural assistance programs, public health operations, and disaster risk management plans, technicians trained by the programs work with communities and, in general, train others (effect of multipliers), for example. What the experience can be easily reproduced within the community and in other communities.

The Program proposes that, initially, the PCCAMC be mandated to:

- Serve as a platform for multisectoral management and coordination of climate change and related programs, activities and projects in the province;

- Monitor the progress of the Program and link it to other adaptation initiatives within the Province, and ensure that the Program contributes to the general development objectives of the Province;

- To become a platform for a long-term and sustained understanding process of adapting to climate change, seeking synergies and overcoming gaps, promoting the necessary adjustments in existing interventions to ensure that they are all integrated and contribute to a broader adaptation, and to the planning and execution of development at the provincial and regional levels; and

- Provide feedback and contributions to national and provincial policies, especially those related to neighboring provinces, climate finance and land use planning.

The final design, attributions and members of the PCCAMC will be defined after a specific process of consultation with the interested parties in the inception phase. However, it is anticipated that existing entities such as the Provincial Government, the mayors (local governments), MEPYD, COE, Ministry of Public Health, Ministry of Environment and Natural Resources, INDRHI, INAPA, Ministry of Public Works and Communications and Ministry of Education will be included. The representatives of the private sector grouped together and industrial organizations, services, banking and agriculture, and civil society (universities, NGOs, women's organizations, youth, and community organizations). The PESC (Strategic Plan of San Cristóbal, an existing Public-Private Partnership that acts as the coordinating body of the province, in order to promote its integral development) has expressed its interest to host the PCCAMC as it does with other provincial committees (such as planning for land use, citizen security, industrial development, art and culture, etc.). The program will support PCCAMC only at its inception.

The PCCAMC is necessary for the sustainability of the Program and its subsequent reproduction. The Program will implement activities to evaluate and strengthen the capacity of PCCAMC and other key institutions, such as INAPA, Ministry of Environment and Natural Resources, INDRHI and MEPYD, in order to provide adequate support. There will also be an activity to design and implement training programs throughout the Province aimed at local governments and local institutions. The Program will provide technical assistance, substantial materials and opportunities for capacity building and development.

To ensure the financing and operations of PCCAMC beyond the duration of the Program, it will be absorbed by the Ministry of Environment and Natural Resources, as the main institution of the national climate change policy. Given that the Ministry of the Environment acts as the Designated National Authority (DNA) of the Dominican Republic for important

international schemes such as the GCF, CTCN, AF and GEF, it could help identify other medium / long-term financing opportunities, especially by replicating the strategies, products, results and Program approaches in other provinces. However, the Program must strengthen and / or develop some capacities in the Ministry of Environment and Natural Resources, so that it can absorb the PCCAMC in an appropriate manner. This includes technical training, process development and establishing the corresponding interinstitutional agreements.

Alternatively, MEPYD and the Governor of San Cristóbal can co-direct the PCCAMC and finance its operations after the end of the Program. MEPYD is the key institution related to national planning, responsible for the national budget and coordinates public investment in the country. MEPYD could help incorporate the results of the Program into other public policies, or replicate it throughout the country. On the other hand, the Government, as a direct dependency of the Presidency, is an important actor to include local efforts within the presidential agenda. Recent experiences in other fields (i.e., 9-1-1, "Surprise Visits", "Quisqueya Aprende Contigo", etc.) represent considerable success stories of the governors' leadership in development in their respective provinces[19].

Although there are other coordination bodies at the municipal and provincial levels, their actions generally do not reach the highest levels of public policy. For this reason, not all community-oriented initiatives (regardless of their degree of success) are replicated later with public funds or are included within the national budget. However, this is explained by the fact that these existing structures are focused on their respective mandates and do not influence public policies.

As the PCCAMC will be formed by representatives of existing institutions, it will not act as an administrative structure but as a collaboration framework. This promotes efficient coordination between the Program and other initiatives to adapt to climate change in San Cristóbal, the promotion of the inclusion of climate change adaptation in public policy and the national agenda, and will eventually support other provinces. Therefore, there is no risk of duplication or of funds or activities, since the Committee will focus on (a) identifying synergies with other adaptation and development programs; (b) coordinate institutions to work together in adapting to climate change and increase resilience; and (c) use the results and results of the Program to influence public policy and investment in relation to climate change. Therefore, the inclusion of the private sector and civil society in a structure of action and support for policy contributes to the long-term sustainability of the Program. The members of the PCCAMC will not receive any form of payment or compensation from the Program, to guarantee the transparency, efficiency and proper use of the AF funds.

[19] Typically, in order to avoid overlaps / gaps, the Ministries consult among themselves before committing themselves to multisectoral initiatives, for this reason, only with an open dialogue can the most adequate scheme for housing, financing and integrating the PCCAMC be pointed out. In relation to the general budget of the Program, the amount allocated to PCCAMC is ~ 0.3% of the funds requested, as a result, the institutions will be able to absorb it easily.

Current bodies and institutions (and others that may be added in the future) will be strengthened by incorporating climate change adaptation and incorporating the perspectives of their institutions into a policy-oriented framework. Each member of the PCCAMC must work to increase both the commitment and the actions of their respective institutions towards adapting to climate change at the institutional and policy level, in accordance with their resources and capacities, which are increasingly strengthened[20].

2.3 A learning and systems platform to integrate the risks related to climate change in community water resources management and livelihoods activities has been institutionalized in 30 communities

It is vital that the lessons learned from the implementation of Component 1 are documented, recorded and widely disseminated, in particular how planning and implementation at the community level is linked to higher levels of planning and development, and on the management of water resources under climate change. The Program will use communication experts to produce lessons learned documents, and these will be disseminated among stakeholders / beneficiaries, in particular to neighboring provinces and other areas in the Dominican Republic and Haiti. The current capacities of communities to analyze and interpret climate data and use them in development and decision-making are insufficient in many places. Therefore, the program will carry out activities to develop institutional capacities and individual skills within the communities.

Activities have been included to develop the capacity of rural communities to integrate climate change into their budgeting and development planning processes. As a key aspect of mass communication and awareness, skills will also be developed in the local media (i.e., newspapers, TV, print media, social networks, columnists, bloggers, etc.). It is recognized that a large number of different institutions, at different territorial scales, are responsible for the management of resources and problems related to development in the Dominican Republic, which may be synergistic with the Program. This helps the dissemination of its products and results, and its replicability.

Also, there are training packages for the beneficiary communities, oriented to the construction and / or restoration of hydraulic works such as pipes, ditches, lines, intake works, etc. There will be training activities to channel water (i.e., using designs such as those used in road design) with culverts to protect community infrastructures against floods and avenues. Finally, training will be carried out in rehabilitation and maintenance of water collection, storage and treatment works, as well as in reforestation for the areas of interest.

[20] There are successful experiences of Dominican institutions in relation to the construction of interinstitutional collaboration frameworks to influence public policy. For example, GIRESOL (an inter-institutional group to promote the adequate and efficient management of solid waste), ADOPEM (a microcredit bank created by several entities that work with women living in extreme poverty), COE (a multi-institutional structure) for disaster risk management) and CEI-RD (a Public-Private Partnership to promote exports).

Summary of Component 2: to guarantee the sustainability and visibility of the Program and its long-term results, a collaborative knowledge management strategy will be implemented under this component. The main dissemination products of the Program will be a handbook of best practices, concrete practices on the sustainable management of water, water and sanitation, and community-based adaptation to climate change. Key stakeholders, staff, communities and beneficiaries will interact more with the national media (newspapers, Internet, radio, etc.) so that the public knows the climate risks and adaptation needs addressed by the Program. Other publications are planned with respect to the impact evaluation of other components. The products of the Program will also be shared through international forums on climate change, including those regularly carried out by agencies such as the UNFCCC, FAO, WHO and UN Women.

An innovative aspect of this component is the establishment of a Provincial Climate Change Adaptation Monitoring Committee (PCCAMC) for the province of San Cristóbal. This Committee will be responsible for the long-term sustainability of the Program and will identify synergies with other initiatives, current or planned, related to climate change in the Province (ie, early warning systems, disaster risk management, development assistance, financing climate change, etc.), channel more public / private financing for adaptation, and encourage the use and adoption of small-scale data (produced by the Program and other initiatives) in the context of current or future public policies. The main strategic structures of San Cristóbal, have expressed their interest in hosting the PCCAMC, and are motivated to incorporate climate change into the planning of the Province, and that, in this process, other synergies can be achieved in pursuit of provincial development.

The expected result of Component 2 is a greater technical capacity of the communities and institutions to assess the impacts, vulnerability and adaptation needs (according to their respective competencies) and ensure the long-term sustainability of the Program. This implies, among other actions, disseminating the lessons learned and good practices in climate resilient water management and their links to the livelihoods of the communities and selected areas, which will be implemented within the Program. All this may contribute to resilience and development needs in other places; and the recognition and integration of new knowledge generated later.

A total budget for Component 2 of US $ 178,000 is estimated.

As shown, the planned interventions of the Program will contribute both to reducing the vulnerability of the rural communities of San Cristóbal and to increasing their resilience. Given that the communities targeted for intervention do not have potable water and sanitation services (and that where these exist, they do not ensure availability in quantity and quality for a dignified life, whether due to abandonment, deterioration, inefficiency or conflicts over the use of the resource inoperative), and because a significant percentage of that population is highly dependent on agriculture, their conditions and quality of life will be affected by the presence of climate shocks / stress and other development challenges. The following table shows how the interventions of the proposed Program would reduce the vulnerability of the communities and increase their capacity to adapt to the impacts of climate change in the medium and long term.

Table 8: Interventions and their Impacts on Vulnerability and Resilience

Project Description	Increase of Resiliency / Vulnerability Reduction
Water planning considering climate change	– Support the design, construction and operationalization of infrastructure under a community approach and other physical interventions. This guarantees that interventions related to water are sized according to the conditions and potential of each community. – Address the long-term sustainability of the measures implemented in the community plan, such as sustainability and maintenance. – Leaders, women and youth can work together to solve other problems (such as conflicts related to the use of water). – Ensure that human activities do not have an adverse impact on the availability and use of water resources in the long term.
Facilities for water supply	– The use of infrastructure reduces the dependence on typical sources (such as rivers) that may be depleting. – Better water services helps avoids water diseases, which means an improvement in the public health of the community. San Cristóbal shows a higher incidence of water-related diseases (i.e., dengue, chikungunya, amoeba, zyka, cholera, etc.). – Rainwater collection facilities can provide affordable drinking water without large labor or pumping costs. – Medium / long-term maintenance means permanent jobs for people in the community, improving their income.
Water conservation measures	– Re-afforestation in communities near watercourses ensures water for various uses and reduces soil erosion. – The use of coffee, fruit trees, timber trees and other crops, implies additional income for the communities. – The protection of micro-basins can contribute to the conservation of biodiversity and / or local tourism (rivers, spas).

It is expected that the Program's resources and impacts will motivate communities and institutions to develop programs for long-term adaptation to climate change in other fields and / or sectors. This could well include, human settlements, sustainable energy, early warning systems, etc.

Social, Economic and Environmental Benefits

The proposed Program will provide a safe and reliable freshwater supply for the beneficiary rural communities of San Cristóbal province, and especially for its particularly

vulnerable population. Climate change is expected to have an impact on water availability by increasing the pressure on water resources (i.e., increase in temperature and decrease in precipitation). The climatic and scientific projection scenarios indicate that, in addition to a certain reduction in the annual flows of the rivers, there will also be a substantial increase in the water requirement per person, as the temperature of the communities increases due to global warming.

The National Development Strategy recognizes access to water and sanitation, increased agricultural productivity, pollution control, development of water infrastructure and integrated management of transboundary river basins as key factors in sustainable development from the country. In the specific case of drinking water and sanitation, more than 85% of the investments made between 1990 and 2016 were allocated to urban centers, while only 10% were invested in rural areas. The average annual investment in drinking water supply in the country is about 87.9 million dollars (average 1996-2012), a relatively high level of investment per capita compared to other developing countries. However, investments are not allocated properly. For example, investments are biased towards water supply at the expense of improved sanitation and the treatment of wastewater, sectors that received less than 2% of total investments. The last National Report on Drinking Water and Basic Sanitation Services indicates that a poor and untargeted allocation of resources has led to a smaller than expected increase, compared to the level of investment, coverage rates and rates. of collection (MEPYD, 2014).

In addition, there are still deficiencies in the management and coordination efforts, so it is not surprising that the regional water and sewerage companies depend almost entirely on the transfers made from the central budget to finance their operations. These existing schemes lack transparency and do not report indicators on the level of efficiency in the use of such subsidies. On the other hand, the transfer process and the performance of the ASOCARES are still far from ideal. While these organizations show a significant increase in cost recovery, especially when compared to the low values of the areas administered by the government, a high government subsidy still contributes to cover the operation and maintenance costs in their systems.

The Program will promote two types of adaptation interventions: (1) protection and improvement of the ecosystem; and (2) planning and execution of water infrastructure at the community level. These approaches will increase the financial, natural, physical and social capital of the communities. A conservative estimate shows that some 21,300 people are direct beneficiaries of the projects. Indirect beneficiaries are other communities that will be provided with technical assistance (i.e., Mucha Agua and La Cole, which have an estimated combined population of 7,000 people). Trade and industry will also benefit, due to the increase in the demand for goods and services required by the investments foreseen by the Program. The main indicators of vulnerability reduction will be (1) to maintain the improved water coverage above 95%; (b) maintain the service continuity index above the 95% threshold; weather; and (c) maintain the water potability index above the 95% threshold[21].

[21] These goals correspond to those indicated in the Government Plan of Mr. Danilo Medina (2016 -2020).

Regarding adaptation measures at the community level of protection and improvement of the ecosystem: the impact of forestry interventions will be maximized by promoting the use of existing plant nurseries in each of the sites included. The Program will invest mainly in native plant species for the rehabilitation of degraded lands or those that, being appropriate to land use, have commercial value for the communities and / or mean economic profitability for the producers.

The following table summarizes the anticipated economic, social and environmental benefits of the proposed Program, both for the communities and for the country as a whole.

Table 9: Social, Economic and Environmental Benefits of the Program

Advantages	Program Scenario	Base Line Scenario
Social Benefits		
a. Families	– Improvement of the drinking water supply for approximately 21,300 people (some 4,260 households) in the targeted areas. – Improvement of public health to prevent water-related diseases in approximately 4,260 households, benefiting the majority of children and the elderly in the communities.	– If integrated actions of adaptation to water are not implemented, the population of the Program area will continue to suffer increasing vulnerability and growing insecurity due to the lower availability of potable water.
b. Communities	– Greater and better mutual trust between people and communities under the conditions of climate change. – Reduction of the potential social conflict between local actors who share common resources (such as water and land), especially farmers and farmers, due to the greater availability of water. – Better cohesion between the community and producers through planning and joint work. – Increase solidarity through the creation / improvement of activities focused on women and youth.	– Conflicts of use: human, forest, crops, energy and livestock. – This will damage the social fabric in rural areas and exacerbate existing migration to urban areas, which will result in increased unemployment and poverty in urban areas. Women and young people will be particularly affected. – The conditions and quality of life of vulnerable rural communities would decrease over time, with the loss of

c. Local Governments / National Government	– Reduction of conflict risks between communities within and / or outside the same basin. – Improvement of social cohesion and autonomy of water management committees and for adaptation to climate change. – Greater empowerment of the community through the use of a participatory approach, through the increase of knowledge and capacity to act in the face of climate change, and through the use of community early warning systems. – Reduction of youth migration in search of new media opportunities and quality of life. – Greater mutual trust between the communities and a greater willingness to jointly combat the current and future challenges of climate change. – A systematized knowledge base is configured to allow the best practices to be identified and replicated. – The establishment of specific community committees is supported and approved. – The main government institutions are strategically involved; their role is identified and reinforced.	productivity and the increase of migration to urban areas, resulting in increased pressure on urban economies already constrained.
Beneficios Económicos		
a. Families	– Employment opportunities created through the activities of the program.	– High dependence on low-quality jobs, threatened by the impacts of climate change.
b. Communities	– Increase in revenues by providing "resilient" water supply and sanitation services. – Stabilization of the water supply available in the community, which can take advantage of the surplus of domestic consumption for agricultural production. – Increase in storage capacity and flow of watercourses.	– Community income would continue to decline and be more vulnerable, both due to the dependence on agriculture and livestock, and the increase in spending on drinking water.

c. Local Governments / National Government	– The areas where water and soil conservation are introduced will reduce the risk of flooding; of crop failure; and the loss of soil. – The diffusion of forest management techniques resistant to climatic shocks (ie, drought) will improve the economic benefits of forest producers and property owners and, together with improved extension services, will result in improved management of areas of the Program, with other associated economic and environmental benefits. – Increase in income through local taxes derived from the increase in program activities. Improvement of the GDP after the increase of the rural economy and its welfare. – Improvement of decentralization and distribution of economic wealth.	– Damages to the service and production infrastructure related to events such as storms, excessive soil moisture and floods. – More subsidies and other direct government interventions to supply communities with water and basic sanitation services, if their current systems do not work as expected due to climate change. Less water security and higher costs for medicines and treatment of diseases. – More expenses for the government and families to attend to diseases related to water and sanitation.
Beneficios Ambientales		
a. Families	– More and better conservation of natural resources (water, soil and forest) that provide ecosystem services (ie, water purification, less degraded lands, etc.). – Improvement in water availability. – Reversing the degradation of natural resources (i.e., forest, water, soil, air and biodiversity) will improve the livelihoods of the most vulnerable people. The	– Increasing climate variability, reducing rainfall and increasing the incidence and intensity of droughts will exacerbate existing problems in ecosystems that are already affected by land degradation, soil erosion and reduction of soil moisture. This will reduce the availability of ecosystem services and further complicate the availability of potable water. – There will be a constant and

	introduction of multipurpose varieties, such as fruit trees and fodder, will strengthen the survival mechanisms of the communities. – Greater regularity of water availability, ensuring flows and reducing erosion and sedimentation. – Greater protection against soil degradation and desertification. – Increase in forest cover and stabilization of areas with plantations, reducing the rate of desertification. – A better conservation of the natural resources of the chosen watersheds will result in better adaptation and greater resilience. – A better understanding of the interaction between climate, the environment and human factors that affect the sustainable use of water resources. – The program will result in greater carbon sequestration through the integration of tree planting within water and soil conservation works. Increasing the coverage and density of used varieties will also contribute to carbon sequestration in the areas included. – Environmental degradation will be reduced by reducing the high dependence of vulnerable communities on natural resources for obtaining wood and firewood, through the training and awareness offered by the Program. – Improvement of habitats with the rehabilitation of the riparian zones. – Support to local nurseries, tree planting, forest expansion, and community involvement will improve ecosystem services.	growing emigration in search of food for animals and water, and the associated propagation of forest fires, which will have a negative impact on natural resources and on the normal functioning of ecosystems and communities. – Erosion and sedimentation of water collection and conduction works. – Potential conflicts between different users of water resources, such as between households, herders and farmers.

As indicated above, the Program will provide economic, environmental and social benefits to the communities affected, in particular to the most exposed households, which will receive more and better water supplies. From an economic point of view, the interventions aim to improve and stabilize the income of households through the reduction of costs in the supply of drinking water, and with the reduction of diseases associated with water and by vectors thereof. Additionally, through forestry interventions, the diversification of income flows of producers will be promoted, with secondary economic benefits in the short and medium term (such as strengthening the economy of communities, municipalities and the province). Socially, the main benefits will stop the displacement of people, both reducing the susceptibility to extreme events, avoiding water scarcity, reducing diseases, building capacities and improving their lives.

With respect to environmental aspects, the Program will reduce pressure on forest resources, deforestation and soil erosion through the promotion and implementation of agro-ecological practices and under the supervision of community committees. An additional benefit will be carbon sequestration.

All activities under Component 1 will be developed jointly with communities and their representatives to create a shared understanding on climate adaptation and sustainable water management, including assessing the concerns and needs of the most vulnerable communities. The program will initiate activities using common rural diagnostic and planning techniques in the development of community-based interventions. In addition, several official agencies are identified as institutional executing entities (the Ministry of Environment and Natural Resources and INAPA). To maximize the local function, local NGOs / grassroots community groups will be selected as partners for the execution of local tasks, due to their experience in the communities.

The principles to be considered in all local interventions are, among others, the following:

1. Encouragement of the participants to take responsibility;

2. Respect for the diversity of the local population;

3. Promote full participation from the beginning of the Program, during and post implementation;

4. Reconciliation of different interests, if any; and

5. Involve multidisciplinary approaches and teams (in the Program staff).

Frequently, children, women and the elderly are the most vulnerable groups in the poorest communities. Since women play a key role in the health, education and income of the family, the Program is very interested in incorporating women into most of the activities and structures of community management. However, despite their important role in the home and food security, the participation of women in economic activities may still be limited / repressed due to conflicts with traditional or religious beliefs. The Program is aware of these aspects and will openly promote the empowerment of women in all stages; even:

1. Discuss with community leaders the need to integrate women into projects;

2. Grants for activities and specific work packages for women's associations;

3. Strengthen your role in the face of climate change within key community organizations; and

4. Establish a recognition and / or certificate for outstanding women.

At the national level, the Program will also seek the inclusion of qualified female technical staff in line and staff personnel. As such, the Program makes an important contribution to the empowerment of women in the Dominican Republic, and is not limited to the target region or areas of intervention. The young leaders identified can participate in a similar way and through access to scholarships.

In order to mitigate and / or avoid negative impacts, specific indicators on key economic, social and environmental variables will be integrated into the results framework, thus ensuring compliance with the Environmental and Social Policy of the Adaptation Fund (ESP). These indicators will be monitored and evaluated regularly throughout the Program, and will be documented and communicated to avoid being violated. The field teams will interact regularly with the relevant people and organizations of the intervened areas to achieve more efficiency and resolve any possible conflict.

Cost-Effectiveness of the Actions

As vulnerability to climate change is multifaceted, any additionality to a socioeconomic reference scenario is difficult to prove. In addition, there are limited options for key institutions and communities in the Dominican Republic, in terms of alternative actions to develop climate resilience in the management of their water resources. Therefore, the Program proposes a combination of promoting greater and better water supply within integrated climate risk management, taking into account the development needs of the communities involved. Based on consultations with government professionals and technicians, national communications and the academic literature consulted, an ecosystem-based approach, which uses efficient water management practices, is considered a cost-effective way to reduce vulnerability (compared to construction of heavier and / or more complex physical infrastructures) in the areas targeted.

The *Second National Communication* and the *Study on the Evaluation of Investment Flows and Financial Flows for Adaptation in the Tourism Sector of the Dominican Republic*, have indicated that, based on research and consultation with key actors, cost-effective adaptation The climate change of rural communities should include: (a) the promotion of activities such as forest restoration and conservation; (b) zoning of areas and proper land use; (c) greater use of crops that are more resilient to the climate (with a focus on endemic and / or traditional varieties, or alternatives of greater economic value); (d) sustainable actions with friendly approaches to the environment; and (e) sustainable land management

and efficient use of water (Ministry of Environment and Natural Resources, 2009, United Nations Development Program, 2011). The program has been designed on the basis of these elements, being careful that the design and implementation correspond to national priorities and strategies.

Strengthening the resilience of rural communities in San Cristóbal to the impacts of climate change has been identified as a priority for urgent and immediate adaptation, with the greatest immediate benefit of achieving SDG 6 (guaranteeing water availability and its sustainable management and sanitation for all), and SDG 15 (protect, restore and promote the sustainable use of terrestrial ecosystems, manage forests sustainably, combat desertification, stop and reverse land degradation and curb the loss of biological diversity). In the absence of the program, the target communities can achieve a certain degree of adaptation, but not at the level proposed in the Post-2015 agenda. The proposed interventions financed by the Program focus on developing adaptive capacity and strengthening the resilience of available water resources and through community management, using "soft" adaptation measures and locally appropriate practices, which are more cost-effective than measures "hard" engineering (assuming that soft measures can adequately withstand the impacts of future climate change even under the worst scenarios).

The main principle of the Program (existing condition that must be changed through the implementation of this) is to develop experiences and practical capacities of adaptation to climate change to ensure that the water resources of the province of San Cristóbal, especially in their rural communities, and their dependent economic activities may be more resistant to the increase in the frequency and intensity of droughts and other climatic risks planned for the next 25-50 years.

In the opinion of the community and institutional actors consulted during the elaboration of this proposal, the Program is considered as a key catalytic initiative to channel the course of climate finance. All national and subnational vulnerability analyzes conducted by various sources, including official reports and independent investigations, broadly agree that vulnerability, especially to the effects of drought, has geographic patterns and socio-economic associations, with San Cristóbal being one of the places in which the ones that this reality is more evident. The decrease in annual rainfall and increasingly irregular rainfall patterns, due to climate change, are negatively affecting water bodies throughout the province, compromising the availability of resources for the population, agriculture / livestock, electricity generation, and recreation.

Addressing the specific vulnerability to the effects of climate change, both in the supply of drinking water and access to water resources, and bring ad hoc responses to specific problems of each site, will have a dramatic impact on the quality of life of rural communities intervened in the context of the Program. As the occurrence of droughts, floods and forest fires have devastating effects on the strategies and survival actions of the poorest people, and given the impacts of climate change it is expected that the frequency and intensity of these events will increase, the 30 rural communities Interventions constitute only a small sample of the scenario that must be changed throughout the country, for which the proposed Program may be the best model.

In line with the above, the budget to be funded by the AF for the proposed program will support:

1. The acquisition of the best technical experience available to help implement, with the participation of the main actors of water resources management in the country, adaptation measures and support for the development of the capacities that will guide the future management of water resources and climate adaptation at the community level in the Dominican Republic. In this context, with the participation of government personnel in the Program, it will be an "in kind" contribution.

2. The design and construction of infrastructure (catchment works, well fields, regulation and storage tanks, treatment facilities, etc.) to improve the supply and access to water in the context of climate change for the 30 Objective communities (more than 21,300 people), and the appropriate transfer of skills and knowledge to their respective beneficiaries.

3. The development of the enabling environment to address the climatic risks of water resources and the dependent community and domestic activities, through: (a) the integration of climate changes in existing water resources management plans and the development of new climate resilient water resource management plans; (b) the establishment of a Provincial Committee to Monitor Adaptation to Climate Change; and (c) community water management and supply plans developed to include risks related to climate change.

4. The dissemination and management of lessons learned will help society (especially people living in vulnerable conditions) to have a better understanding of the problems of climate change and guidance on which practical solutions will be adapted according to the specific areas.

The three-pillar approach of the Program (implementation of measures to improve water supply, development of enabling environment, and improvement of watershed management through re-afforestation) is essential for full replication in the future of adaptation measures in any other vulnerable place in the Dominican Republic. Failure to address any of these pillars would reduce the effectiveness of the entire program. **With 97.8% of technical solutions and 2.2% for enabling environment, it is understood that the program is the most effective and balanced way to realign and initiate the process of adaptation to climate change at the level of rural communities of any province of the Dominican Republic. The success factor of the initiative is to prioritize real interventions, which reduce the vulnerability of the communities "in the field", and which creates conditions to replicate it in other localities of the country.**

For the management of climate resilient water resources: with an investment of US$8,200,000, the Program will implement 7 potable water supply and basic sanitation systems (including final design, construction of intake works, water collection systems, water storage tanks, storage, pipes and connections, pumping systems, treatment systems,

etc.). These projects will benefit at least 21,300 people (50% of whom are estimated to be women) from 30 rural communities. Under the same component, measures for water conservation under climate impacts (ie river basins / riverbanks, reforestation plans, etc.) will be implemented for some 2,722 hectares.

The investments proposed by the Program will allow the 21,300 beneficiaries to meet their domestic water needs (estimated by WHO as 50 to 100 liters / day / person) and provide household sanitation systems to some 2,385 households. This implies an average cost of potable water and sanitation supply of $ 301 / person. This analysis reveals that these investments are more profitable than the alternatives considered to satisfy the same demand for a period of 20 years[22]. At these values, public health costs must be subtracted from attending to diseases related to water and sanitation (reported by the Ministry of Public Health as $ 292 / person in 2017) and the current costs of purchasing bottled water for consumption (estimated at $ 49 / person).

Similarly, with an average cost of $ 613 / ha, the Program will ensure access to water resources required by community projects and the resilience of these in the medium and long term, through the re-afforestation of some 1,607 hectares and with the conservation of about 1,115 hectares. At these costs, the additional income of the farmers can be subtracted from the implementation of agro-forestry practices and the adoption of varieties with greater commercial value, the effect of this on the increase in food production, the improvement in the efficiency in the use of resources, and income for other services. Reasonable alternatives are the transfer of the same volume of water from other areas (i.e., Valdesia Dam) through medium-scale conduction systems. These systems have a cost range of between $ 9,200 and $ 17,620 / ha. Even if we then include the costs of the facilities, firefighter systems and other elements, it is clear that the results of the proposed options are more profitable.

The cost-effectiveness analysis of the options adopted will be improved as more data becomes available during the implementation of the Program, and before any of the projects are constructed.[23] The water supply and sanitation options are designed to operate 20 to 50 years or more. Therefore, the lowest cost per m3 of water is not always the most cost-effective, especially if the quality of the construction is compromised to save money. Cheap drilling or poor construction quality can lead to premature well failure or contamination of supply sources. The water infrastructures built and subsequently abandoned by the users after a few years of operation are clearly not profitable. The cost-effectiveness relationship takes into account the distance between the home and the source, the protection of the source against pollution, the pollution itself, and the cost of maintaining the infrastructure. All these costs have been included after the evaluation of the options and the environment in which they will be built and operated. However, the

[22] The alternatives considered are those included in the latest version of Source Book of Alternative Technologies for Freshwater Augmentation in Latin America and the Caribbean. A compilation of experiences and good practices in the use of several water delivery, harvesting, quality, treatment and conservation technologies (OAS-UNPEP, 2016).

[23] Profitable technologies to improve access and water management, in the context of climate change, mean an optimal value of the money invested in the long term. Therefore, this aspect will be monitored in all interventions.

effectiveness of the costs of the options will be guaranteed during the implementation of the Program, ensuring that the construction of the freshwater augmentation infrastructure takes into account the expectations and profitability principles to allow an economical and sustainable access to drinking water[24].

For the development of the enabling environment (establishment of the Provincial Committee for Adaptation to Climate Change and for the dissemination and management of information), there are no reasonable alternatives to the approaches suggested by the Program under that component, since it is designed to address all existing governmental instruments that can contribute to the integration of the stakeholders involved in the management of water resources in the province of San Cristóbal. These measures will reduce the physical exposure of watersheds to climatic risks, and will help avoid the additional costs derived from an adaptive misuse of the land and the planning of the development, use of practices such as destroying the vegetation of the basins, the unsustainable use of water for agriculture and livestock, which currently characterizes the watersheds of the areas under intervention. This is critical to safeguard the sustainability of the community's water resources and (in general) the economic development activities of the Province in the face of climate change. Investing 2.2% of Program resources (ie $ 44,000 + $ 32,000 + $ 102,000 = $ 178,000) is a profitable investment considering the economic role of this region. In fact, San Cristóbal is among the most productive provinces in the country (for example, only industrial activity in Bajos de Haina, one of the most industrialized municipalities of the province, contributed 32% of GDP in 2014).

The cost-effectiveness of the Program will be reflected in the field and at the operational level, through the following approaches:

- Throughout the program, resources will be aligned with the financing and delivery of program products that have competitive procurement components, to guarantee the best value for money. In this sense, the Program will apply the best practices identified by other climate change adaptation projects under way in the country and the region.

- The Program will use existing governmental structures and processes for its implementation. By taking advantage of existing institutional and governmental structures, in-kind support and contributions from agencies at the national, provincial and local levels (office space, staff time, vehicles, communications, etc.) will also be used.

- Through the networks of existing stakeholders, the results framework of the Program will use studies, analysis and references from line agencies, and thus take advantage of proven delivery mechanisms, such as the UNDP Small Grants Program. This will further expand the scope and replicability of the results.

[24] For example, Presidential Decree 42-05 includes some guidelines and codes of practice, which provide a basis for the realization of economic and sustainable access to fresh water, and which integrates all of these criteria detailed above. In addition, the implementation of the Program will also benefit from any study and / or evaluation available related to technologies and techniques that improve water sources and their subsequent use.

– Most of the program's funds will be allocated to activities at the community and field level, therefore, this increases opportunities for the local acquisition of goods and services.

Table 10: Cost-Effectiveness of the Proposed Measures

Objective	Budget (Millions en USD)	Beneficiaries	Cost / Benefit	Alternatives
Supply of drinking water and sanitation	8.2	21,300 people (of whom 50% are estimated to be women)	This investment will allow beneficiaries to meet their domestic needs for drinking water (50-100 l / day / person) and dispose of wastewater properly. The average cost of these systems is $ 301 / person, minus the avoided health costs per year ($ 292 / person) and the annual cost of purchasing bottled water ($ 49 / person)	The most reasonable alternative to the proposed approach is to do nothing and / or continue with the status quo. In this case, the 21,300 beneficiaries and their communities will see their quality of life deteriorate, being more vulnerable, and needing more assistance from the government and subsidized.
Re-afforestation and conservation		Producers and landowners (2,722 ha)	With an average cost of $ 613 / ha, access to water resources required by community projects and climatic resilience are assured in the medium and long term. This includes re-afforestation activities on 1,607 ha and conservation practices on 1,115 ha. To these costs, the additional income of the producers can be subtracted due to the implementation of agro-forestry practices and the adoption of varieties of greater commercial value.	Reasonable alternatives are the transfer of water from other areas (i.e., Valdesia Dam) through medium-scale impulse lines. The costs of these systems range from $ 9,200 to $ 17,620 / ha. It is clear that the proposed options are more profitable.

The proposed interventions are profitable, since large investments in infrastructure are not considered: the selected adaptation measures contained in the Program consist mainly of a series of activities aimed at restoring natural and social capital and achieving resilience in water systems as a means to reduce the vulnerability of rural communities and small towns. In addition, restoring the natural capital of any ecosystem has multiple benefits for rural communities, and it is anticipated that the benefits will greatly outweigh the costs, in addition to the expected synergies.

It should be noted that the Program follows the list of priorities of the NAPA of the country, which already considers the cost-effectiveness as a key concern for the prioritization of the measures. The measures are also linked to the concepts of the UNFCCC and the World Bank, such as the strategies of "non-repentance" and "low-repentance" in terms of adaptation. The specific interventions of the Program have followed a classification of costs and benefits, including the necessary inputs (ie, labor, materials, finances, equipment, time, etc.) and the spillover impacts (ie, higher income, savings, greater security of community infrastructure, better climate protection, etc.).

The underlying needs, the real demand of each activity, the level of familiarity with, and the acceptability of the activities (including addressing the different responses by gender) and the eventual environmental benefits have also been considered. However, in the early stages of the proposed program design, the alternatives discussed with the government authorities were: (1) to establish a small facility of small subsidies for specific adaptation measures; and (2) a support project based on ecosystem services that included, among others, the promotion of seeds that are more resistant to climatic variability and climate change, and water conservation in microbasins. While these initiatives are relevant, in terms of their expected activities and outcomes, discussions with key institutions led to the conclusion that such initiatives could be better developed in separate technical / financial assistance projects for which funds will be sought later.

Alignment with National Priorities

Law 5852 (approved in 1962 and amended by Laws 281, 238 and 431) establishes the main aspects of the legal framework for the management of water resources, which include: (a) water as a public good (which means that the ownership of the water belongs to the owners of the land or is public); (b) water use concession system; (c) prioritization of municipal use; (d) prohibition of water pollution; and (e) the participation of users in the management of water resources. The Water Law links water rights with land ownership or with public service providers and establishes a limited right over private property of water, only for water that originates in the owner's land, such as springs and rain water[25]. In addition, Law 6-65 created the National Institute of Water Resources (INDRHI) assigning functions at three levels: (1) policy development and planning at the normative level; (2) administration of water rights, application of regulations and hydrological services at the organizational level; and (3) water use for irrigation systems at the operational level. Since the INDRHI is a dependency of the Ministry of Environment and Natural Resources, the activities related to the Program are in accordance with the current and / or applicable policies.

[25] Since 2000, the Dominican Congress has discussed a bill that aims to regulate the use of water resources. This legislation is not expected to be approved in the short / medium term. However, the Program will monitor it and its impacts, if implemented. A positive coordination and communication with the Ministry of Environment and Natural Resources - which coordinates the environmental policy and between the different levels of government - can facilitate the inclusion of the possible results and results of the Program in the law when it is finally approved. This approach could be equally useful for regulations implementing such law, or other related legislation.

The proposed Program is aligned with the *National Development Strategy*, which establishes that the country "manages with equity and effectiveness the risks and protection of the environment and natural resources and promotes an adequate adaptation to climate change" as one of its four pillars. Among the 29 actions mentioned in this strategic area, freshwater receives particular attention (Dominican Republic, 2012). Likewise, the proposed Program is consistent, both with the National Environmental Policy and with the National Policy on Climate Change. All these policies point to the implementation of several strategies such as the restoration of protective ecosystems, the custody and management of water resources and the achievement of universal access to water (Dominican Republic, 2010).

In addition, the following policies were considered for the design of the program:

- Law 64-00 - General Law on Environment and Natural Resources;

- Law 202-04 - Sectoral Law on Protected Areas (important criteria for selecting areas);

- National Sanitation Strategy of the Dominican Republic.

The National Sanitation Strategy includes five main pillars: (1) Coverage and Quality Services; (2) Management, Financing and Planning; (3) Legal and Institutional Framework; (4) Environmental Sustainability; and (5) Participation, Consciousness and Citizen Practices. Although this instrument also includes important cross-cutting issues (gender and climate), no evidence of the use and / or benefits achieved through the implementation of this strategy was found in the drafting process of this proposal.

With respect to climate policy, the Program responds specifically to several priority sectors, namely: rural development and water resources (Dominican Republic, 2015) and includes the main recommendations of the National Adaptation Action Plan:

- The vulnerability of poor communities and vulnerable groups will be a priority for the country, due to the threats of climate change on human settlements and infrastructure.

- Expected increases in temperature and the reduction of rainy seasons are affecting water for human consumption, the flows of water bodies are being reduced throughout the country;

- Institutional and community capacities will be strengthened to provide adequate responses to the problems of climate change and to increase resilience.

- It is essential to promote partnerships that include the private sector and civil society to address climate change in areas with limited or low incomes; and

- Addressing climate change and its impacts needs to mobilize additional financial resources and capital to manage risks and promote technologies and innovation.

The *Third National Communication* defines priority adaptation measures and policies as those that support vulnerable communities and prioritize water resources and rural development. As the Program includes activities in all these sectors, it contributes to the country's water security. With prospects of addressing the threats of deforestation and access to water, the Program will contribute to placing the Dominican Republic on a firmer path towards water security with better water use and better public health in vulnerable communities that make them more resilient

Compliance with National Standards

One of the key aspects of the Program is the development of community management approaches and management technologies on the demand side, which do not have significant environmental impacts normally associated with the development of large infrastructures. It is expected that infrastructure investment will be made as part of government and community programs to improve water supply and storage capacity. Large-scale water extraction activities are not expected, beyond the provision of sustainable irrigation points for livestock and some water collection, insofar as these are applicable and viable. Although the activities of the Program do not require licenses from the Ministry of Environment and Natural Resources, a comprehensive Environmental Impact Assessment was carried out during the entire proposal in order to anticipate and avoid potential risks.

Table 11: National Standards Applicable to the Program

Standard	Applicability	Comment
Law 64-00: General Law on the environment and natural resources	- Environment and social norms - Issues environmental authorizations - Planning and monitoring of water resources, forests and biodiversity	Main public policy of sustainability, protection of the environment and social participation.
Law 176-97 on the National District and municipalities	- Issue municipal authorizations - Manage the participatory budget	Main policy for local governments as the first level of land use planning.
Environmental standards and complementary regulation	- Environmental standards on water quality and discharges [NA-AG-001-03] - Standard for the environmental management of non-hazardous solid waste [NA-RS-001-03] - Environmental standard on the quality of groundwater and discharges to the subsoil	Included in the Evaluation of the Environmental Impact Study of the Program. It includes a comprehensive environmental management system based on relevant standards and best practices.

	- Environmental standard for the forestry industry that processes woods - Forest technical standards - Environmental standard on air quality and emission control [SGAN03]	
Other guidelines	- Social impact assessment procedure - Environmental impact assessment procedure	
Presidential Decree 42-05	- Include guidelines and codes of practice, which provide a basis for economic and sustainable access to drinking water.	It includes technical standards to design, operate and build infrastructure for potable water and sanitation.

The consultations with experts and representatives of the community did not raise any concerns regarding possible environmental and social impacts of the Program that require changes in the design of the project. However, although it is not required (nor is it necessary), it carried out a formal Environmental Impact Assessment for the proposed interventions, and the Environmental Impact Study includes specific devices for each type of intervention[26]. The identified impacts will be managed through the Environmental and Social Management Plan, which includes the necessary mitigation measures in consultation with the communities and in accordance with the provisions of the Ministry of Environment and Natural Resources. The implementation will be monitored in a participatory manner as part of the Program's M&E.

The sites where the intake works, well fields, and pumping stations will be located, were defined following the specified technical standards and, prior to construction, a hydrological review will be carried out jointly with INAPA and INDRHI to confirm that the places chosen are the most appropriate. From the perspective of water quality, the interventions of the Program comply with the national water quality standards described in the section that regulates the extraction and use of water. Likewise, the minimum water quality standards for direct consumption have been established, which have been provided by INAPA, and which have been compared with the FAO and WHO forecasts (which establish pollution prevention measures to be observed from the design of water supply works). In addition, the Program fully complies with the policies that regulate the general management of water, specifically the rules for building and operating works by the community.

[26] Alternatively, environmental and social assessment tools specific to the project can be developed, based on the *UNDP Project-wide Environmental and Social Assessment Procedure*, which is now part of the UNDP Program Policy and Operations Procedure, to implement a redundant system to detect potential impacts and mechanisms to address them. More information at: http://www.undp.org/content/undp/en/home/librarypage/operations1/undp-social-and-environmental-screening-procedure.html.

As it was verified during the elaboration of the complete proposal, the evaluation of the Program included quality programming standards based on the applicable norms and standards applicable to different sectors. The necessary safeguards were followed and incorporated into the design of the Program. In addition, the proposed interventions will comply with all current national technical standards, particularly those related to water and sanitation services, civil and mechanical infrastructure, construction and operation, environmental and social standards, public health and occupational safety[27]. The program identified gaps / overlaps in technologies and techniques appropriate to the sector (ie, potable water, sanitation, re-afforestation, etc.), that are aligned with adaptation needs or that can be synergistic (where this is possible) and feasible), and identified possible solutions or opportunities (where possible), including sources of technical assistance, transfer modalities, and other potential supports.

As the Program's interventions will be coordinated with key institutions (such as the Ministry of Environment and Natural Resources, INDRHI, INAPA, universities and local NGOs) it will be easy to monitor the alignment of the Program with technical standards in water management, water supply and sanitation services, community associativity and respect for people's labor rights. The entry into force of unforeseen standards (to date) will be part of the quality management of the program.

With the participation of the key institutions, the Program could establish cooperation agreements with other relevant institutional partners in the areas of water resource management, small infrastructure, environment, and livestock and agriculture, which can support this process. Such associations could include protocols that create synergies with the activities of the Program, such as:

1. The National Institute of Drinking Water and Sewerage (INAPA), which can provide training in operation and management of water infrastructure, and technical advice.

2. The National Institute of Water Resources (INDHRI), including the activities of planning and management of water resources, as well as the supervision of the management of the basins by the communities;

3. The National Office of Meteorology (ONAMET) that could train the local population on the conformation of the climate and the qualification and the equipment of the meteorological stations;

4. The Ministry of Agriculture, in particular for training activities and dissemination of improved agricultural techniques, and studies of shallow water irrigation systems;

[27] *Report 2: Definition of Adaptation Interventions*, prepared by the Brightline Institute, includes a compilation of the technical standards applicable to water management, construction and operation of infrastructures, re-afforestation schemes, and other aspects such as security and protection, environmental quality and social development [Appendix B].

5. The Ministry of Public Health, in particular for training activities and dissemination of community health techniques, as well as the prevention of diseases related to hygiene;

6. The state owned Agricultural Bank (Banco Agícola), ADEMI and ADOPEM can provide financial solutions for producers and women, and training in finance and microcredit; and

7. The Dominican Institute for Agricultural and Forestry Research (IDIAF), to improve seed development activities and the supply of improved seeds.

For the engineering (ie, planning, design, financing and construction) of the facilities, specific INAPA criteria have been used for the construction of rural aqueducts throughout the country, and have been correlated with some existing benchmarks for sizing (ie, fields of wells, intake works, storage tanks, treatment plants, etc.). In relation to the quality of the infrastructure, the existing construction standards provided by the Ministry of Public Works and Communications (MOPC) have been followed. This approach has been complemented with feasibility studies (social, economic, demand, safety, quality, capacity, etc.) of the program. Once the resources and assistance provided by the AF have been received, other aspects will be followed, such as drawing up plans, administrative authorization processes, formalizing the management committees, informing the public, education, and periodic monitoring, including interested parties. Specifically, the intake works will be built close to the communities, but in a way that avoids contamination.

In addition, it has been established that the community retains ownership of the land around water points (such as intake works, reservoir and regulation tanks, and treatment plants), and that any activity or construction-within a specific radius around the facilities that could threaten the quality of the water (latrines, watering places, laundry, mechanic, etc.) is prohibited.

In December 2016, INAPA issued a letter of approval to the Program, stating that, as the national authority on drinking water and sewerage in the Dominican Republic, INAPA confirms that the proposed Program is in accordance with local regulations for water supply and sanitation and applicable regulations and that the program will be fully supported (a copy is attached). This support has been evidenced with the participation of INAPA in the definition of the target communities, their presence in the field visits, in the design of the infrastructure works, in the definition of the applicable technical standards, and in the monitoring of the progress and the quality of this Proposal.

As part of the *Environmental Impact Study*[28], the legal and regulatory compliance of the Program was addressed in detail, which allowed identifying and analyzing possible management options in case of conflicts. This analysis showed that the Program complies with all national environmental and social regulations and with the Environmental and

[28] The Environmental Impact Study (which covers the environmental and socioeconomic impacts and the measures to avoid them) is included in Report 3: Environmental Impact Study, prepared by the Brightline Institute. [Appendix C]

Social Safeguards of international entities such as FAO, GEF, PAHO / WHO or FA. In addition, the Program complies with the norms established by the Ministry of Environment and Natural Resources in relation to the fight against drought and desertification. Some activities, such as the rehabilitation of ecosystems and the establishment of forest parcels, directly address land degradation, the fight against desertification and the protection of biodiversity.

Regarding this last point, the inclusion of the Mystery of Environment and Natural Resources as executing entity within the Program has turned out to be a measure of efficiency and cost-effectiveness. Technicians from Ministry areas (ie, Forest Resources, Hydrology, Soils and Water, Planning, Climate Change and Social Participation) have actively participated in the preparation of this proposal, and especially in the technical design of the projects afforestation and water conservation.

The program has included the experiences and recommendations of independent local research centers (such as INTEC, UAFAM, Loyola Institute, IDIAF, etc.) and other government agencies. Particular attention has also been paid to the internationally established forecasts and criteria by the United Nations, when considering specific measures such as the choice of water supply and conservation measures. Therefore, an emphasis has been placed on local and traditional species that are capable of adapting and have good commercial value, in order to promote a better climate adaptation.

Therefore, the criteria to be used in the selection of land for community forests or for infrastructure works, have considered the system of land tenure in each of the communities targeted by the Program. That is, if it is a fiscal land, family land or individual land. Before separating the land for project interventions (for example, storage tank, treatment plant), the Program also considered the following factors:

- Clarification of the type of property / management;
- Cost-benefit analysis and
- Appropriate agreements between the Program and the land managers / owners.

Non-Duplicity with Other Programs / Resources

The proposed Program is the first integrated approach to expand sustainable water management and increase the resilience of water resources of rural communities in San Cristóbal province, while contributing to their institutional and community capacity. The components of the Program correspond to the products of the "Environmental Protection Program of USAID / TNC (No. 517-A-00-09-00106-00)", which produced the study Critical Points for Vulnerability to Variability and Change Climate Change in the Dominican Republic and its Adaptation to Same, but will go further in terms of interventions, integration of the new approach to climate change adaptation for water management, water supply and sanitation services, the scope of monitoring and evaluation (M&E), and the dissemination of knowledge as proposed by Berigüete et al. (2015) and Berigüete & Terrero (2016).

The USAID / TNC 517-A-00-09-00106-00 project ended in April 2014, so it can be excluded from the list of interventions / funding sources that can be duplicated. Other existing initiatives in the Dominican Republic, which integrate adaptation to climate change and resilience, in their general framework, and implemented by government entities and local NGOs, do not cover the selected province. Among these interventions, the most recent climate change adaptation projects are:

- "CCRD Project for Climate Resilient Infrastructure Services (CRIS)". A USAID multinational project focused on increasing the resilience of the National District's infrastructure services (for example, transportation, water, sanitation, waste, energy, communications and housing) to climate change. This project ended in 2014.

- CCCCC / EU "Assessment of Vulnerability and Capacity (VCA) in the face of climate change in agriculture in the province of San Juan and Subzone of Hondo Valle in Elías Piña, Dominican Republic". This project ended in 2015.

- The ongoing projects of USAID / DR "Program of Planning for Adaptation to Climate Change (CLIMA-Plan)"; "Implementation of climate change adaptation measures (CLIMA-Adapt)"; and the "Program for Enhanced Climate Information (CLIMA-Info)"; which focus on the provinces of Santiago, Samaná, San Pedro and the National District.

Additionally, the Program incorporates some lessons learned from the aforementioned projects and also from other initiatives.

Table 12: Lessons Learned from other Adaptation Projects

Project	Applicability
Critical Points for the Vulnerability to Variability and Climate Change in the Dominican Republic and its Adaptation to the Same	– Understanding vulnerability, sensitivity and exposure to climate change in water, agriculture and other sectors, can help design better projects and activities of adaptation to climate. Includes discussing the causes of vulnerability
Sanitation Project Of 5 Pilot Municipalities	– Design and construction of sanitary sewer networks, based on the specific needs of the beneficiaries. – Include integral development approaches and gender equity in water works, and improve the conditions of hygiene and public health of the beneficiary communities. – Monitor the jobs created during the execution of the works, and the effect of this on the local economy.
CCRD Project on Climate Resilient Infrastructure Services (CRIS)	– Anticipate institutional challenges to maintain the cities' internal capacity for climate resilience and take advantage of opportunities to introduce climate considerations into the decision-making planning process. In the Program, this applies to the community context. – Involve and retain the appropriate municipal staff and take

	advantage of the value of the working groups. Involve the private sector with a different strategy, including consider preparing short and long-term options in an adaptation portfolio.
Program National Sanitation Strategy Of The Dominican Republic [Program DOM-014-B]	– Carry out diagnoses of the management status of excreta, wastewater, waste and hygiene practices of the communities. – Agree, among the main actors (at the community level), the objectives to be reached in the horizon of the Program. – Define the general guidelines of the adopted strategies, and prepare a general plan to prioritize investments.
ECOMICRO - Green Funding for Adaptation to Climate Change (IADB DR-M1048)	– Includes design of green financial products that include loans and technical assistance to facilitate the implementation of climate change adaptation measures for small farmers in the southern region of the Republic Dominican.
Vulnerability and Capacity Assessment (VCA) against climate change in agriculture in the province of San Juan and Subzone of Hondo Valle in Elías Piña, Dominican Republic	– Gain credibility: Use the best data and information available, of the highest quality; Apply and recognized methods and procedures of analysis; Clearly communicate data gaps, method limitations and uncertainties in results; Discuss non-weather related factors that may cause confusion. – Gain legitimacy: Involve key stakeholders in the design of the Program and Projects; Ensure that stakeholders represent the full range of appropriate technical sectors and levels of society; Maintain open dialogue and participation, providing voice to many actors throughout the process (especially the most vulnerable).
Program of Planning for Adaptation to Climate Change (CLIMA-Plan); Implementation of climate change adaptation measures (CLIMA-Adapt); and the Improved Climate Information Program (CLIMA-Info)	– The documents of these projects have been used only as a reference. However, the design of the projects suggests the participation of the direct / affected beneficiaries as a reasonable approach to address vulnerability to climate change and achieve other collateral benefits (such as political participation, institutional capacity, and more information). – The link between community structures that work with risk management and those that are interested in or committed to increasing the adaptive capacity of communities in the face of climate change has been strengthened.
Preparation of projects to reduce emissions from deforestation and degradation (REDD +)	– Promote the use of sustainable forest resources throughout the national territory and reduce emissions from deforestation, to the benefit of poor rural communities and biodiversity.
Santiago Human and Resilient [within the 100 Resilient Cities International Initiative - 100RC]	– Establish strategies to facilitate the implementation of integral solutions to face the challenges generated by globalization, urbanization and climate change, and their socio-economic and environmental impacts.

Other revised interventions focus on human settlements, watersheds and tourism. No other interventions were found in the province under the Program (San Cristóbal), which was verified with officials of the Ministry of the Environment and with the Development Council of San Cristóbal.

Knowledge Management and Learning

An Information and Knowledge Management (I&KM) system is an integral component of project management, particularly within the context of climate change, where the context is constantly evolving and there may be necessary exchanges between different objectives. The Program has been conceived as a demonstration mechanism to improve the capacity to implement measures aimed at strengthening adaptation to climate change at the community level. In this sense, the dissemination of lessons learned will be a key activity. The Monitoring and Evaluation (M&E) Plan will pay special attention to capture the lessons learned to raise the results of the project to other areas and vulnerable communities in the country. Component 2 of the Program ("Capacity Building and Capacity Development in Key Institutions and Communities to Manage Risks Related to Long-term Climate Change") focuses particularly on the dissemination and exchange of information[29]. As detailed in this document, different knowledge materials (manuals, website, calendars, presentations, etc.) will be produced for specific target groups (politicians, field workers, communities, academia, media, etc.), integrating practical lessons on "how to achieve more sustainable and more resilient water management" in rural communities. Greater reach will also be achieved at higher levels, participating in the ministerial dialogues and COPs of the UNFCCC.

Figure 12: Examples of Materials to be Produced by the Program

[29] The objective of this approach is to create opportunities to generate knowledge that can be widely disseminated, and to develop the capacities of a wide range of stakeholders and other stakeholders, beyond the project. In addition to the guidelines provided by the AF, the guidelines proposed by CARE have been considered, which are recognized for their efficiency in the context of communities. These tools are available at: http://www.careclimatechange.org/tk/cba/en/step_by_step_guidance/information_knowledge_management/IKM_system.html.

The program will develop a series of tools and instruments to be applied in the selected sites, and will serve as a basis to help address climate change in target communities by increasing resilience through better management of water resources. Component 1 will create technical instruments to support a wide range of concrete adaptation activities for sustainable water management and potable water and sanitation services, based on the identification of best practices, appropriate technologies and lessons learned, and that will be incorporated in the manuals and guides of good practices. The participatory development of these tools and instruments, as well as the development of the activities, will ensure the support of the stakeholders, therefore, they will contribute to make future replication efforts successful, especially in areas with similar communities.

At the field level, the Program will benefit from the experiences and knowledge of community members, municipalities, government agencies, entrepreneurs, local leaders, NGOs, universities, consultants and other institutions. The program will facilitate the development of community adaptation activities through participatory workshops at the local level to ensure a high level of community participation, promoting the empowerment and ownership of the program and, therefore, strengthening its long-term sustainability. Participatory workshops will serve to identify local conditions (strengths-weaknesses-opportunities-threats), understand the needs of the community, especially with respect to vulnerability and adaptation, and identify and prioritize adaptation activities in the field.

To date, several development programs and projects have been identified that can incorporate the experiences and lessons learned in their work activities. Component 2 will facilitate replication through training, awareness and activities in the field. As this component includes establishing and maintaining a website; a newsletter; training and outreach programs targeted at key stakeholders (empowered women and young leaders) that may include field exchange visits, information materials, training workshops and events; as well as the dissemination of the results and impacts of the Program and the lessons learned, and to promote the exchange of experiences. International agencies can share the lessons learned by the Program through their national, global, or regional initiatives. Local universities can do something similar.

All knowledge products of the Program will be socialized with the relevant public. To ensure that this will work beyond the duration of the project, all products will be transferred to key institutions (not only as training or training, but also to introduce climate change adaptation into the decision-making process), which could become the main impact of the Program, especially if this can establish regular processes for institutions and communities. For example, in the preparation of each written guide two consultation steps will be included, the first to capture the existing knowledge of interest to be disseminated (particularly among the most experienced people in the community); and the second, to verify the adequacy of the guide's design, through the use of a preliminary version to be tested with the members of the community. The final version of the teaching materials will also be transferred to the local authorities during the monitoring and replication agreements, after carrying out consultative and validation processes.

The evaluation and monitoring activities of the Program incorporate criteria and indicators to evaluate the knowledge management activities, and include precise elements for the identification, description, documentation and reporting of the lessons learned. At the end of the Program, a final report will be made on the lessons learned (in digital format) that will be presented to the authorities and institutions related to the project. This report will have a printed version, for its dissemination to the participating communities and other identified communities that may be interested in the experience and that share the conditions of vulnerability before the projects. This will be shared with NGOs.

Consultations with the Stakeholders

Focus of the Consultations

The proposed Program reflects the main pillars and cross-cutting approaches of the National Development Strategy, the National Climate Change Policy and other relevant instruments. Executives of IDDI, officials of the Ministry of Environment and Natural Resources, professionals and technicians of INAPA, as well as consultants, advisors and academics, participated in the preliminary consultative process. As a result of several meetings, the possible areas of intervention of the Program and the multi-interdisciplinary approach to the consultative process to be followed were established to ensure that the goals of the Program cover the key sectors, the stakeholders, and the final beneficiaries of the interventions.

Screening of Stakeholders

The Ministry of Environment and Natural Resources (the key government counterpart of the process), through its Department of Climate Change, suggested key government institutions related to the objectives and general activities of the Program. To this end, he instructed IDDI to communicate with these institutions, seek their support and evaluate the possibility that they could provide it, and coordinate additional consultations with all the main stakeholders (during the conceptualization and design phase of the Program). This process resulted in a series of meetings with government executives to ensure the participation of their respective institutions, and confirm their availability.

The main topics discussed during these meetings (from May to December 2016) addressed the climate scenarios elaborated in the context of the Third National Communication, the relevant contents of the Critical Points Report, the areas of the country most severely affected by climate change, as well as the as the criteria to select the areas to intervene. The five criteria considered were:

- Climatic vulnerability (exposure and sensitivity to climate change);
- Social vulnerability and poverty of the family nuclei (low adaptation capacity);
- Availability of relevant information (water service, conflicts of use, etc.);

– Existence of ongoing programs and projects (to avoid duplicity and overlaps); and

– Diversity of production systems and target groups (housewives, women, etc.).

The province of San Cristóbal presents many areas that meet the criteria mentioned above. Within these areas, the communities identified as beneficiaries of the program's interventions were consulted directly and on a basis vis-a-vis. This strategy has been particularly successful, especially because it allowed the identification of specific sites for the implementation of Program activities and individual projects (i.e., rural aqueducts, forestry plans, etc.).

Other relevant institutions consulted on the possible outcomes of the Program and the relevant actors were: Ministry of Agriculture, Dominican Agrarian Institute (IAD), Dominican Institute of Hydraulic Resources (INDRHI), Dominican Agribusiness Board (JAD), Pro-Nature Fund (PRONATURA), Technological Institute of Santo Domingo (INTEC), Center for Sustainable Agriculture with Appropriate Technologies (CASTA), Foundation for the Development and Welfare of Women and Children of San Cristóbal (FUNDEBMUNI) and Foundation for Water and Sanitation of Haina. In the opinion of the consulted officials, it is necessary to make specific consultations with the rural communities, their organizations and their leaders and representatives, to point out the commitment of the interested parties in the complete proposal stage and to define the specific sites of the Program in the design phase this. As a result, a first map of actors was drawn up, which was the basis for designing the consultations, in accordance with local regulations[30].

Participation Plan

After all the actors consulted during the development of the concept note were informed about the endorsement of the AF to the conceptual note of the Program, and there was consensus regarding the main components and the logical framework of the program (results, products, activities, indicators, etc.), a technical meeting was held at the Ministry of Environment and Natural Resources in April 2017. The following actors participated in these meetings:

– Ministry of Environment and Natural Resources,

– National Institute of Potable Water and Sewerage (INAPA), and

– Dominican Institute for Integral Development (IDDI).

These meetings validated the logical framework and included extensive discussions on the proposed activities and their relevance to the objectives of the Program. Special emphasis

[30] To ensure that participants, especially from organizations, present institutional (and not personal) views, they were asked to freely communicate their participation in the Program so far, and to seek the due approval of their executives or leaders to continue collaborating in the development of the proposal.

was placed on the need to involve communities in the planning of water resources interventions, the need to use existing organizational structures, including local NGOs, the need to ensure that funds lead to real action on the ground and the scale of interventions that could be possible within particular amounts of funding. There was considerable debate about which livelihood options would be most effective and about the need for communities to be part of the decision-making process when choosing particular options. Agro-forestry was identified during the meetings as a particularly suitable livelihood option within the conservation efforts of the basins. In addition, the need to ensure that the project focuses on drinking water supply and access to water resources was strongly emphasized by the participants, following their experience in previous projects at the community level. The interested parties identified the importance of considering multiple uses of water as a problem in the construction of water infrastructure.

As the concept note adopted by the AF included a wide range of stakeholders (at the national, provincial and community levels, government sector, private sector and civil society), a series of visits and consultations were planned. In accordance with the Terms of Reference of the Environmental Impact Study (according to the Guide for Social Impact Assessment and the Guide for Environmental Impact Studies, provided by the Ministry of Environment and Natural Resources) consultations would be convened after completing the Evaluation of Environmental Impact, to ensure that the proposed interventions do not have significant negative impacts on the communities, that they can contribute to their development and that they will increase their resilience, and that the communities give their approval to the Program. Complying with this aspect was the main requirement to be able to proceed with the design of the Projects.

Preparation of the Consultations

The stakeholder consultation and participation process for the full proposal was based on the planned strategy included in the concept note to achieve greater participation and commitment from the communities and their organizations. Said strategy included -among others- the following:

- Holding workshops with key actors (individuals and / or organizations) to present the project, carry out evaluations, identify activities and establish objectives and commitments. As needed, the workshops included some sessions in Creole (for Haitians who do not speak Spanish).

- The whole process included preliminary visits to potential communities to provide them with information about the Program and allow community leaders and their members to discuss the Program with each other before the workshops, respecting their own processes and times regarding internal consultation and decision making.

- After the communities discussed the Program and were clear about the expectations and possible benefits, the workshops were scheduled. The objective of each activity was to identify and prioritize the actions of the Program taking into account the resources and capacities of the communities. This process facilitated the successful participation

of stakeholders and, therefore, achieved an adequate assessment of needs and the establishment of appropriate objectives.

– The communication was cordial and with an adequate and respectful cultural approach to ensure adequate inclusion, understanding and contribution. The participation of women and the elderly was encouraged to ensure equitable participation and a more comprehensive vision.

In addition to face-to-face consultative meetings and interactive events, the Program also prepared a sample of knowledge management material on water resources management resilient to climate change and potential livelihood diversification activities (in the form of a fact sheet, and in accordance with the content of the concept note approved by the AF). This material was prepared in an easily understandable format for dissemination to key stakeholders and stakeholders.

Conducting the Consultations

In December 2017, two consultation meetings were convened with representatives of local communities and organizations. Representatives from a total of 20 organizations had the opportunity to comment on the proposed program and provide detailed feedback, in particular on the range of water management activities and livelihood diversification that should be supported using AF resources, to ensure the effectiveness of the proposed interventions and to make the designs of the individual Projects more efficient. Among those consulted are:

– Provincial Development Council-San Cristóbal Strategic Plan (PESC),
– Association of United Women for the Progress of San Cristóbal (AMUPROSANC),
– Chamber of Commerce of San Cristóbal,
– Dominican-Haitian Women (MUDHA),
– Institute for Environmental Studies - San Cristóbal,
– Association of Coffee Growers La Esperanza (ASOCAES),
– National Police,
– House of Women Villa Altagraciana (CAMUVA),
– Community Battalion,
– Ministry of Women,
– Foundation for the Wellbeing of Children (FUNDABINI),
– Town Hall of Villa Altagracia,
– Federation of Neighborhood Boards of Villa Altagracia (FEJUVEVA),
– Pro-Development Board of the Cacaos (APRODECA),
– Liceo Felix E. Mojica,
– "Quisqueya Learns with You",
– National Institute of Potable Water and Sewerage (INAPA),
– Ministry of Public Health,
– Fernando Arturo de Meriño Agroforestry University (UAFAM) and
– Ministry of the Environment and Natural Resources.

The key points discussed during the meeting were the following:

- The participants supported the proposal.

- The participants, who identified a strong link between the inability to manage the impacts of climate on their livelihoods and environmental degradation, praised the livelihoods part.

- The need to pay special attention to gender roles was emphasized, citing problems such as abuse and domestic violence, lack of income and childcare.

- All participants strongly supported the outstanding participation of women, as well as any other livelihoods activity that can be included in the full proposal.

- Potable water supply projects must include domestic sanitation systems, to avoid environmental pollution and use wastewater as fertilizer.

- As far as possible and feasible, include provisions for payments for environmental services, in accordance with community-based water management planning.

- The participants identified the importance of linking agro-forestry activities with the management and conservation of water sources.

Participants were presented with a range of water management and livelihood options. Those that were particularly and positively supported by the participants (drilling, excavations, rainwater harvesting, wood lots, dry season gardening, beekeeping, animal husbandry, bottled water, handicrafts, production of soap, butter and other processed products) They were identified as those of greatest interest to the participants, who requested that they be duly included in the complete proposal. However, it was clarified that despite the wide range of options and alternatives for diversification of livelihoods that the Program could potentially support, to be more efficient, those that are compatible with the primary objectives of the water supply systems will be prioritized. potable water and basic sanitation (construction of rural aqueducts, rehabilitation and repair of works, planting of water, planting of fruit trees, creation of water marketing structures, systems to take advantage of water served for agricultural purposes, water bottling, etc.). All of these alternatives can increase income and diversify the livelihoods of communities.

The participants were asked to identify the factors that should be used in the selection of the areas targeted by the program, in accordance with the information provided and their best knowledge and experience. A wide range of factors was discussed, but in particular the degree of vulnerability of water resources and household income (and its linkage with factors such as poverty and livelihoods) was emphasized. Therefore, these factors were used to identify target communities. For this reason, poor rural communities were privileged, and particularly, those that do not have potable water supply, those that have it but with deficiency, and in general those that do not have community sanitation systems or systems for water treatment of domestic residuals.

With respect to implementation arrangements, participants understood the importance of investing most resources directly in communities, through existing governance structures, but at the same time recognize that in some communities existing structures may not necessarily be the most appropriate. The management structure at the community level may vary from one community to another. However, the participants are optimistic when they point out that some communities have created associations, committees and organizations (ie risk management committees, water user associations, etc.) with great success. The participants confirmed the important role of the Ministry of the Environment and Natural Resources as a key actor, and cited the positive experiences of the ASOCARES that have been implemented by INAPA in different communities of the country.

Results of the Consultations

In terms of community participation, each community is different from the others. Some participants suggested holding another meeting when the Program proposal is approved and financial resources are obtained (to ensure that the AFwill provide these resources), and with a definition of the individual projects that would be executed. After that, the Program can begin to make inter-institutional / organizational arrangements with the communities and their representatives. When the participants expressed their interest in participating cooperatively and collaboratively as program partners, they indicated that the Program and the communities should not create excessive expectations and thus create more confidence.

In the opinion of the attendees, the proposed Program has been developed with considerable great detail, the most important elements of the development of the original proposal were explained and the results of the community consultation have been rationally included in the context of the complete proposal. They agree to provide more information and / or assistance if requested. Practically everyone indicated interest to participate in the planning and / or execution of some specific activities in the field.

Attached is a detailed report of the consultations and meetings (including a copy of the attendance lists).

Justification of the Requested Funds

Under a baseline scenario, the specific intervention areas reported conditions of poverty, socio-economic and climatic vulnerability (lack of adequate water supply and sanitation) that will continue and even increase over time. Given that the Dominican Republic is very vulnerable to climate impacts, under increasing temperatures it is very likely that the availability of water, forest and soil resources will be greatly affected. Changes in total precipitation, increases in drought or frequency of storms would act in a similar direction. In relation to these matters, the program's interventions seek synergies with public health, the family economy, food security and risk management. While there is great uncertainty regarding the precise local consequences of global warming, inaction would surely be detrimental to the country, both for the losses incurred due to current climate variability and future changes.

With respect to the proposed interventions of the Program, in general there are limited options available in terms of alternative actions to develop climate resilience in sectors such as water resources and public health. Under these conditions, the additional program, with respect to any socioeconomic baseline, is difficult to prove due to the multifaceted nature of the vulnerability (environmental, social, economic, territorial, etc.). However, it is expected that the Program will have a positive impact on the conditions and quality of life of the communities, and that it will reasonably increase their resilience.

The following analysis shows several justifications regarding the request for funds by component.

Component 1: Community-level implementation of climate resilient water resource management activities

Baseline scenario (without the resources and support of the AF)
The participation of the community in planning management activities, especially by women, is very limited, which increases their vulnerability to the effects of climate change. There are also no links between the river basin management plans and the specific needs of the communities and the potential impact they may have on the ecosystem through proper sanitation, limiting cross-water services with social and economic potential highlighted in the National Development Strategy. As a result, the momentum and purpose for integrated climate resilient water management is lost and the support of local communities is not achieved; or the programs of civil society and government cannot achieve transformational changes. There is a lack of information in communities about how to manage water, diversify their activities and increase their livelihoods, in response to the impacts of climate change on their water resources, which limits their ability to respond and adapt to climate change.

As in many communities in the Dominican Republic, vulnerable communities in the province of San Cristóbal currently face significant limitations in the implementation of water management measures that can create resilience to the impacts of climate change. There is not enough capacity within the communities and the government to support them, identify appropriate measures, implement them and maintain them. Even where infrastructure exists, such as pumping, lack of resources and community organization result in insufficient maintenance.

Program scenario (with the resources and support of the AF)
Using the AF resources, the Program will implement extensive training of key institutions and communities, which will provide long-term support to communities in the planning and implementation of climate-resilient water management measures. This will be an essential element, both for the implementation of the proposed AF program, and for greater support to the target communities. Thirty (30) communities will receive support for the development of water management plans at the community level. Essential to this process will be the establishment of appropriate institutions at the community level, with a goal of at least 50% representation of women in these organizations.

A key aspect of this component will be to convene regular meetings of representatives of these 30 communities, to share experiences and help maintain momentum in the implementation of the plans at the community level, and to promote the long-term adaptive management of water resources within these communities. Fundamentally, AF resources are necessary to implement an extensive water management infrastructure program in the 30 target communities. This will mainly include drinking water supply and sanitation systems, and watershed reforestation. These measures will provide communities with the capacity to manage their water resources at the community level, which will greatly help them adapt to the impacts of climate change, including the increasing prevalence of droughts and floods. INAPA is a key institutional actor, being the main authority in water and sanitation services, and being the executor of these projects.

Several mechanisms will be developed through community-level institutions to ensure the maintenance and ongoing management of the measures beyond the duration of the proposed program. Specifically, the creation and / or strengthening of the ASOCARES will be encouraged, which will be empowered by the built systems and will be supported for their efficient operation in the medium and long term. The lessons learned from the development and operationalization of community water management plans will be documented and disseminated among key stakeholders throughout the province and other regions. This will establish a situation in which the key institutions will have the necessary capacity to support water management activities (climate resilient) driven by the community throughout the country.

Component 2: Capacity building and capacity building in key institutions and communities to manage the risks related to long-term climate change

Reference scenario (without the resources and support of the AF)
In a baseline scenario, the target areas report conditions of poverty, socioeconomic and climatic vulnerability (lack of adequate water supply and sanitation, unsustainable agricultural practices, environmental degradation, and dependence on activities incompatible with the ecosystem). As the Dominican Republic is very vulnerable to climate impacts, under increasing temperatures it is very likely that availability (production) and access (prices) to drinking water will be adversely affected. Changes in total precipitation, the greatest drought or the frequency of storms would act in a similar direction. While there is great uncertainty regarding the precise regional or local consequences of global warming, inaction would surely be detrimental to the target communities, both in terms of losses incurred due to current climate variability and future change. In this context, socioeconomic scenarios point to increasing risks of problems related to poverty, such as water scarcity, food insecurity, health or social welfare. Climate variability and climate change place a heavy burden on rural communities and the most likely households, which will most likely exceed their capacities.

Program scenario (with the resources and support of the AF)
The focus of this component includes both the strengthening of specific capacities through adaptation planning and climate risk management. Although this represents only a first

step in the scaling up of successful actions and learning, the results of the Program for the object areas and in the Country represent a significantly positive alternative scenario in comparison with the baseline. The lessons learned from the development and operationalization of water management plans at the community level will be documented and disseminated to the main stakeholders throughout the Dominican Republic, through the use of a wide range of alternatives. This will establish a situation in which the Program will have produced the necessary capacities to support community management of drinking water and climate-resilient water conservation activities throughout the country.

With respect to the proposed interventions of the Program, there are limited options available in terms of alternative actions to develop climate resilience in the management and use of water resources, and their links to the health and economy of communities. In addition, for a reference socioeconomic scenario such as that of the communities identified, it is difficult to prove any additionality due to the multifaceted nature of the vulnerability (environmental, social, economic, territorial, etc.) and the lack of sound public policies to manage the risks climatic conditions in poor communities.

Sustainability of the Program

The sustainability of the results of the Program is directly related to Component 1 (sustainable water management) and the "focused on practice" Component 2 (strengthening / development and extension of capacities) of the institutions. At the community level, capacity building will provide permanent benefits once the program is completed: trained local staff (especially vulnerable women) will have strengthened positions and will be able to participate in future development projects and / or continue to improve their efforts related to climatic adaptation. Due to the novel but realistic design of the Program, its results will likely influence practice and policy beyond the time of project implementation. That is the transformative potential of the initiative.

The long-term sustainability of the Program is based on several pillars. On the one hand, the empowerment of the community is critical and measures have been taken to ensure this, such as the incorporation of all possible partners and populations during the formulation stage of the Program (as discussed above). The dissemination of the expected results, with sufficient quality and transparency to constitute - by itself - the best practices of community-based adaptation (and demonstrate it within the implementation of Component 1 in the field) will dramatically promote this. The Program will also take into account the needs of local organizations, as they identify them, respecting their cultural and legal status, avoiding conflicts and being sufficiently useful to create the appropriation of the end user. This is also relevant for NGOs and other local organizations of interest.

The Program will also build on existing best practices and knowledge of key institutions (Ministry of Environment and Natural Resources and INAPA), and will make practical use of the tools developed to identify profitable technologies and practices. This has allowed us to design a set of specific activities (in the form of individual projects) of adaptation to climate change that will be executed in the field. The lessons learned will provide solutions for sustainable and climate-smart water management, which can be consolidated and

replicated beyond the useful life of the Program; thus incorporating adaptation technologies into the current spectrum of conservation and development instruments. In terms of water supply and sanitation services, a similar approach can be used to achieve savings and maximize the economic function of AF resources.

The poorest households, small farmers and representatives of target communities will be trained to take charge of small-scale infrastructures, and the Program will train women and young people to carry out lighter maintenance tasks, thus contributing to strengthening local capacity and empowerment. This commitment was prioritized during the consultation phase; it was agreed in the complete proposal, and it will be an obligation of the implementation of each Project.

At a higher level, a factor of sustainability is government participation, both at the political and operational levels. Through the Ministry of Environment and Natural Resources, the Program brings the commitment of the water authorities (INDRHI, INAPA) and other authorities to support the communities to maintain the water and sanitation infrastructures built once the Program is finished. Similarly, the Ministry of Public Health can make a significant contribution to supporting communities to extend good health and hygiene practices once the Program ends.

Indirectly, the Program will demonstrate how climate-smart investments can be profitable, thus promoting the extension of similar activities beyond the selected sites. With a greater awareness of market opportunities related to adaptation to climate change, the Program will promote new investments in adaptation. The methodologies, results and lessons learned will be compiled and disseminated to other third parties through the Program and through a range of well-focused media. To maximize this function of the Program, a public awareness campaign and demonstrations of the effectiveness of interventions in the field will be organized.

The Program will also monitor and evaluate its implementation on an ongoing basis (M&E); thus reducing the risk that the beneficiary households and / or communities may be dissatisfied with the interventions. Some preliminary lessons from other projects seem to indicate that the risk of the projects ending after the project teams have left is low and quite manageable.

In summary, the following aspects of the sustainability of the program have been identified:

Table 13: Strategy for Sustainability of the Long-Term Program

Criteria / Explanation
Development of Capacities
The development, creation and strengthening of the capacities of planners, and at all levels of government, will provide a central focus for all activities. The training related to climate change will be developed with a focus on community-based adaptation and restoration activities of the aquatic ecosystem. These will be designed with replicability in mind, and will remain after the completion of the Program as a continuous key resource for workers, authorities and other sector agencies. The program

will develop evidence of the cost of adaptation per beneficiary unit (ie, cost per household, productive hectares of forest land, community income, etc.).

Investment in Infrastructure

The interventions and infrastructures have been subject to a financial feasibility assessment during the design and prioritization process, to guarantee sustainability and maximize the cost-benefits of each of the interventions and for each of the communities. This extends to the institutions.

Financial Sustainability

The program will channel the support provided by FA to the most vulnerable communities, but with an approach that helps community groups of users / households (ie, ASOCARES, risk management committee, forest micro-entrepreneurs, etc.) so that become independent and self-sustaining. In the context of the program, this means that these groups would continue to operate beyond the execution period.

Institutional Sustainability

The proposed Program will help the Dominican Republic to improve and create management plans for the province of San Cristóbal in general, and of vulnerable rural communities in particular, and mainstream them to the activities of the relevant institutions. These plans (top-*down*) will also strengthen the local plans of the communities (bottom-*up*). The design and execution of strong management plans (provincial and community) will be important for the sustainability of the activities implemented in Component 1 (such as increased water supply, soil and water conservation measures, agro-forestry, etc.).

Social Sustainability

Capacity building activities, networking, and presence in the field will help achieve the program's social sustainability. Increasing trust through dialogue and consultation with stakeholders and mobilizing stakeholders through capacity building will help achieve long-term sustainability as well. It is expected that a strong focus on the construction of local knowledge, capacities and incentives, as well as a strong programmatic approach, will be sufficient to guarantee gender equity in all operational matters and lead to social sustainability.

Environmental Sustainability

It is expected that the Program's focus on achieving a correct adaptation to climate change in the degraded micro-basins of the vulnerable rural communities of San Cristóbal will lead to better environmental sustainability and better management of natural resources. Reforestation and all the variety of " *soft* " measures adopted to protect watersheds will stabilize the physical environment. The program will promote integrated water management with the full commitment of the community and community organizations. In addition, the Program can support the use of renewable energy, such as solar pumping systems or photovoltaic panels, as opposed to fossil fuels, to operate facilities and infrastructures (in those places that are technically and economically viable). As demonstrated by existing water installations that work with solar energy, solar panels will also be useful to provide security lights in water facilities. The sustainability of a system with solar energy depends on the existence of the technical and financial capacity of the community to acquire the system. Therefore, under the Program, it will conduct an evaluation first to determine the preparedness of the community to maintain such a system, and if other community actors could co-finance them.

Environmental and Social Impacts and Risks

Table 14: Overview of Environmental and Social Impacts and Risks

Checklist of environmental and social principles of AF	No additional assessments are required for compliance	Potential impacts and risks: additional assessments and management are required for compliance
Compliance with the Law	The program complies with the relevant national laws, regulations and policies; and complies with the country's relevant legal framework for water management and use, environmental protection and local rural development.	Very low: no current or potential risks related to compliance with the law were found during the implementation of the Environmental and Social Impact Assessment (EIAS).
Access and equity	The intervention logic of the Program is to provide benefits in the most vulnerable communities, with fair and equitable access to activities, equipment, resources and training throughout the planning and execution phases. All individuals or groups that request participation will have the same opportunity to benefit from the adaptation activities proposed by the Program. The eligibility criteria of the program are clear and transparent and defined together with the relevant stakeholders, including relevant to water, sanitation, re-afforestation, rural development, environment, climate change and public health issues. The interventions of the Program plan to remove barriers such as: difficulty of access to water resources; vulnerability in terms of biophysical and climatic risks; social vulnerability; and selection and decision-making criteria that exclude women. Through these criteria, the Program will ensure the participation of less empowered groups, including women, minorities and especially vulnerable groups.	Very low: program interventions guarantee access and equity to sensitive groups, especially women (heads of household or single mothers) young people, the elderlyand people with disabilities. The benefits of the availability of drinking water and sanitation include all the individuals of each community subject to intervention. In the AF results framework for the Program, key indicators of events related to "access and equity for vulnerable groups" will be included.
Marginalized and vulnerable groups	The program focuses on marginalized and vulnerable groups (poorest rural communities) and aims to help them improve their living conditions and quality of life, which are already compromised by poor local development, poverty, lack of access to opportunities, deficit infrastructure and climate	Very low: the program has observed the appropriate environmental and social safeguards. These include: community detection; environmental and social impact assessment, including needs and conflicts; Open, free and informed consultations with key stakeholder groups. It is

	change. Interventions and projects will include all members of the community, and will be careful not to exclude (by action or omission) Dominicans of Haitian descent and Haitian immigrants (especially those with questionable immigration status) and their families. The program does not have a negative impact on these groups.	considered to prepare a contingency plan if applicable.
Human rights	The Program respects the fundamental rights of people in the areas subject to intervention: it does not affect their freedom, nor does it discriminate the participation or benefits for people regardless of their condition, age, sex, political or religious affiliation, etc. In addition, the Program does not integrate any activity contrary to the laws or traditions of the people. Participation in the program will be voluntary and free for all people. IDDI, the Ministry of Environment and Natural Resources and INAPA, have a proven record of respect, promotion and non-violation of fundamental human rights.	Very low: all program activities and interventions have been developed and designedwithin the framework of international and national human rights. Through participatory approaches, people and communities will be consulted to avoid any impact on human rights.
Gender equity and women's empowerment	The program's logical framework provides for the direct participation of women and women's associations so that they can directly benefit from the activities of the Program and individual projects. Operationally, the participation of women mainly those who are single mothers and / or heads of household will be promoted and prioritized. The program proposes to help women develop sustainable income-generating activities, such as participation in ASOCARES, and thus improve their income and living conditions. This will also empower them in the context of their respective communities, traditionally led by men. This includes, but is not limited to, prioritizing women during the recruitment processes of the Program's personnel, or within the procurement processes of goods and services.	Low: progress with respect to women's participation, equity and empowerment will be measured through the M&E of the Program.
Basic labor rights	Basic labor rights refer to gender, respect, hours of work; etc. The program will ensure that national labor standards are respected in all activities.	Very low: The monitoring of basic labor rights will be carried out throughout the program. For these purposes, each supplier and / or

	The Program will also ensure that adequate salaries are paid for each assigned task and that no child will be employed. The social security, unemployment relief and labor benefits regulations will also be respected and applied.	contractor of the Projects shall be requested to present proof of compliance with labor obligations with their employees, in accordance with the provisions of the law.
Indigenous populations	N / A	N / A
Involuntary resettlements	The involuntary resettlement of people due to the activities of the Program is not a problem. Infrastructure works for water supply and sanitation do not require any resettlement, and instead are adaptation measures to prevent people from being displaced due to the effects of climate change. For the most demanding works of physical space, public lands donated by third parties or contributed by the community will be used. Through mechanisms for dispute resolution, devices of complaints / claims to protect any potential affected by P rogram or activities are included.	Very low: no potential risks were found related to the resettlements during the ESIA.Although resettlements are not necessary for the activities, the Program will monitor closely.
Protection of natural habitats	All program activities will be carried out in areas that are already in use. The program will teach alternatives to traditional agricultural practices, which will help reduce pressures on ecosystems. The Program will work with drinking water collection and supply techniques that optimize the use of the resource. Forestry interventions will increase coverage, save water, limit runoff and soil erosion in selected target areas. The Program may cause negative impacts on the biophysical environment, if the activities of the Program are not carried out in accordance with the provisions of the environmental management and adaptation plan, which includes constant monitoring.	Low: Some potential risks for natural habitats were identified during the ESIA, mainly during the construction of the main facilities and water infrastructure. Protecting the integrity of natural habitats will be held throughout the Program and appropriate measures according to the law will be implemented.
Conservation of biological diversity	The program will adopt forestry practices that increase and / or protect biodiversity compared to the baseline scenario, including proven conservation techniques. The program will not introduce any variety or exotic or invasive species in the selected	Low: some potential risks to biodiversity were found during the ESIA, mainly during the construction

	areas. As noted above, water collection, treatment or storage facilities can affect biodiversity, especially when the areas need to be cleared to build and / or rehabilitate the planned facilities. The Program may cause negative impacts on biological diversity, if the activities of the Program are not carried out in accordance with the provisions of the environmental management and adaptation plan, which includes constant monitoring.	of the main facilities and water infrastructure. Protecting the integrity of natural habitats will be held throughout the Program and appropriate measures according to the law will be implemented.
Climate change	The focus of the Program is adaptation to climate change through sustainable water management. From a climatic perspective, the Program incorporates resilience (adaptation) and the removal of greenhouse gases (mitigation) to community life. The adaptation actions undertaken under the context of the Program must be evaluated systematically and constantly, in order to understand if they contribute to the creation of resilience under an increasingly variable climate. The final evaluation of the Program and the evaluation of socio-climatic vulnerability will support the achievement and dissemination of this objective. Possible impacts on land use will also be recorded, which will contribute to the evaluation of GHG emission reductions (mitigation and / or sinks). However, some minor GHG emissions can occur due to fossil fuel and electricity consumption during construction, operation and maintenance activities. These consumptions will be monitored properly.	Very low: the program provides for adaptation and mitigation assessments.
Prevention of pollution and efficiency of resources	In the communities included in the Program, water resources are exposed to various forms of pollution associated with little or no sanitation coverage (solid waste, wastewater, agrochemicals, etc.). The program will work to prevent, avoid and mitigate these types of pollution. There may be more pollution related to the construction of water storage and treatment facilities, including the deterioration of water quality downstream, or the detrimental effects of limiting access to water by downstream users.	Low: some possible contamination risks were identified during the EIAS, mainly related to solid waste, noise, wastewater, etc. Environmental integrity will be monitored throughout the program and appropriate measures will be implemented in accordance with environmental standards.

	In addition, greater water availability in the community can encourage other uses such as irrigation, which can create pollution due to the use of pesticides and pesticides.	
Public health	By providing more and better water and sanitation services, a positive impact on the health of the selected communities is expected, and lower costs due to diseases. Education and training in water management and planning at the community level can be expanded to prevent diseases transmitted by water vectors, such as rats and mosquitoes. This will reduce the incidence of diseases such as z i ka, dengue, malaria, etc.	Very low: no potential risks to public health were found during the implementation of the EIAS or during the consultation processes. However, this aspect will be monitored throughout the program and appropriate measures shall be prescribed by law and standards.
Physical and cultural heritage	No adverse impacts on the physical and cultural heritage of people in the intervention areas are foreseen. The chances of Program activities or projects causing damage to physical assets are zero.	N / A
Soil and soil conservation	In the object areas there are no zones where the lands are particularly fragile, or which are at risk of being lost or degraded, due to the effect of the activities of the Program. The Program will have positive impacts on the landscape of the intervention areas, through the establishment of agroforestry systems and conservation practices. Soil conservation and restoration of fertility are key practices in smart forestry.	Very low: the Program foresees activities to identify and evaluate potentially negative impacts.

Other actions that contribute to reducing the identified risks are:

- Prepare short-term community adaptation plans, detailing the specific objectives, adaptation activities, implementation arrangements and program commitments, partner institutions and beneficiaries. This can increase the overall effectiveness of the program.

- Under Component 1, the identified financial mechanisms have been evaluated based on their cost-effectiveness. Based on the results obtained, only the most profitable and appropriate financial mechanisms for each intervention zone will be implemented and, therefore, financial mechanisms will not be clearly proven to achieve the objectives. Such cases could present an opportunity for proven schemes such as microcredit, small donations or subprefects.

- A key component for community adaptation will be the monitoring and evaluation plan and evaluate the progress and results of the activities implemented. This plan will include a set of indicators to measure the results of the activities, and to demonstrate how the proposed interventions will increase resilience in the participating communities.

- Measures for water conservation under climate impacts (ie catchments / riverbanks, reforestation plans) implemented for at least 2,722 hectares will help to ensure the sustainability of the project in the long term, in terms of preservation and protection of the Water.

- The dissemination of results, products and results of the Program will allow replication in other places. In addition, the availability of a learning platform can help communities to be more precise with respect to other adaptation initiatives.

- The sensitization, training and technical assistance activities for the execution of the projects will be carried out by relevant government agencies, universities (i.e., UAFAM and Loyola) and NGOs. The program will identify NGOs that work directly in specific communities.

- The relevant government institutions have made the designs of the specific projects, and there are agreements for the participation of these in the monitoring and evaluation of them. This approach has allowed almost all of the Program's resources to be invested in the community.

- Stakeholder participation at all levels of the program will ensure proper planning and execution of activities, consistent with the objectives of the program and with local development priorities and stakeholders.

- Management / advisory groups will be established at different levels of governance of the Program, to ensure the commitment and involvement of the institutions and beneficiaries. This will help identify and prioritize measures to manage unforeseen risks, and facilitate decision-making. These structures can help to forge a joint vision of the implementation and progress of specific activities in the field. These groups will include representatives of the beneficiaries, implementing partners, community organizations, cooperatives, churches, clubs and local NGOs.

PART III: IMPLEMENTATION ARRANGEMENTS

Institutional Agreements

Shared Vision

The Project will be implemented by IDDI with the support of the relevant public entities: the Ministry of Environment and Natural Resources and INAPA, which will be the executing entities. Additionally, the participation will be promoted of private entities (ie, producer groups, MIPIMES, local merchants who can be suppliers of goods and services), other civil society organizations (ie, PRONATURA, INTEC, UAFAM, Fundación H+D, Loyola Institute, etc.), selected community groups (especially ASOCARES), as well as independent professionals (ie, contractors, consultants and advisors). As the Dominican Republic has established a regulatory and institutional framework for climate change, the activities of the Program have been aligned with the country's priorities and its national commitments under the UNFCCC. This includes, but is not limited to, the Nationally Determined Contribution (NDC).

Management Agreements

The agreements for the management of the proposed Program have been designed to facilitate extensive links at all levels, from those responsible for policy formulation at the national level to the institutions at the operational level, to the rural communities and the final beneficiaries. In designing this implementation provision, the following key considerations were taken into account:

1. Consistency with the governance structures and the mandates of various agencies, in order to promote mainstreaming and ownership;

2. Accountability and transparency in the flow of funds to guarantee cost-effectiveness;

3. Disbursement of funds in a timely manner to ensure that the Program delivers within the stipulated period; and

4. Transversalization and sustainability.

The Dominican Institute for Integral Development (IDDI) will serve as the National Implementation Entity (NIE) for the program. IDDI will have the technical and administrative responsibility to achieve the expected results / products of the Program, as defined in this document. In addition, IDDI is responsible for the timely delivery of the Program's inputs and outputs and, in this context, for the coordination of all other responsible parties, including ministries, local governments, decentralized agencies and other authorities. Any implementation agreement for the Program should clearly recognize the separation between aspects related to implementation and execution. With respect to this matter, IDDI will comply with the relevant guidelines of the Adaptation Fund.

The Ministry of Environment and Natural Resources will be an executing entity. In addition, the Ministry will act as the main government institution to facilitate linkages between the national and local levels, and to coordinate the activities of the Program at the local level. The Ministry is in a good position to do this, as it has offices and staff at the provincial level. The deliverables of the Program at the community level will follow the channels of the current structure of the government of the Dominican Republic. Through the Vice Ministry of Forest Resources and the Vice Ministry of Soils and Waters, the activities of re-afforestation, conservation of the micro-basins, and / or restoration of the ecosystems will be coordinated.

The implementation of activities at the community level will be the responsibility of the Community Committees / Community Groups (CC/CG), through the corresponding decentralized agencies, mainly INAPA (which will also be an executing entity). INAPA will also be in charge of the execution of the potable water and sanitation projects, as well as the creation and formalization of the ASOCARES. In the places where the conditions exist, all the activities foreseen by the CC/CG will be closely related to the associations of water users and the committees of irrigation users (for the management of water resources and irrigation systems, such as the supervision of infrastructure projects, identification of private contractors, etc.). In accordance with this approach, the CC/CG will be strengthened so that they can work with several decentralized agencies in relation to the program.

Other governmental bodies such as INDRHI, the Ministry of Public Health, the Ministry of Public Works, etc., could be qualified as executing entities if necessary and / or depending on the nature of the activity carried out. This measure not only helps strengthen the capacities of these institutions, but also reduces delivery risks.

Steering Committee

The Program will create a Steering Committee (PSC) composed of high-level representatives of IDDI, the Ministry of Environment and Natural Resources, INAPA, and key institutions such as the Government of San Cristóbal, INDRHI, MEPyD, local governments, universities and NGOs. This committee will be chaired by IDDI, and the Ministry of Environment and Natural Resources will be permanent secretary. In addition, the membership of the PSC could include the governing ministries of the decentralized agencies that will participate in the delivery of the project's products at the community level, such as the Ministries of Public Health, Public Works and Communications, of Industry and Commerce, of the Youth, of Women and others.

Executive Board

The Executive Board of the Program (PEB) will be responsible for approving the key management decisions of the Program and will play a key role in ensuring technical quality, financial transparency and overall impact on the Program's development, and will be established as soon as possible to approve the proposal presented. The Board will be composed of high-level designated representatives of agencies with direct participation in the implementation of the Program (i.e., IDDI, INAPA, MEPyD, Governor of San Cristóbal,

Ministry of Environment and Natural Resources, etc.). Once the Program has been approved, the PEB will be formalized during the inception phase. At this point, a complete list of the PEB members designated by the institutions and their alternates will be provided. This will include the initial report.

Management Unit

IDDI will establish a Program Management Unit (PMU), which will be responsible for the implementation of project activities. This Unit will prepare annual work plans, progress reports, and carry out the M&E plan of the Program. The PMU will be in charge of coordinating the activities under each component with the different government agencies / local organizations that will collaborate and participate in the execution of the project. This unit will also be responsible for guaranteeing the appropriate participation of the interested parties and the involvement, transparency and performance.

Program Staff

Program Manager

IDDI will designate a Program Manager (PM), who will be appointed during the inception phase of the Program (that is, between the date on which confirmation of approval of the Program is received by the AF and receipt of the Program's first disbursement for the implementation thereof). The PM fees will be borne by the Program. The PM will be a dedicated professional, designated for the total duration of the Program. The main responsibility of the PM is to ensure that the Program produces the results specified in the Program document, with the required level of quality, with efficiency and transparency, and within the time and cost limitations specified.

As a way to ensure the integration of the AF Program into the structures and processes of the key institutions, the Program Manager will be a senior official with at least 10 years of experience in matters related to adaptation to climate change in the Dominican Republic and experience relevant in gender, community-based adaptation, rural development, territorial planning and local governments.

Technical / Support Staff

The PM will be supported by a central team of technical and support staff, who will form the Program Management Unit (PMU) within the IDDI to implement the activities of the Program, including daily program operations, management and reporting operational and financial transactions. The support staff may include - typically - accountants, consultants, engineers, drivers, secretaries, etc. The Program Manager will appoint the technical / support staff based on criteria of transparency and competitiveness, and respecting the aspects of equality, equity and gender established by the AF.

In correspondence with what is established by the AF and by the regulations in force, the personnel of the Program will be recognized their fundamental rights, their labor rights, and the provisions established by law.

Local Coordination and Implementation

Community Committees and Community Groups

At the local level, Community Committees and Community Groups (CC/CG) will be established in each site to be intervened and / or where the individual projects will be executed. This will ensure adequate coordination and participation at the local level of the key actors and representatives of the beneficiary groups. In the areas of intervention, the CC/CG will be responsible for the delivery of the project's products at the community level, through the appropriate government agencies, mainly INAPA, the Vice Ministry of Forest Resources, the Vice Ministry of Soils and Waters, and the Directorate of Climate Change.

To execute the activities and transfer the economic resources required to carry them out, IDDI will sign a Cooperation Agreement with the CC/CG, in line with its established practices for the implementation of projects at the community level. The PSC will have the responsibility to ratify the scope of said agreements. In case of not achieving with a particular CC/CG, IDDI may propose other projects.

The nature and extent of the Cooperation Agreements can be defined based on IDDI's vast experience in implementing community-based initiatives in the Dominican Republic, which has been shown to encourage greater local ownership of initiatives, ensure accountability to purposes of the Program, encourage local creativity and mobilize the local counterpart for the implementation of the Program. It also ensures that the project is integrated into community work, instead of being seen as an additional responsibility that does not align with their own development plans or actions.

Under the proposed program, the relevant government agencies will work in coordination with the CC/CG to deliver the Program's products, and to ensure that the institutional capacity for local adaptation action is built and survives beyond the life of the Program financed by the AF. At the beginning of the program, the capacity of government agencies to determine the capacity gaps and the necessary support for the development of capacities to execute the program financed by the AF will be evaluated. Based on the findings, the Program, in coordination with the Ministry of Environment and Natural Resources and INAPA, will strengthen the areas that must be built to achieve the Program's objectives (ie, technical capacity, financial management and monitoring and information, etc.).

The processes for the CC/CG are robust and mature throughout the Dominican Republic, and also the processes to establish institutional arrangements with them. However, in some communities there are already community structures that can play - under a framework of appropriate dialogue - the role of the Community Committee / Community Groups. This is important because it avoids duplication of efforts.

Community Agents

For the implementation of the program, particularly in the management of water resources and forest resources in the intervention zones, it is essential the participation of community agents, who will provide technical assistance to the communities. Therefore, it is necessary to ensure that they have the necessary technical skills to implement the activities. Learning from the experiences of the Small Grants Program (UNDP-GEF-PPS), institutional arrangements can be used in the Program with respect to the use of the services of community agents.

The first option, and the preferred one, is to form a group of community agents, made up of interested members of the community, beneficiary groups and local NGO staff, through practical and concrete training in aspects that will focus -in principle- on the types of services that will be required by the interventions of the Program. The community agents will be empowered by the trainers (technicians of the Ministry of Environment and Natural Resources and of the INAPA, as appropriate, and consultants that will be hired through the Program) to offer their services to the beneficiary communities as it has been established for the program. Officials from government institutions and Program staff will periodically conduct field visits to ensure that the services provided by community agents conform to national standards and / or good practices. This approach is inclusive, profitable, innovative and sustainable, since it builds capacities, transfers technology and empowers people to diversify their livelihoods and helps them meet their needs.

The capacity of the community agents will be established through the evaluation of their skills, as well as an evaluation of the capacities of the target communities to assimilate the technical support they can provide. The Program will carry out an assessment of the functional, technical and other critical needs in support of the delivery of Component 1. It is expected that the capacity needs will vary significantly among the communities, but the common skills that will be developed under the Program would be appropriate practices in changing climatic conditions, community mobilization, climate risk management in the field (ie, water conservation techniques, etc.). The resources needed for the capacity development activities of the extension agents are budgeted within the components, as well as the budget for the local / external consultants who will carry out the training that will be provided. This is a basic measure of cost-efficiency.

The experience of consultations, meetings and field visits, indicates that there is a great interest on the part of local people to become community agents (at least based on their knowledge of the communities and their perception of the services that could provide these) due to the opportunity to acquire new skills and income. Some community agents even charge some fees for the services they perform for other members of the community (i.e., seedlings, fertilizers, etc.).

In cases in which the object community does not have the capacity to constitute community agents, an alternative option for the Program would be to include the extension service in the Cooperation Agreements to be signed between IDDI and the CC/CG. Under these agreements, the plans, activities and operations are developed specifying in detail the type

of community service required, the frequency of visits, the types of services to be provided, and an estimate of the costs of these will be provided. The deliverables and monitoring mechanisms are detailed as an appendix to the Agreements. The Program will cover the additional cost involved in the provision of these services, in the form of transport / travel subsidy.

The CC/CG, in coordination with the relevant government institution, will submit regular reports to the PMU for monitoring, and to activate the release of funds to cover the incremental costs. The incremental emphasis is due to the fact that, as established for the projects implemented under the National Implementation Modality (NIM), the Program will not pay the professional services of the personnel paid by the government, nor will it dedicate or provide them with any asset, amount, sum or other values.

The Ministry of Environment and Natural Resources and INAPA, through their respective provincial offices in San Cristóbal, will be responsible for coordinating the CC/CG in the target communities to ensure that they learn from each other's experiences in the implementation of the Program. In addition, it is essential for the coordination function of these institutions, to ensure that the Program can take advantage of economies of scale as much as possible during implementation. This is particularly crucial in cases where the CC/CG could obtain a better price if they negotiate collectively (ie for civil works, plant seeds, etc.). The provincial office of the Ministry of Environment and Natural Resources will also collaborate with the Provincial Committee for Monitoring Adaptation to Climate Change (Output 2.2), giving information and opinion on the execution of the Program.

Local NGOs

A Program of the size of this Proposal cannot rely solely on government systems. Fortunately, local NGOs are rapidly acquiring capacities to execute climate, forestry and environmental projects, in collaboration with communities and international agencies. The strategy of the Program will be to complement the government and NGOs with new and / or existing capacities (in other sectors) to create a group of community agents. This has been shown to work in the Dominican Republic based on the experiences of local NGOs (for example, the Disaster Risk Management Programs and the Small Grants Program). Regarding this aspect, it is expected that, according to their mission, experience and availability, organizations such as PRONATURA, UAFAM, Fundación H+D, and the Loyola Institute, could achieve some leadership in support of water management (Component 1) and in the development of Capabilities (Component 3); while other local organizations (such as CAMUVA, MUDHA, and ASOCARES) can provide services and support at the field level.

Provincial Committee

Under Component 2, a Provincial Committee for the Monitoring of Climate Change Adaptation (PCCAMC) will be created, and will be granted the power to provide general guidance and supervision, in order to bring the Program to its long-term sustainability. The Provincial Committee will act as "representative" of the beneficiaries of the Program and

the community organizations with respect to the main government institutions. Its main activities will be related to the inclusion of the achievements of the Program and the additional steps within the investment plans of the central and local government. This includes, but is not limited to, the National Budget, the Participatory Budget (a well-known and well-established mechanism that promotes the participation of civil society in the investments of local governments to ensure their plurality, efficiency, sustainability and transparency), and within the Pluriannual Plan of the Public Sector. Likewise, the PCCAMC can work with other relevant national and / or international institutions to develop their own projects related to climate and development, for the benefit of the communities and organizations of the Province of San Cristóbal.

The final design of the Provincial Committee, the attributions and the members will be defined after the inception phase. However, it is highly anticipated that it will include existing entities such as the Government, local governments, MEPyD, COE, Ministry of Public Health, Ministry of Environment and Natural Resources, INDRHI, INAPA, Ministry of Agriculture, Ministry of Energy and Mines, and the Industry and commerce ministry. The representatives of the private sector can be from industrial, service, banking or agricultural organizations, and from civil society, since they will include universities, NGOs, and groups of women, youth and communities. The San Cristóbal Strategic Plan (CFSP) is interested in hosting the PCCAMC, as they do with other strategic provincial committees.

The commitment of the Program is to initially support the establishment of this committee, to meet the objectives of the program, but with a broader vision that supports the identification of other needs for adaptation to climate change, and the implementation of solutions for the benefit of the most vulnerable, and the long-term sustainable development of the Province of San Cristóbal.

Organization of the Program

Program Structure

The structure of the Program will be arranged as indicated in the following figure:

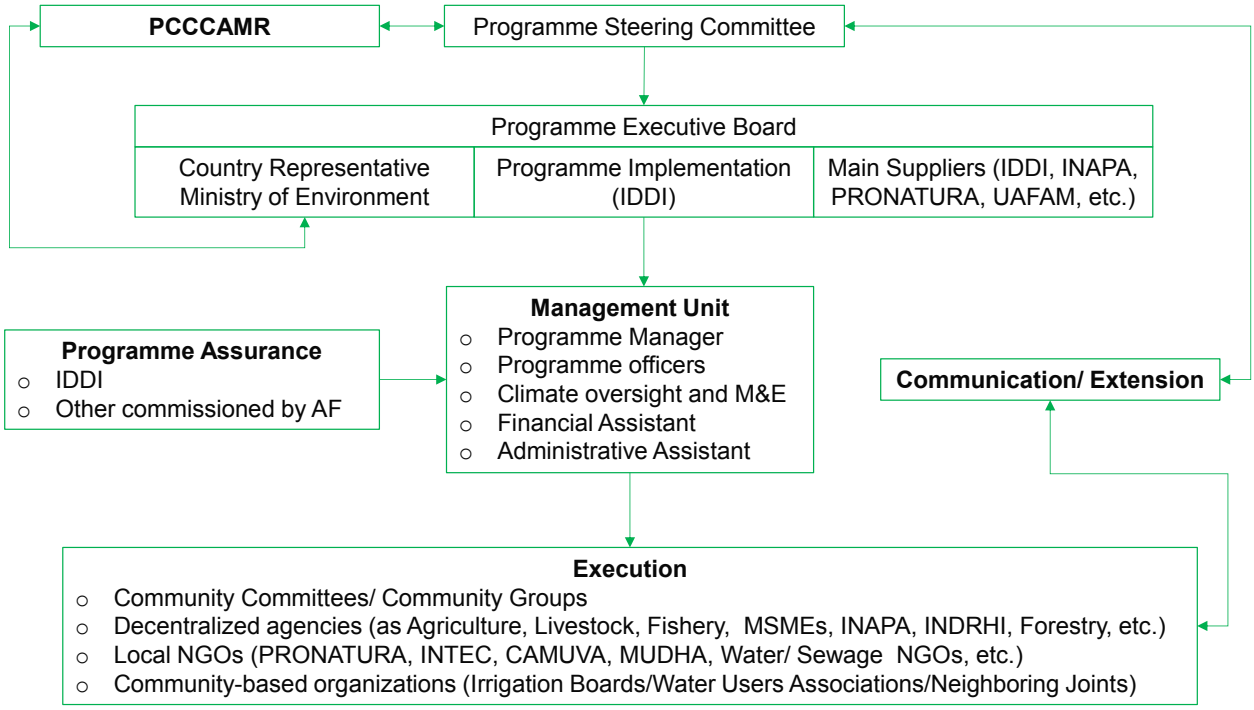

Figure 13. Proposed Program Structure

Program Guarantees

IDDI will support the implementation of the Program by assisting in the monitoring of program budgets and expenses, hiring Program staff, consulting services, and subcontracting and acquiring equipment and materials at the request of the PMU. Regarding the technical aspect, IDDI will monitor the progress of the implementation of the Program and the achievement of the results / products of the Program according to the proposal approved by the AF, and with the participation of the organizations included in the different management structures of the Program. Several designated program officers will be assigned to the PMU to provide financial and technical support and implementation services. The use of external consultants is foreseen, but only in cases in which the expertise of these does not exist in IDDI.

Through the audits to be carried out during the implementation of the Program, and following the international financial rules and regulations and the applicable audit policies, transparency and general efficiency will be increased, and it will be ensured that the resources have been correctly invested.

Program Execution

Table 15: Program Execution Expenditures (in USD)

DESCRIPTION	Y1	Y2	Y3	Y4	Total
Program Manager	48,000	49,056	50,135	51,238	198,429
Climate Specialist	24,000	24,528	25,068	25,619	99,215
Financial Specialist	24,000	24,528	25,068	25,619	99,215
Accountant	19,200	19,622	20,054	20,495	79,372
Technical Official	15,000	15,330	15,667	16,012	62,009
Administrative Official	15,000	15,330	15,667	16,012	62,009
Driver	8,400	8,585	8,774	8,967	34,725
Furniture	9,736				9,736
Computers	18,000	300	300	300	18,900
Miscellaneous supplies	3,500	1,600	1,600	1,600	8,300
Vehicle	40,000	2,500	2,500	2,500	47,500
M&E + Audits	24,000	15,000	17,500	20,000	76,500
TOTAL	**248,836**	**176,379**	**182,333**	**188,362**	**795,910**

Notes: (1) Social charges are not included.
(2) Section D provides a detailed breakdown of the costs for M&E.

Financial Risk Management

Program Risk Management

The key risks underlying the Program have been analyzed during the formulation phase in relation to the sites targeted by the Program. During the course of the program, a conventional register of risks (at intervals of not less than six months) in which critical risks for the Program have been identified will be regularly taken. With respect to this aspect, models ("templates") can be used to record risks used by UNDP or the World Bank, or similar tools.

The following table summarizes the main risks of the project.

Table 16: Program Risks and Risk Management

Identified Risks	Level	Mitigation Measures	Responsable
Lack of coordination, collaboration and cooperation between the executing agencies.	Medium	– Operational agreements between the implementing partners and the relevant agencies with an adequate definition of roles and responsibilities. – Dialogue and consensus building.	IDDI, Ministry of Environment, INAPA, INDRHI, Government
Changes and staff turnover in local implementing agencies may affect the schedule and /	Low	– Training. Information and communication. – Inter-institutional agreements that	IDDI, local institutions

or program activities.		provide a framework for the appointment of qualified personnel – Awareness among authorities. – Strengthening of target groups for the implementation of activities.	
Lack of acceptance and participation of key stakeholders and target groups, or differences between groups or stakeholders can weaken and delay activities.	Medium	– Capacity building, training and awareness. – Participatory processes to promote commitment and inclusion of all interested parties. – Representation of key groups and stakeholders in community committees and field activities. – Mediation in case of conflicts.	IDDI, local institutions, private sector
The instruments developed by the Program could take more time to provide tangible results than their duration.	Low	– Prioritization of activities that can be designed and implemented effectively within the life of the project. – Inclusion of long-term research in institutional work plans. – Awareness and lobbying among the authorities for the approval of incentives / licenses (if any) within a period that ensures a sufficient schedule for on-site piloting.	IDDI, Ministry of the Environment, INAPA, INDRHI, Gobernación
Politicians prioritize economic benefits over social and / or environmental benefits.	Low	– The project activities explicitly integrate the needs of social, economic and environmental development in an integrating framework of climate resilient agriculture and water management. – The project will give priority to low-cost resistance strategies that demonstrate the impact on revenues.	IDDI
Congress is discussing a new law that regulates the use of water resources.	Medium	– This risk is minimized with greater coordination and communication with the Ministry of the Environment, which coordinates the environmental policy between the different levels of government.	IDDI, Ministry of the Environment, INAPA, INDRHI
The lack of information at the local (and reduced) level on many aspects of climate change.	Medium	– Prepare specific studies on specific areas and / or at the community level with respect to the threats of climate change. – The project foresees the need to start with a short-term evaluation of the priority activities and interventions.	IDDI
Delays at the start of the	N/A	– Develop a detailed work plan to	IDDI

Program have an impact on the achievement of outputs and results and reduce the scope to deliver the Program as described.		guide the start phase of the Program.	
Insecurity in specific areas (ie, robberies, strikes, etc.) can jeopardize the implementation and monitoring of the Program.	Low	– Cooperation with local communities and structures. – A good cooperation with the leaders of local organizations for the execution of activities. – Use of social networks to create alerts about social conflicts and / or security problems.	IDDI, local governments
A poor understanding of the objectives by the Program team.	Low	– Strong participation of leaders, especially in executing agencies and key actors. – Support of national experts. – Training adapted for target groups.	IDDI
Low mobilization of the target group due to a poor understanding of the problems of climate change.	Low	– Greater collaboration with target communities. – A participatory approach. – Sensitization to the effects of climate change at different levels.	IDDI, Ministry of the Environment, INAPA, INDRHI, Gobernación
Lack of capacity to fulfill financial commitments, and in particular of resources by the partners in the implementation of the program.	Medium	– A continuous dialogue will be established before and after the signing of the Program document among the program partners. – Sufficient allocation within the detailed proposal and cooperation agreements made to develop teams with sufficient capacity (both in terms of size and technical capacities), which are sufficiently integrated in the executing agencies. – Establish realistic objectives for the contributions of the partners in the first instance	IIDI, Ministry of the Environment, INAPA, INDRHI
The lack of sufficiently qualified partners.	Low	– Capacity building. – Selection and evaluation of partners, needs assessments. – Collaboration with communities at a decentralized level	IDDI, CFSP, Governance

Program Sustainability

The activities proposed by the Program will help the Dominican Republic to create community-based water management plans for San Cristóbal, and will incorporate them into the work of the Ministry of Environment and Natural Resources, INAPA, INDRHI, and other relevant institutions. These plans will include 30 rural communities that are highly

vulnerable due to factors related to poverty and climate change. The construction of robust local management plans will be important for the sustainability of the activities implemented in Component 1 (such as a greater water supply or diversification of income through practices such as agroforestry). The appropriation created through the participation of local communities and the development of capacities at the community level for the planning and management of water resources, further guarantees the sustainability of the actions of the Program. The prospect of participating in new activities that produce income is an important asset to involve communities and organizations as beneficiaries. The Program emphasizes the inclusion of long-term sustainability measures in its design as one of its main priorities.

Opinion on Risk Analysis

After analyzing the potential impacts of the Program, as well as the magnitude of the main risks faced by the initiative. It is concluded that both the Program, in general, and the individual projects are viable from the point of view of their contributions to reduce climate vulnerability and increase the resilience of the target communities. This statement is extensive to the technical, financial, environmental and social aspects of the program, as well as its cost-effectiveness and general sustainability.

Management of Environmental and Social Risks

The Program has a risk rating of Category B, according to the Environmental and Social Policy of the AF. Therefore, it could have minor environmental, social or gender impacts. These impacts and risks have been evaluated during the preparation of the Environmental and Social Management System (ESMS) of the Program, which includes an ESIA (Environmental and Social Impact Assessment) and an ESMP (Environmental and Social Management Plan). Both reports are attached to this document as Appendix 1 and Appendix 2.

The program includes clearly identified interventions in each of its components. These sub-projects, mean interventions defined in the approval stage of the Program. For example, in the case of Component 1, community water management plans must be made before the final design of the water infrastructure, in accordance with the stress induced by the climate and the needs of the community. For Component 2, the appropriate management of knowledge and the dissemination of lessons learned and best practices will depend on the communication strategy adopted in the context of the Program, the effectiveness of the relevant media and the acceptance of the general public.

The ESMP focuses on process-oriented risk management, where the mechanisms are incorporated into the program's implementation to ensure that rigorous risk assessment and management measures are applied to each intervention, as they are defined, approved and implemented the relevant activities. Because of this, the ESMP has been designed to facilitate a pre-inception phase of the three-month program, to facilitate the following activities prior to the implementation of the project without default. This means that, once the proposal is approved by the AF, the IDDI and the participating institutions will take a

period of up to three (3) months to define or agree on any aspect not fully defined (at the proposal level) so that the Program start the phase of inception when receiving the funds of the AF.

Screening for Interventions

During the implementation of the Program, a checklist will be used for the regular examination of the components, according to the aspects described in Section II.A (Components of the Project). An explanatory document has been prepared for training and capacity building purposes, which is included in Appendix 2 (ESMP). This document attempts to apply the 15 principles of the AF Environmental and Social Policy (ESP) to all interventions proposed by the Program, in a way that members and beneficiaries can easily understand, and that reflect the AF objectives.

Table 17: ESP Compliance Checklist

Principles of the ESP	Activity			
	Existing Risk	Activity with Positive Impact	Activity with Negative Impact	Explanation
Compliance with the law				
Access and equity				
Marginalized and vulnerable groups				
Human rights				
Gender equity and women's empowerment				
Basic labor rights				
Indigenous populations				
Involuntary resettlements				
Protection of natural habitats				
Conservation of biological diversity				
Climate change				
Prevention of pollution and efficiency of resources				
Public health				
Physical and cultural heritage				
Land and Soil Conservation				

Non-Eligible Activities

The funds provided by the AF for the Program will not be used directly or indirectly to:

- operational or administrative costs of the ministries, directors, departments or agencies of the government of the Dominican Republic or the government of any other country;

- salaries of officials, executives or basic staff of non-governmental organizations, with the exception of salaries related to the services rendered by these persons specifically for the purposes of achieving the objectives of the Program;

- activities related to the extraction or depletion of non-renewable natural resources (including, among others, forests, aggregates, oil and gas);

- the resettlement of persons, their means of subsistence, or the elimination or alteration of any physical or cultural heritage under any circumstances; or

- any other use that is considered incompatible with the Law and / or the legal framework.

This list of exclusion of activities can be modified by recommendation of the Program Steering Committee, or by resolution of the Ministry of Environment and Natural Resources.

Public Consultations

Any potential resistance of the community to the interventions of the Program, will be avoided through a communication strategy to seek an early and constant involvement and participation of the interested parties, and maintaining permanent spaces for the exchange of information.

The following table provides a reference calendar, and establishes the frequency of queries that will be made to the community during the implementation of the Program.

Table 18: Community Consultation Schedule

Frecuency	Responsable	Purpose	Expected Results
3-month pre-inception phase	IDDI and program partners	Training program tailored to the needs of community members and project partners	Program partner network validated
Start of the program	IDDI	Collect socio-economic reference information	Reference data
As necessary and at least every 3 months (rotating communities)	IDDI	Discuss the impacts of the interventions, the challenges, the schedule, review the 15 principles of ESP; and notify the public about the grievance mechanism.	Evaluation of the impacts of interventions and program activities.

The Program Management Unit will ensure that marginalized and vulnerable groups in the selected areas are included in public consultations, maintaining smaller focus groups as needed, including: disabled people, single mothers who are head of household, the elderly (including those who do not have a fixed income or a pension, if any), Dominican descendants of Haitian nationals, and immigrants of questionable immigration status and their families.

The interested parties of the Program and the community consultations must follow the guidelines for information and public participation, established by the Ministry of Environment and Natural Resources. This includes step-by-step guidance and for capturing, analyzing and reporting comments. In addition to the existing framework for free access to public information, in the Dominican Republic there is a culture of requesting government intervention for cases in which projects violate people.

Claims Mechanism

The Ministry of Environment and Natural Resources has an established grievance procedure, which will be used as the mechanism for claiming the Program. This is covered in Law 64-00 (General Law on the Environment and Natural Resources). Complaints related to the activities of the Program implemented with AF resources, or by action or effect of the individual projects, will be directed to the personnel designated in the Program Management Unit (PMU).

The public can submit complaints through the following channels:

- On the website of the Ministry of Environment and Natural Resources:
  http://ambiente.gob.do/denuncias-ambientales/

- By email to:
  despacho@ambiente.gob.do

- In writing to:
  Ministry of Environment and Natural Resources
  Cayetano Germosén esq. Gregorio Luperón
  The Pedregal, Santo Domingo.

- By phone:
  From Monday to Friday: from 8:00 a.m. at 4:00 p.m.
  (+1) 809-539-6400; (+1) 809-200-6400 (free)

- By social networks:
  Whatsapp: (+1) 849-356-6400
  Twitter: @AmbienteRD
  Instagram: @AmbienteRD
  Facebook: @AmbienteRD

Depending on the nature of the complaint, or if for some reason the complainant is unwilling to submit a report to the Ministry of Environment and Natural Resources, they may file a complaint through the appropriate Municipal Government.

When a complaint is reported, the following information is recorded:

- The nature of the problem;
- The location of the problem;
- When the problem occurred (date and time);
- Who or what is the perceived source of the problem; and
- Any information or evidence, especially eyewitnesses, documents, photographs, videos or a sample of water or soil (the information or evidence must be credible and relate directly to the incident reported).

Optionally, the applicant's contact information: Name, Phone number, National ID ("cédula"), Address and Email (optional). This is only if the plaintiff requires it. It is not mandatory.

The complaints will be handled by the corresponding personnel of the Ministry of Environment and Natural Resources, which will investigate the complaint. This process usually includes an on-site visit to the investigation. Depending on the case, the Ministry may invite other relevant agencies (legal, coercive, technical, etc.) to participate in the investigation. During the investigation, the people or agencies responsible for the action will be identified to correct the problem. The Ministry will prepare a report of its findings and recommendations and action if necessary. The institutions participating in the Program, regardless of their role and situation, will abide without reserve the Ministry's recommendations.

The complainants may request a copy of the reports related to the complaint, as established in the Law of Free Access to Information. Any claim and the way of resolving it will be communicated to the AF.

Risk Registry

The integral risk management strategy is an integral part of the Program. The Program Management Unit (PMU) will establish and maintain a "Risk Registry" to record, track and evaluate risk management during the implementation of the Program. To increase the efficiency and transparency of the implementation, this will be evaluated and updated quarterly through the four-step process:

1. Filling and updating of the risk register by the PMU and IDDI (shared with the PEB quarterly);
2. Risk assessment and classification of interventions by beneficiaries, PMU and IDDI;

3. Risk assessment by the PEB (Executive Board of the Program), which will recommend mitigation and risk management measures for the IDDI; and

4. IDDI will work with the PMU and beneficiaries to integrate additional mitigation measures into the design and execution of project activities.

An independent external audit, conducted by a recognized firm, will be conducted annually.

Monitoring and Evaluation (M&E)

The program's focus for monitoring, reporting and evaluation is explained in the Technical Manual. The results of Monitoring and Evaluation (M&E) will be to provide project updates, risk assessments, and any changes required for the Program. In summary, the M&E will provide answers, in a systematic manner, on the progress and success of the Program and its partners to achieve the desired results and results. This includes the community's progress in climate adaptation.

Given the nature of the Program, the Program Management Unit will hire the services of an M&E officer to be responsible for data collection, compilation, follow-up and presentation of the Program's reports, as well as for supporting operational and additional assistance in the design and implementation throughout the project, adjusting the results and activities of the project according to the changing context. It is important to remain flexible and learn from the inevitable unforeseen changes in the operational landscape, and using an adaptive management approach.

Reports will be made quarterly and annually in accordance with AF standards. The monitoring and reporting plan implies an iterative approach to collect data and improve the design of the Program and the proposed interventions. The program will begin after the inception workshop with key stakeholders and interested parties, IDDI, the PMU and the M&E officer, who will clarify the purpose, roles and responsibilities of the Program, and address all pending barriers.

There are specific budget lines dedicated to M&E to ensure that the necessary resources are allocated to execute the M&E framework. The integral M&E framework of the Program will comply with the policy of the Adaptation Fund, and will be based on IDDI safeguards, formalized under its Accreditation process before the AF. The costs associated with implementing the M&E system are detailed below.

Table 19: Costs Associated with the Implementation of M&E

Type of M&E Activity	Responsable	Budget (Excluding Program staff time)	Period of Time
Inception and report workshop	- Program Manager - IDDI	Cost Estimated: $ 5,000	Within the first 2 month after the start of the Program.
Measurement of means of verification of results expected from the Program.	- The Program Manager will supervise the hiring of specific studies and institutions, and will delegate responsibilities to the members of the team.	Cost Estimated: $ 10,000 (to be finalized during the inception phase and validated by the actors in the inception workshop)	Start, middle and end of the program (during the evaluation cycle) and annually if necessary.
Measurement of the means of verification of the products of the Program and of the progress of the implementation.	- Supervised by the Program Manager - Program Staff	Cost Estimated: $ 5,000 (to be determined during the preparation of each annual work plan)	Annually before the definition of annual work plans.
Progress Report	- Program Manager - Team Program	None	Quarterly
Evaluation intermediate	- Program Manager - Program Team - Key government institutions and partners - External consultants (or evaluation team)	Cost Estimated: $ 11,000	At the midpoint of the implementation of the program.
Final evaluation	- Program Manager - Program Team - Institutions key government and partners - External consultants (or evaluation team)	Cost Estimated: $ 11,000	At least 3 months before the end of the program.
Final report of the program	- Program Manager - Program Team - IDDI - Local consultant	Cost Estimated: $ 6,000	At least 3 months before the end of the program.
Audit	- Program Manager - Program Team - IDDI - External consultants (or audit team)	Cost Estimated: $ 17,000	
Visits to field sites	- Program Manager - Program Team - Institutions key government and partners - IDDI	Cost Estimated: $ 11,500	Lifetime of the program
ESTIMATED TOTAL (USD)		**$ 76,500**	

At the beginning of the Program, basic indicators will be established to evaluate the impact of the interventions in each community. The PMU will collect the baseline data during the 3-month pre-inception phase. The indicators for the results-based monitoring framework are shown below.

Performance criteria / Standard proposed for component 1: Environmental and Social / Gender Risk Management

1. Minimize the removal of vegetation in the intervention areas;

2. Minimize contamination by solid waste, oils and agrochemicals;

3. Improvement in the quality of water available to communities;

4. Decrease in diseases related to water and related to mosquitoes;

5. Avoid impacts on flora and fauna and communities;

6. Do not include exotic or invasive species for reforestation;

7. Not cause any involuntary resettlement, be it a physical or economic displacement;

8. Equal participation of men and women in the design and improvement of water infrastructure; and

9. Participation and participation of women and vulnerable populations.

Performance criteria / Standard proposed for component 2: Environmental and Social / Gender Risk Management

1. Capacity building and capacity development;

2. Training on best practices for water management;

3. Training to create more resilient livelihoods through better water management;

4. Dissemination of the results / impacts of the program; and

5. Establish long-term platforms to incorporate the results of the Program.

The monitoring of the benefits and effectiveness of the projects will be maintained beyond the duration of the Program, through the creation of more capacities within the Ministry of Environment and Natural Resources, and other key government institutions (including support to develop new institutional processes). In relation to this issue, the agreed strategic indicators are:

1. Development of water management plans at the community level;

2. Impact of water resources and livelihoods on unplanned development;

3. Groundwater and surface water quality (physical-chemical and microbiological); and

4. Incidence of diseases related to water, sanitation and climate change.

The integral results framework of the Program described below, defines the indicators of success for the implementation of the Program as well as the respective means of verification. The table also indicates where the data, goals and indicators disaggregated by gender will be collected. A Monitoring and Evaluation (M&E) system will be established for the Program, based on these indicators and means of verification. An assessment of the baseline situation and indicators at the household level will be made at the beginning of the program and will be monitored through household surveys in the middle of the program and at the end of the program. This will allow monitoring and evaluating the impacts of the project on livelihoods and confirm the profitability of the options included for this project.

The baseline data will be obtained from the National Household Survey of Multiple Purposes (EN-HOGAR). On the other hand, NGOs that have projects in the target areas usually collect data such as income, demography and economic activities. In communities where reference data do not exist, they will be collected as part of the program's own baseline, established under the M&E.

Results Framework

Table 20: Results Framework

Indicators	Base Line	Objective	Data Source
Outcome 1: Resilient climate change management of water resources by small communities of San Cristóbal			
Number of communities in which the management plans have been developed and implemented.	There are no community management plans. Lack of coherent and planned water management activities in the communities.	Community water management plans implemented by 30 small rural communities.	Progress of the program / technical reports
Number of operational infrastructure projects for water supply and sanitation implemented by communities.	Communities have limited infrastructure projects for water supply and storage.	30 communities, benefiting at least 21,300 people (of which approximately 50% are women).	Progress of the program / technical reports
Number of measures for water conservation implemented.	There are some individual and non-inclusive measurement systems for water conservation.	Forest systems implemented on the site, which supply water to 2,722 hectares.	Progress of the program / technical reports

Result 2: Greater technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according to their respective competencies.			
Amount of training materials produced and used in the training.	Community members and their households remain vulnerable to climate change.	Availability of useful information on best practices for climate-resilient water management.	Progress of the program / technical reports
Number of provincial committees for adaptation to climate change.	Reduction of the link between key institutions and communities regarding climate change.	A Provincial Committee to Monitor Adaptation to Climate Change, fully established in San Cristóbal.	Progress of the program / technical reports
Learning platform created under the operating program.	Communities and institutions do not work collaboratively to adapt to climate change.	A collaborative platform increases community participation in climate change adaptation.	Progress of the program / reports

Alignment with AF

Project Objectives	Project Objectives Indicators	Results of the Fund	Indicators of Fund Results
Improve resilience and capacity to adapt to climate impacts and risks on water resources in San Cristóbal.	Number of communities with capacity to adapt to climate risks	**Result 2:** Strengthening institutional capacity to reduce the risks associated with socio-economic and environmental losses induced by climate.	2.1. Number and type of specific institutions with greater capacity to minimize exposure to climate variability risks.
Improve resilience and capacity to adapt to climate impacts and risks on water resources in San Cristóbal.	Number of communities with capacity to adapt to climate risks	**Result 3:** Greater awareness and ownership of adaptation processes and reduction of climate risk at the local level.	3.1. Percentage of rural beneficiary population that knows the anticipated adverse effects of climate change and the appropriate responses.
Improve resilience and capacity to adapt to climate impacts and risks on water resources in San Cristóbal.	Number of communities with capacity to adapt to climate risks	**Result 4**: Greater capacity for adaptation within the relevant development and natural resources sectors.	4.2. The physical infrastructure was improved to resist climate change and stress induced by variability.
Improve resilience and capacity to adapt to climate impacts and risks on water resources in San Cristóbal.	Number of communities with capacity to adapt to climate risks	**Result 6:** Diversified and strengthened livelihoods and sources of income for vulnerable people in specific areas.	6.1 Percentage of households and communities that have more secure (increased) access to livelihood assets.

Project Outcome	Project Outcome Indicators	Fund Outputs	Fund Output Indicator
Outcome 1: Community-level implementation of climate resilient water resource management activities	Percentage of the population with improved water management practices that are resilient to the impacts of climate change in the selected areas.	**Output 3:** Specific population groups participating in awareness-raising activities on risk reduction and adaptation	3.1.1 Number and type of actions or risk reduction strategies introduced at the local level.
Outcome 1: Community-level implementation of climate resilient water resource management activities	Percentage of the population with improved water management practices that are resilient to the impacts of climate change in the selected areas.	**Output 4:** vulnerable physical, natural and social assets strengthened in response to the impacts of climate change, including variability	4.1.2. Number of physical assets strengthened or built to withstand the conditions derived from climate variability and change (by asset types)

Detailed Budget

See Annex 2

Disbursement Schedule

See Annex 3

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

Record of endorsement on behalf of the government

Ing. Pedro García Brito, M.Sc Director of Climate Change and CDM Ministry of Environment and Natural Resources, Dominican Republic +1 809-567-4300 / +1 809-807-1116 pedro.garcia@ambiente.gob.do	Date*: (July 18, 2018)*

Implementing Entity certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (*National Development Strategy, National Communications to UNFCCC, National Policy on Climate Change, and Dominican Republic's National Action Plan for Climate Change Adaptation*) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/Programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
David Luther, Executive Director, Dominican Institute of Integral Development Implementing Entity Coordinator 	
Date: July 30, 2018	Tel. and email: +1 809 534-1077 | dluther@iddi.org
Project Contact Person: **David Luther** (Executive Director)	
Tel. And Email: +1 809 534-1077 | dluther@iddi.org	

ADAPTATION FUND

Dominican Republic

July 18, 2018

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for Enhancing climate resilience in San Cristóbal Province, Dominican Republic - Integrated Water Resources Management and Rural Development Programme

In my capacity as designated authority for the Adaptation Fund in Dominican Republic, I confirm that the above national programme proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Dominican Republic.

Accordingly, I am pleased to endorse the above programme proposal with support from the Adaptation Fund. If approved, the programme will be implemented by Dominican Institute of Integral Development and executed by the Ministry of Environment and Natural Resources; the National Institute for Water Supply and Sewerage; and community-based NGOs.

Sincerely,

Ing. Pedro García Brito, M.Sc
Director of Climate Change and CDM
Ministry of Environment and Natural Resources

MINISTERIO DE MEDIO AMBIENTE Y RECURSOS NATURALES
VICEMINISTERIO DE GESTIÓN AMBIENTAL

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS (INAPA)

001890 **"Año del Fomento de la Vivienda"**

08 DIC 2016

Al: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Correo: Secretariat@Adaptation-Fund.org
Tel.: (202) 458-7347

CC: Instituto Dominicano de Desarrollo Integral, Inc. (IDDI)
Calle H #17, Zona Industrial de Herrera, SDO
Correo: info@iddi.org
Tel.: (809) 534-1077

Tema: Programa de Fortalecimiento de la Capacidad de Resiliencia en la Provincia de San Cristóbal, República Dominicana – Manejo Integral de Recursos Hídricos y Desarrollo Rural

El Instituto Nacional de Agua Potable y Alcantarillados (INAPA) es la autoridad nacional para el agua y el saneamiento en la República Dominicana, y como tal, confirmamos que la propuesta de referencia está alineada con las normas nacionales para suministro de agua y servicios sanitarios. En relación a esto, confirmamos nuestro apoyo a las intervenciones que se proponen en el marco del Programa, así como nuestra disponibilidad e interés de participar en el desarrollo e implementación de cada una de dichas intervenciones.

Al efecto, con gusto endosamos el Programa propuesto al Fondo de Adaptación, esperando que sea valorado positivamente. Si el mismo es aprobado, nosotros vamos a trabajar con el Instituto Dominicano de Desarrollo Integral, Inc. (IDDI) para emitir los permisos y autorizaciones necesarias para ejecutar las intervenciones, en la medida que estas cumplan los requerimientos de ley.

Atentamente,

Ing. Horacio Mazara,
Director Ejecutivo

Calle Guarocuya, Edif. INAPA, Centro Comercial El Millón, Apartado 1503, Santo Domingo, Rep. Dom.
Tel.: 809-567-1241 • Fax: 809-363-0537
RNC: 401-00745-2

Annex 1. Individual Projects (sub-projects)

1. Selected Infrastructures Projects

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

AMPLIACION ACUEDUCTO MULTIPLE CAOBAL, LA CUCHILLA, VILLA ALTAGRACIA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema diseñado y construido en el año 2003 para abastecer una población de 2,607 habitantes, trabajando por gravedad Y bombeo, siendo la fuente de abastecimiento el río Duey captada mediante una cajuela que abastece al acueducto de Santo Domingo, a través de la línea de aducción Ø30" L.J. y desde aquí se realiza empalme en Ø8" PVC para abastecer el acueducto de El Caobal, además tiene como componentes:

- Línea de Conducción: Ø8" PVC (SDR-26)

- Estación de Bombeo: Cisterna en H.A., capacidad 144 m^3, dos (2) bombas de eje vertical de 30 HP cada uno.

- Línea de Impulsión: Ø8" PVC, L = 1,945.84 m y Ø6" PVC, L = 1,455.60 m

- Almacenamiento: Depósito Regulador Superficial de H.A., capacidad 250 m^3.

- Línea Matriz: Ø4" PVC (SDR-26)

- Red de Distribución Ø4", Ø3" y Ø2" PVC

En la actualidad 04/2018 este sistema requiere ampliación: nuevo Depósito Regulador, mayor capacidad de la línea de conducción y red de distribución, esto debido al deterioro físico que presenta el Depósito Regulador y al crecimiento poblacional de la zona. El nuevo rediseño contemplara los siguientes componentes:

- Fuente: Río El Duey.

- Obra de Toma: Empalme desde línea de aducción Ø30" L.J. (existente), Ac. Sto. Dgo. (CAASD)

- Línea de Conducción: Ø8" PVC (existente)

- Estación de Bombeo: Cisterna en H.A. con capacidad de 144 m³, dos (2) bombas de eje vertical de 30 HP, (verja de malla ciclónica) (existente).
- Línea de Impulsión: Ø8” PVC (existente), L = 1,945.84; Ø6” PVC (existente), L= 1,455.60 m

- Tratamiento: Cloración Simple

- Almacenamiento: Depósito regulador superficial H.A. (existente) a demoler y construir uno en la misma área con Capacidad de 300 m³.

- Línea Matriz: Ø8” PVC (SDR-26), L=32.18 m (a colocar).

- Red de Distribución: Ø4" PVC (existente), L= 1,473.12 m y Ø6” PVC (SDR-26), L= 2,165.20 m; Ø4" PVC (SDR-26), L= 4,856.00 m y Ø3" PVC (SDR-26), L= 8,360.00 m (a colocar).

- Tipo de Sistema: Gravedad – Bombeo

- Acometidas Totales: 796 unidades urbanas, 417 unidades existentes y 379 unidades a instalar

- Tasa de Crecimiento Anual: 1.6%

Población:	Año 2019:	Año 2039:
	3,980 habitantes	5,467 Habitantes

Dotación: 150 lts/hab./día.

Caudales:	Año 2019:	Año 2039:
	Qmax/d= 8.64 lps.	Qmax/d= 11.86 lps.
	Qmax/h= 12.44 lps.	Qmax/h= 17.08 lps.
		Qb= 17.80 lps.

EL CAOBAL

L.C Ø8" PVC (exist).

Registro Ac. Sto. Dgo. (CAASD).

L.C Ø8" PVC (exist).

18°35'58.75" N
70° 9'9.33" O

Cisterna en H.A. con Cap= 144 m³, dos (2) bombas de eje vertical de 30 HP.

Cloración Simple

L.I. Ø8" PVC (exist.)

V.C. Ø3" HF

Ø4" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø4" HF

Ø3" PVC (SDR-26).

V.C. Ø3" HF

L.I. Ø6" PVC (exist.)

Ø3" PVC (SDR-26).

Tapon Ø3"

Ø3" PVC (SDR-26).

V.C. Ø3" HF

Ø4" PVC (SDR-26).

TRAMO ASFALTADO
L=1,931m

L.I. Ø8" PVC (exist.)

Ø4" PVC (SDR-26).

V.C. Ø3" HF

L.I. Ø6" PVC (exist.)

V.C. Ø4" HF

L.D. Ø4" PVC (exist.)

V.C. Ø4" HF

V.C. Ø4" HF

V.C. Ø3" HF

Tapon Ø3"

V.C. Ø4" HF

V.C. Ø4" HF

V.C. Ø4" HF

Ø6" PVC (SDR-26).

Ø4" PVC (SDR-26).

Ø3" PVC (SDR-26).

Deposito Regulador
Superficial H.A. Cap= 250 m³

18°35'6.72" N
70°10'29.28" O

V.C. Ø4" HF

Tapon Ø4"

Ø8" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø4" HF

V.C. Ø3" HF

Ø6" PVC (SDR-26).

TRAMO ASFALTADO
L=780m

Ø3" PVC (SDR-26).

Ø4" PVC (SDR-26).

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø3" HF

TRAMO ASFALTADO
L=695m

Ø4" PVC (SDR-26).

V.C. Ø4" HF

Tapon Ø4"

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø3" HF

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

LEYENDA

Registro Ac. Sto. Dgo. (CAASD)

Linea de Conducción Ø8" PVC, L= 577.76 m (exist.)

Cisterna en H.A. con Cap= 144 m³, dos (2) bombas de eje vertical de 30 HP.

Linea de Impulsión:

Ø8" PVC (existente), L= 1,945.85 m.

Ø6" PVC (existente), L= 1440.32 m.

Depósito Regulador Superficial de H.A., cap= 250 m³, (exist. a demoler)

" " " " cap= 300 m³, (a construir).

Linea Matriz Ø8" PVC (SDR-26) (a colocar), L= 85.43 m.

Conducción y Distribución:

Ø6" PVC (SDR-26) (a colocar), L= 2,165.20 m.

Ø4" PVC (existente), L= 1,473.12 m.

Ø4" PVC (SDR-26) (a colocar), L= 4,856.00 m.

Ø3" PVC (SDR-26) (a colocar), L= 8,360.00 m.

Tapon Ø4", Ø3".

V.C. Ø4", Ø3" HF

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

AMPLIACION ACUEDUCTO MULTIPLE CAOBAL, LA CUCHILLA, VILLA ALTAGRACIA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema diseñado y construido en el año 2003 para abastecer una población de 2,607 habitantes, trabajando por gravedad Y bombeo, siendo la fuente de abastecimiento el río Duey captada mediante una cajuela que abastece al acueducto de Santo Domingo, a través de la línea de aducción Ø30" L.J. y desde aquí se realiza empalme en Ø8" PVC para abastecer el acueducto de El Caobal, además tiene como componentes:

- Línea de Conducción: Ø8" PVC (SDR-26)

- Estación de Bombeo: Cisterna en H.A., capacidad 144 m^3, dos (2) bombas de eje vertical de 30 HP cada uno.

- Línea de Impulsión: Ø8" PVC, L = 1,945.84 m y Ø6" PVC, L = 1,455.60 m

- Almacenamiento: Depósito Regulador Superficial de H.A., capacidad 250 m^3.

- Línea Matriz: Ø4" PVC (SDR-26)

- Red de Distribución Ø4", Ø3" y Ø2" PVC

En la actualidad 04/2018 este sistema requiere ampliación: nuevo Depósito Regulador, mayor capacidad de la línea de conducción y red de distribución, esto debido al deterioro físico que presenta el Depósito Regulador y al crecimiento poblacional de la zona. El nuevo rediseño contemplara los siguientes componentes:

- Fuente: Río El Duey.

- Obra de Toma: Empalme desde línea de aducción Ø30" L.J. (existente), Ac. Sto. Dgo. (CAASD)

- Línea de Conducción: Ø8" PVC (existente)

- Estación de Bombeo: Cisterna en H.A. con capacidad de 144 m³, dos (2) bombas de eje vertical de 30 HP, (verja de malla ciclónica) (existente).
- Línea de Impulsión: Ø8” PVC (existente), L = 1,945.84; Ø6” PVC (existente), L= 1,455.60 m

- Tratamiento: Cloración Simple

- Almacenamiento: Depósito regulador superficial H.A. (existente) a demoler y construir uno en la misma área con Capacidad de 300 m³.

- Línea Matriz: Ø8” PVC (SDR-26), L=32.18 m (a colocar).

- Red de Distribución: Ø4" PVC (existente), L= 1,473.12 m y Ø6” PVC (SDR-26), L= 2,165.20 m; Ø4" PVC (SDR-26), L= 4,856.00 m y Ø3" PVC (SDR-26), L= 8,360.00 m (a colocar).

- Tipo de Sistema: Gravedad – Bombeo

- Acometidas Totales: 796 unidades urbanas, 417 unidades existentes y 379 unidades a instalar

- Tasa de Crecimiento Anual: 1.6%

Población:	Año 2019:	Año 2039:
	3,980 habitantes	5,467 Habitantes

Dotación: 150 lts/hab./día.

Caudales:	Año 2019:	Año 2039:
	Qmax/d= 8.64 lps.	Qmax/d= 11.86 lps.
	Qmax/h= 12.44 lps.	Qmax/h= 17.08 lps.
		Qb= 17.80 lps.

LOMA VERDE.

Tapon Ø3"

Ø3" PVC (SDR-26).

Tapon Ø3"

Tapon Ø3"

Ø3" PVC (SDR-26).

Ø4" PVC (exist.).

Tapon Ø3"

Ø3" PVC (SDR-26)

LOS MEJIA

Tapon Ø3"

Ø3" PVC (SDR-26).

V.C. Ø3" HF

V.C. Ø3" HF

Ø4" PVC (SDR-26).

Ø3" PVC (exist.).

V.C. Ø4" HF

Tapon Ø4"

Ø4" PVC (SDR-26).

LOS REINOSO

V.C. Ø4" HF

Ø3" PVC (SDR-26).

Ø4" PVC (SDR-26).

V.C. Ø4" HF

Ø4" PVC (SDR-26).

V.C. Ø3" HF

V.C. Ø4" HF

LOS NUÑEZ

V.C. Ø3" HF

L.I. Ø6" PVC (SDR-21).

V.C. Ø4" HF

V.C. Ø4" HF

Cloración Simple

Ø6" PVC (SDR-26) .

Deposito Regulador
Superficial H.A. cap= 150 m³.

V.C. Ø3" HF

Tapon Ø3"

Ø3" PVC (SDR-26).

18°32'50.69" N
70° 8'46.14" O

Ø6" PVC (SDR-26).

Ø4" PVC (SDR-26).

LOS JESUS

L.M. Ø6" PVC (SDR-26).

Ø3" PVC (exist.).

18°32'47.50" N
70° 8'25.93" O

L.I. Ø6" PVC (SDR-21).

Ø3" PVC (SDR-26).

Pozo #2
(a construir)

Tapon Ø3"

Ø4" PVC (exist.).

Ø2" PVC (SDR-21).

Tapon Ø2"

Pozo #1 (exist.)
(a rehabilitar y equipar)

18°32'46.13" N
70° 8'26.77" O

LEYENDA

Obra de Toma: Campo de Pozos

Dos (2), uno existente (rehabilitar y equipar) y uno a construir.

Línea de Impulsión:

Ø6" PVC (SDR-21), L= 956.08 m.

Almacenamiento:

Deposito Regulador Superficial H.A. cap= 150 m³.

Línea de Matriz:

Ø6" PVC (SDR-26), L= 30.60 m.

Red de Distribución:

Ø6" PVC (SDR-26), L= 392.63 m.

Ø4" PVC (exist.), L= 734.36 m.

Ø4" PVC (SDR-26), L= 873.78 m.

Ø3" PVC (exist.), L= 736.00 m.

Ø3" PVC (SDR-26), L= 2,579.19 m.

Ø2" PVC (SDR-21), L= 51.30 m.

Tapon Ø4", Ø3", Ø2".

V.C. Ø4", Ø3" HF

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

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DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO CASTAÑO, DISTRITO MUNICPAL MEDINA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

La comunidad de Castaño con sus sectores cuenta con dos (2) pozos con una fuente pública cada uno, los cuales no garantizan un servicio apto para el consumo humano, pues no poseen ningún tipo de tratamiento. En el 2013 se inicio la construcción del acueducto a través del Banco Interamericano de Desarrollo (BID), luego la obra fue paralizada y rescindida, en dicho año los comunitarios fueron organizados y capacitados por la ONG. Sur Futuro, formando la Asociación Comunitaria de Acueducto Rural (asocar), además los comunitarios compraron dos terrenos, uno por RD$ 90,000.00 pesos para la construcción del depósito y otro por RD$ 30,000.00 pesos para la construcción del local de la ASOCAR.

El sistema a construir que abastecerá de agua potable a la comunidad de Castaño con sus sectores: Vietnam, La Cuaba y La Cuabita, tendrá como fuente de abastecimiento las aguas subterráneas, ubicadas en la margen del Rio Sosua en la sección de Cataño, mediante un campo de pozos, además tendrá como componentes las siguientes unidades:

- Estación de bombeo: (nicho para paneles de control, equipos de bombeo y verja de malla ciclónica).
- Línea de Impulsión: Ø6” PVC (SDR-21), L=1,116.61m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador elevado 12 m H.A., Cap= 150m^3 (a construir).
- Línea Matriz: Ø6” PVC (SDR-26), L=60.00m. (a colocar)
- Red de Distribución: Ø4” PV (SDR-26), L= 1,422.55 m; Ø3” PVC (SDR-26), L= 3,932.21 m. (a colocar)
- Tipo de Sistema: Bombeo.
- Acometidas: 347 unidades rurales.
- Tasa de crecimiento: 1.6%

Población: Año 2019: 1,737 habitantes Año 2039: 2,386 habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019:

Qmax. /d = 3.77 Lps.

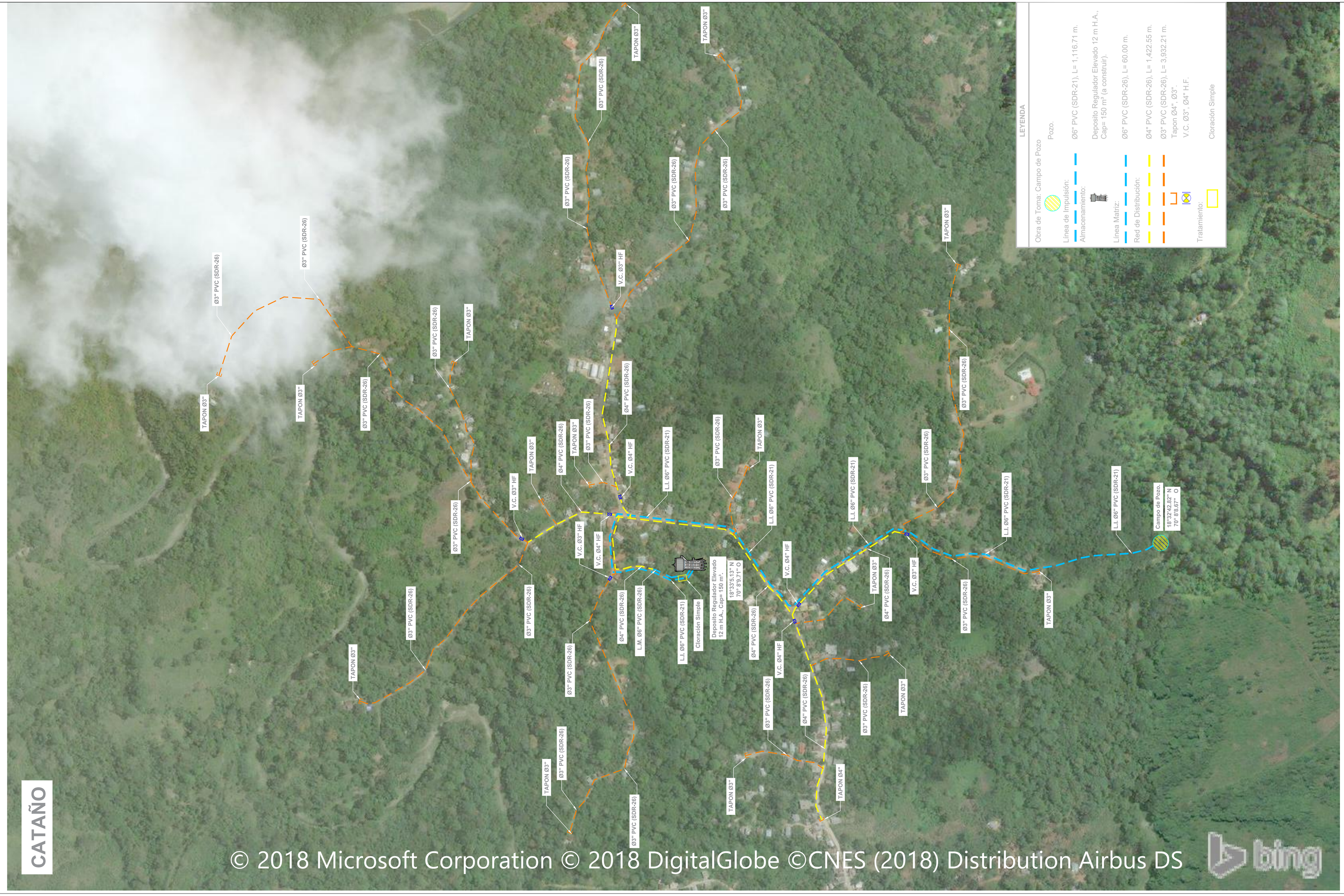
Qmax. /h = 5.43 Lps.

Año 2039:

Qmax. /d = 5.18 Lps

Qmax. /h = 7.46 Lps.

Qb. = 7.77 laps


LEYENDA
Obra de Toma: Campo de Pozo
Pozo.
Línea de Impulsión:
Ø6" PVC (SDR-21), L= 1,116.71 m.
Almacenamiento:
Deposito Regulador Elevado 12 m H.A., Cap= 150 m³ (a construir).
Línea Matriz:
Ø6" PVC (SDR-26), L= 60.00 m.
Red de Distribución:
Ø4" PVC (SDR-26), L= 1,422.55 m.
Ø3" PVC (SDR-26), L= 3,932.21 m.
Tapon Ø4", Ø3":
V.C. Ø3", Ø4" H.F.
Tratamiento:
Cloración Simple
Campo de Pozo, 18°32'42.82" N 70° 8'8.87" O
Deposito Regulador Elevado 12 m H.A., Cap= 150 m³. 18°33'5.13" N 70° 8'9.71" O
CATAÑO
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INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE LOS ALGARROBOS - OCHOA, DISTRITO MUNICIPAL MEDINA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

El sistema que abastece de agua con precariedad a la comunidad de Los Algarrobos fue construido en el año 2010, bajo la supervisión del síndico en turno y tiene como componentes: Fuente, aguas subterráneas; Obra de toma, campo de pozos (2) con una fuente publica cada uno; Línea de Impulsión Ø1" PVC, L=300 m; Depósito Regulador Superficial de Block, capacidad 2,640 Gls (10 m^3) con una fuente publica para uso de emergencia.

En vista de que la fuente (aguas subterráneas) que abastece el sistema reduce considerablemente su caudal, es necesario reubicar nueva zona para campo de pozos y extender el sistema a la comunidad de Ochoa para garantizar la demanda requerida por la población de ambas comunidades, además la propuesta contempla las siguientes unidades:

- Obra de Toma: Campo de pozos con estación de bombeo (nicho para paneles de control, equipos de bombeo y verja de malla ciclónica) ubicados en la carretera Medina – La Cuchilla. (a construir)
- Línea de Impulsión: Ø4" PVC(SDR-21), L= 1,628.00 m. (a colocar)
- Tratamiento: Cloración Simple
- Almacenamiento: Depósito Regulador Elevado 10 m H.A., capacidad 65 m^3 (a construir).
- Línea Matriz: Ø4" PVC (SDR-26), L= 59.44 m. (a colocar)
- Red de Distribución: Ø4" PVC (SDR-26), L= 313.65 m; Ø3" PVC (SDR-26), L= 4,430.00m y Ø2" PVC (SDR-26), L= 100.00 m. (a colocar)
- Tipo de Sistema: Bombeo.
- Acometidas: 160 unidades rurales.
- Tasa de crecimiento: 1.6%

Población: Año 2019: 799 habitantes. Año 2039: 1,098 habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019: Qmax/d= 1.73 lps

Qmax/h= 2.50 lps

Año 2039: Qmax/d= 2.38 lps

Qmax/h= 3.43 lps

Qb= 3.57 lps

LOS ALGARROBOS - OCHOA

ZONA DE POZO
18°32'34.10" N
70° 8'36.75" O

Cloración Simple

L.I. Ø4" PVC (SDR-21)

L.I. Ø4" PVC (SDR-21)

L.I. Ø4" PVC (SDR-21)

L.I. Ø4" PVC (SDR-21)

Ø3" PVC (SDR-26)

L.I. Ø4" PVC (SDR-21)

TAPON Ø3"

Ø3" PVC (SDR-26)

18°32'32.29" N
70° 7'49.88" O

Dep. Reg. Elevado 10 m
H.A., Cap= 65 m³.

V.C. Ø3" HF

V.C. Ø3" HF

Línea Matriz Ø4" PVC
(SDR-26)

V.C. Ø4" HF

V.C. Ø3" HF

Ø4" PVC (SDR-26)

LOS ALGARROBOS

HIDRANTE

V.C. Ø3" HF

OCHOA

Ø3" PVC (SDR-26)

Ø2" PVC (SDR-26)

TAPON Ø2"

Ø3" PVC (SDR-26)

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

Ø4" PVC (SDR-26)

V.C. Ø3" HF

Ø3" PVC (SDR-26)

V.C. Ø3" HF

V.C. Ø3" HF

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

TAPON Ø3"

LEYENDA

Obra de Toma: Campo de Pozos

Pozo.

Línea de Impulsión:

Ø4" PVC (SDR-21), L= 1,627.92 m.

Almacenamiento:

Deposito Regulador Elevado 10 m H.A.,
Cap= 65 m³ (a construir).

Línea Matriz:

Ø4" PVC (SDR-26)), L= 59.44 m.

Red de Distribución:

Ø4" PVC (SDR-26), L= 313.65 m.

Ø3" PVC (SDR-26), L= 4,430.00 m.

Ø2" PVC (SDR-21), L= 100.00 m.

Tapon Ø3", Ø2".

Hidrante.

V.C. Ø3", Ø4" H.F.

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

REHABILITACION ACUEDUCTO SAN FRANCISCO, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

La comunidad de San Francisco se abastece por un sistema construido por los comunitarios en el año 2004, teniendo como componentes:

- Fuente: Noria San Francisco
- Obra de Toma: Cajuela en nacimiento de la noria.
- Línea de aducción: Ø3" PVC, semi presión, L= 260.00 m, aproximados.
- Almacenamiento: Depósito Regulador Superficial en block 50 m³.
- Línea matriz: Ø2" PVC semi-presión.
- Red de Distribución: Ø2", Ø1 1/2" Y Ø1". PVC semi-presión
- Acometidas: 40 Unidades Rurales

En la actualidad 04/2018 este sistema se encuentra en estado de deterioro a causa de los fenómenos naturales, además no fue construido considerando las especificaciones técnicas.

Para que el sistema opere con eficiencia debe ser rehabilitado, teniendo como componentes:

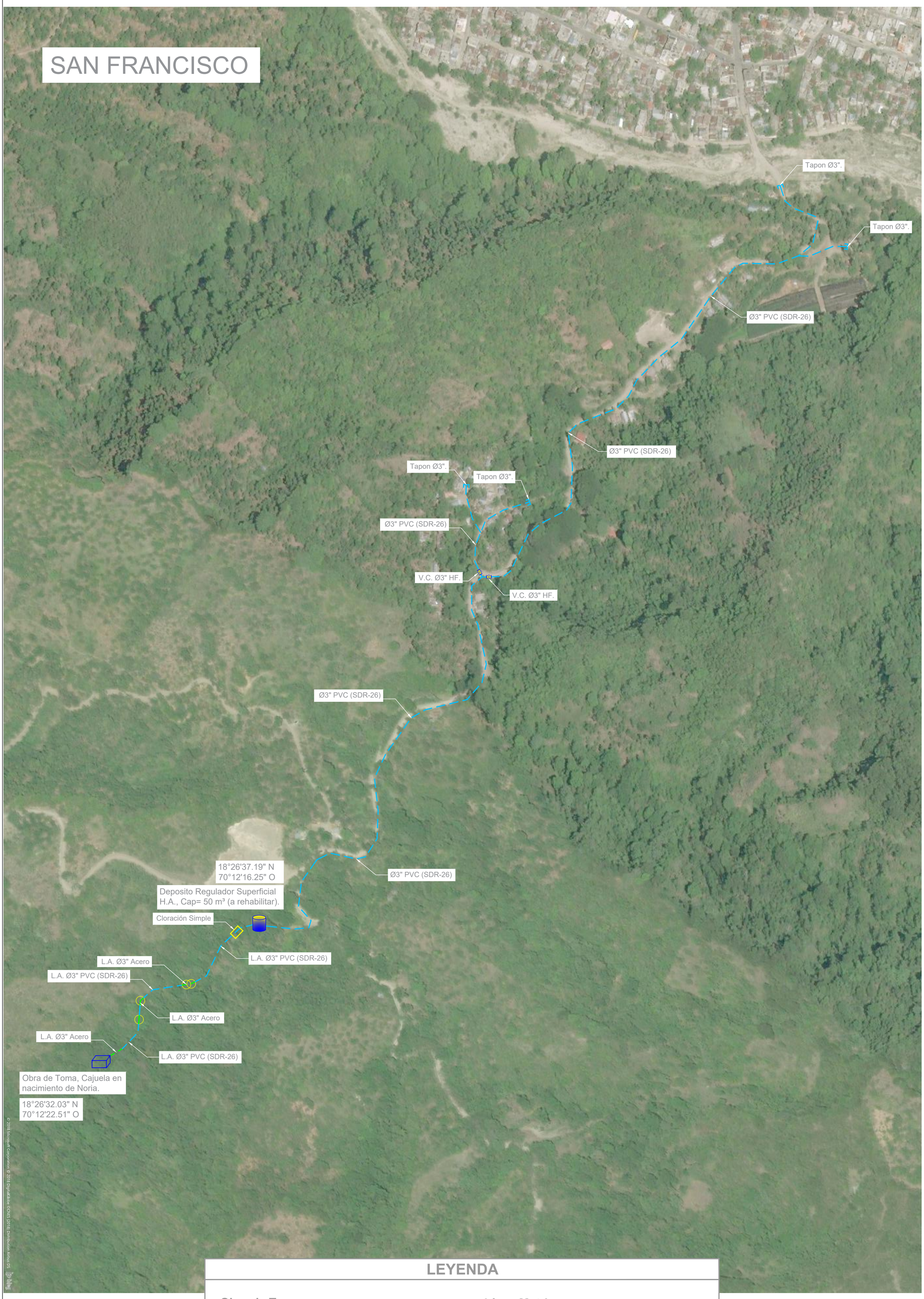
- Fuente: noria San Francisco
- Obra de Toma: Cajuela en nacimiento a rehabilitar (colocar tapa, válvula de compuerta a la salida, resane y desagüe) (a rehabilitar)
- Línea de Aducción: Sustituir tubería existente de Ø3 PVC semi-presión por Ø3" PVC (SDR-21), L= 196.15 m y Ø3" Acero, L= 52.00 para los cruces. (a colocar)
- Tratamiento: Cloración Simple
- Almacenamiento: Depósito Regulador Superficial de Block Cap= 45 m³ a rehabilitar (resane, pintura, verja, escalera exterior e interior, By-pass y limpieza del área). (a rehabilitar)
- Línea Matriz: Ø3" PVC (SDR-26), L= 140.53 m. (a colocar)
- Red de Distribución: Ø3" PVC (SDR-26), L= 1,402.91 m. (a colocar)
- Tipo de Sistema: Gravedad

- Acometidas totales: 40 unidades rurales,
- Tasa de Crecimiento: 1.6 anual

Población:	**Año 2019**	**20 años (2039)**
	346 habitantes	476 habitantes

Dotación: 100 lts/hab/día

Año 2019:	Año 2039:
Qmax. /d = 0.50 lps	Qmax. /d = 0.69 lps
Qmax. /h = 0.72 lps	Qmax. /h = 0.99 lps



LEYENDA

Obra de Toma:

Cajuela en el nacimiento de la noria. (exist.) (a rehabilitar).

Línea de Aducción:

Ø3" PVC (SDR-21), L= 196.15 m.

Ø3" Acero, L= 52.00 m.

Almacenamiento:

Deposito Regulador Superficial de Block, Cap= 45 m³ (a rehabilitar).

Línea Matriz:

Ø3" PVC (SDR-26), L= 140.53 m.

Red de Distribucion:

Ø3" PVC (SDR-26), L= 1,402.91 m.

Tapón Ø3".

V.C. Ø3" HF

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO ARROYO HIGUERO, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

El sistema que abastece a la comunidad de Arroyo Higüero se encuentra deteriorado, fue construido en el año 1975, teniendo como componentes: Fuente, Arroyo María; Obra de Toma directa; Línea de Aducción Ø2" semi-presión; Deposito Superficial H.A. capacidad 7 m³; Redes de Distribución Ø1" y Ø1/2" PVC semi-presión.

En vista a las condiciones en que se encuentra el sistema y a la poca capacidad para almacenar y conducir el caudal demandado por la población, se propone construir un sistema de agua potable contemplando las siguientes unidades:

- Fuente: Arroyo María
- Obra de Toma: Cajuela en nacimiento del arroyo. (a construir)
- Línea de Aducción: Ø4” PVC (SDR-21), L= 635.00 m; Ø3 Acero, L= 652.00 m; Ø3” PVC (SDR-21), L= 1,167.27 m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador Elevado 10.00 m H.A., Cap.= 45 m³ (a construir).
- Línea Matriz: Ø4” PVC (SDR-26), L= 308.00 m. (a colocar)
- Red de Distribución: Ø3” PVC (SDR-26), L= 820.00 m; Ø2” PVC (SDR-21), L= 60.00 m (a colocar)
- Tipo de Sistema: Gravedad
- Acometidas: 85 unidades rurales.
- Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	426 habitantes	585 Habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019: Qmax/d = 0.92 Lps.	Año 2039: Qmax/d = 1.27 Lps.
Qmax/h = 1.33 Lps.	Qmax/h = 1.83 Lps.

Arroyo Higüero

18°28'47.22" N
70°12'24.20" O

Zona de O.T (Cajuela en nacimiento arroyo Maria)(a construir).

Ø4" PVC (SDR-21).

Ø4" PVC (SDR-21).

Ø4" PVC (SDR-21).

O.T. (exist.) (a dejar fuera de servicio).

Línea de Aducción Ø3" Acero.

Línea de Aducción Ø3" Acero.

Línea de Aducción Ø3" PVC (SDR-21).

Línea de Aducción Ø3" PVC (SDR-21).

Línea de Aducción Ø3" PVC (SDR-21).

Carretera Arroyo Higuero - La Colonia.

Línea de Aducción Ø3" PVC (SDR-21).

Línea de Aducción Ø3" PVC (SDR-21).

Cloración Simple.

Deposito Regulador Elevado
10 m de H.A., capacidad 45 m³

18°27'49.50" N
70°12'19.99" O

Línea Matriz Ø4" PVC (SDR-26).

Ø3" PVC (SDR-26).

C. Arroyo Higüero

TAPON Ø2"

Ø2" PVC (SDR-21).

V.C. Ø3" HF

V.C. Ø3" HF

Ø3" PVC (SDR-26).

V.C. Ø3" HF

TAPON Ø3"

LEYENDA

Obra de Toma:

- **Cajuela en nacimiento arroyo Maria (a construir).**

Línea de Aducción:

- **Ø4" PVC (SDR-21), L= 635.00 m.**
- **Ø3" Acero, L= 652.00 m.**
- **Ø3" PVC (SDR-21), L= 1,167.27 m.**

Almacenamiento:

- **Deposito Regulador Elevado 10.00 m H.A., cap= 45 m³**
- **Línea Matriz Ø4" PVC (SDR-26), L= 308.00 m**

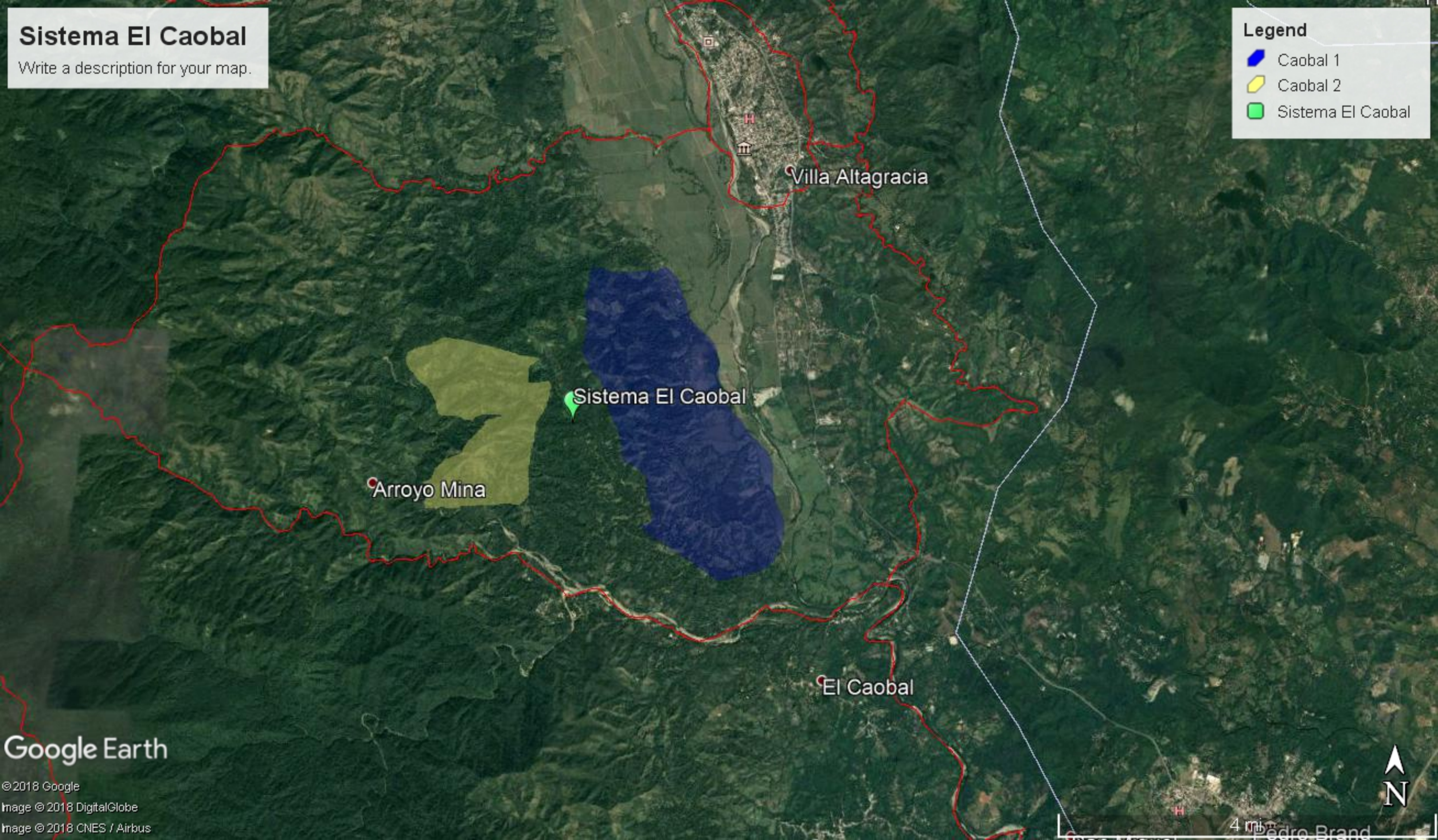
Red de Distribucion:

- Ø3" PVC (SDR-26), L= 820.00 m
- Ø2" PVC (SDR-21), L= 60.00 m
- Tapón Ø3", Ø2".
- V.C. Ø3" HF
- O.T. (exist.) (a dejar fuera de servicio).
- Carreta Arroyo Higuero-La Colonia.

Tratamiento:

- Cloración Simple

2. Selected Re-afforestation Areas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Legend
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Sistema El Caobal
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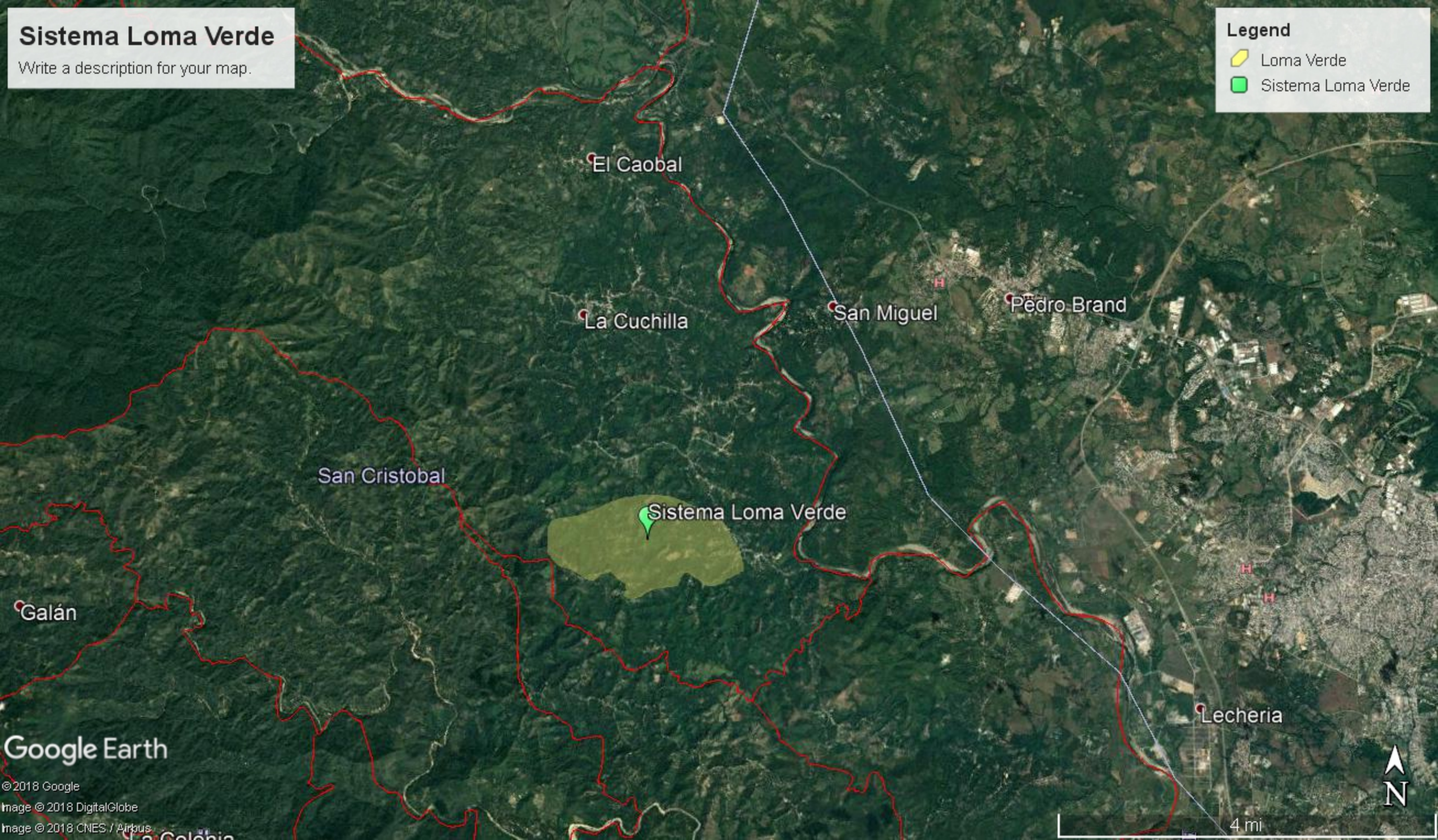
Sistema Loma Verde
Write a description for your map.
Legend
Loma Verde
Sistema Loma Verde
El Caobal
La Cuchilla
San Miguel
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© 2018 Google
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Image © 2018 CNES / Airbus
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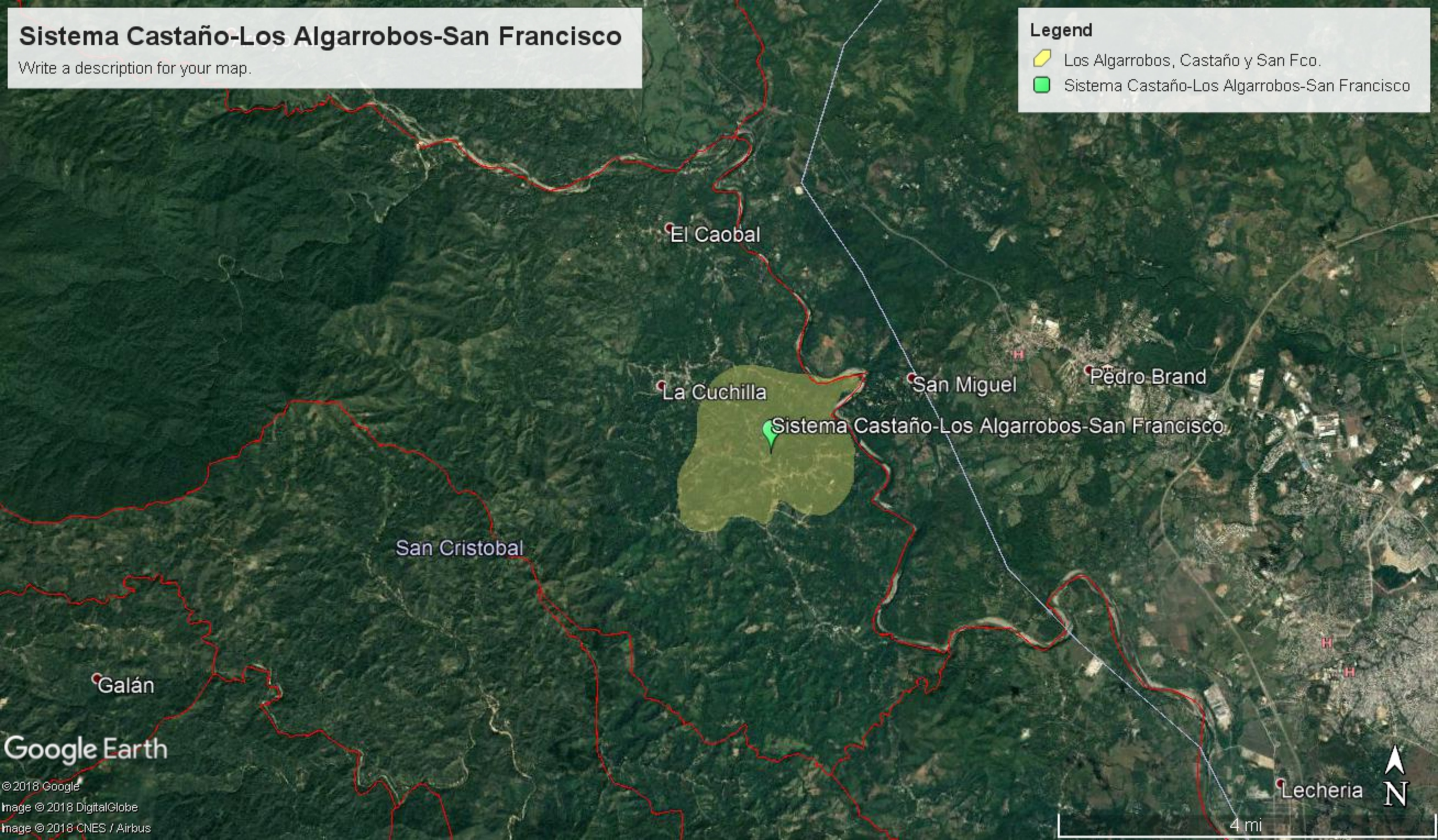
Sistema Castaño-Los Algarrobos-San Francisco
Write a description for your map.
Legend
Los Algarrobos, Castaño y San Fco.
Sistema Castaño-Los Algarrobos-San Francisco
El Caobal
La Cuchilla
San Miguel
Pedro Brand
Sistema Castaño-Los Algarrobos-San Francisco
San Cristobal
Galán
Lecheria
Google Earth
© 2018 Google
Image © 2018 DigitalGlobe
Image © 2018 CNES / Airbus
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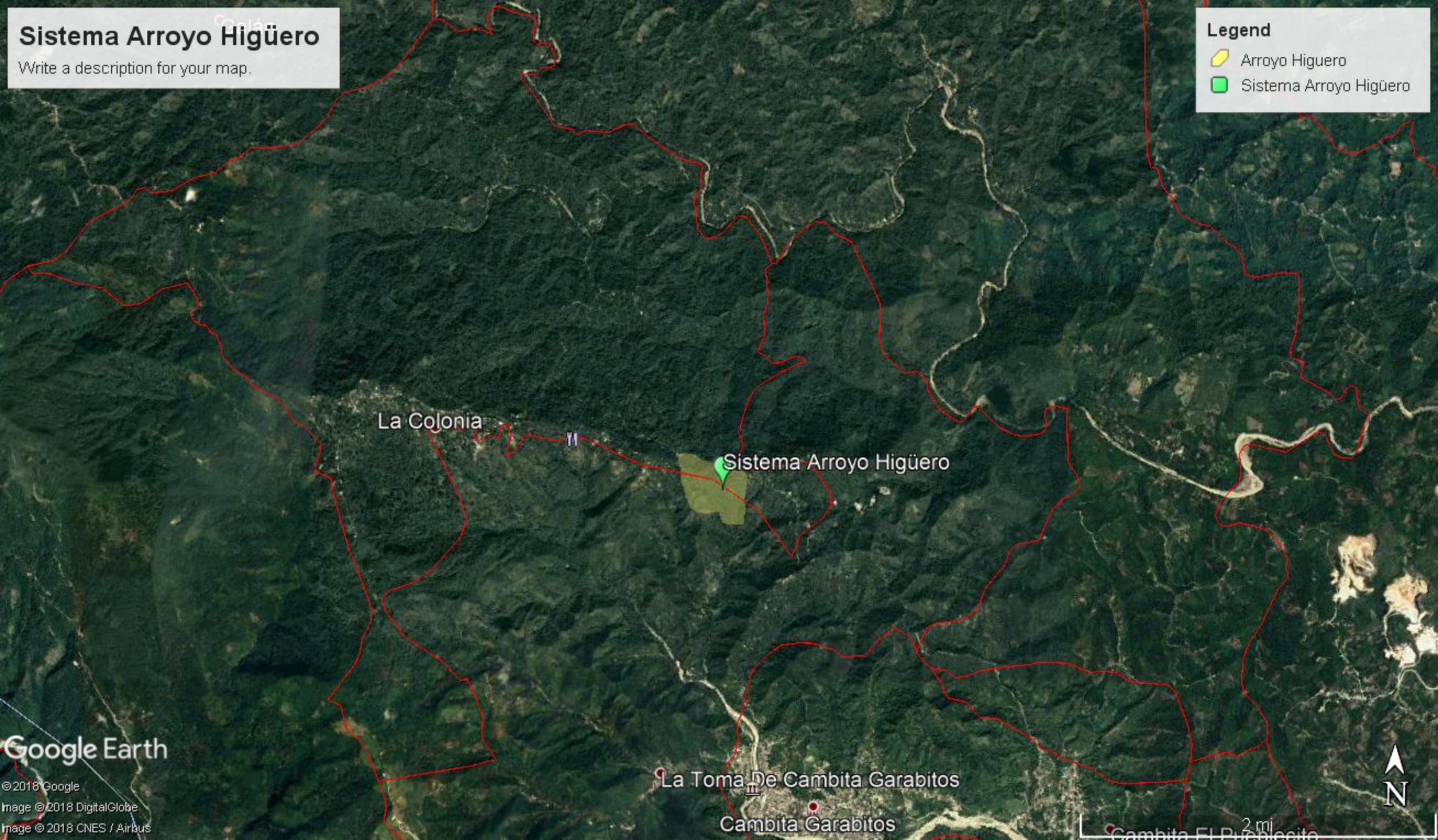
Sistema Arroyo Higüero
Write a description for your map.
Legend
Arroyo Higuero
Sistema Arroyo Higüero
La Colonia
Sistema Arroyo Higüero
La Toma De Cambita Garabitos
Cambita Garabitos
Google Earth
© 2018 Google
Image © 2018 DigitalGlobe
Image © 2018 CNES / Airbus
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2 mi


Sistema El Fundo
Write a description for your map.
Legend
El Fundo
Sistema El Fundo
La Toma De Cambita Garabitos
Cambita Garabitos
Cambita El Pueblecito
Sistema El Fundo
Google Earth
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3. Additional Projects (excluded by the lack of foreseen funding)

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE MUCHA AGUA - FIRME PUNDUN, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema a construir abastecerá de agua potable a las comunidades de: Mucha Agua, Humachon, La Pangola, Juan Roman, El Arroyo, La Jicotea, El Limón, La Canelilla, El Alto y Firme Pundun. Teniendo como componentes las siguientes unidades:

- Fuente: Río Mucha Agua
- Obra de Toma: Dique Caucasiano (a construir)
- Línea de Aducción: Ø6” PVC (SDR-21), L= 855.35 m. (a colocar)
- Tratamiento: Planta Potabilizadora Filtración Rápida 12 lps con Tanque Adosado, Cap= 50 m³
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 200 m³ (a construir)
- Línea Matriz: Ø6” PVC (SDR-26), L= 80.00 m. (a colocar)
- Red de Distribución: Ø4” PVC (SDR-26), L=2,691.36 m y Ø3” PVC (SDR-26), L= 6,442.37m. (a colocar)
- Tipo de Sistema: Gravedad – Bombeo
- Acometidas: 450 unidades rurales.
- Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	2,286 habitantes	3,140 Habitantes

Dotación: 150 lts/hab/día.

Caudales:

Año 2019: Qmax/d= 4.96 lps	Año 2039: Qmax/d= 6.81 lps
Qmax/h= 7.14 lps	Qmax/h= 9.81 lps
	Qb= 10.22 lps

La comunidad de El Firme Pundun, será abastecida como extensión del acueducto múltiple Mucha Agua, mediante una estación de relevo, ya que la misma se encuentra en una zona más elevada que la zona de planta-depósito del sistema múltiple, para dicha extensión se contemplaron las siguientes unidades:

- Línea de Conducción: Ø3” PVC (SDR-26), L= 974.02 m desde Línea Matriz Ø6” del acueducto múltiple hasta la Estación de Bombeo (Cisterna de 30 m³, nicho para paneles de control, equipo de bombeo y verja de malla ciclónica).
- Línea de Impulsión: Ø3” PVC (SDR-13.5), L= 2,388.65 m
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 45 m^3
- Línea Matriz: Ø4” PVC (SDR-26), L= 100.00 m
- Red de Distribución: Ø3” PVC (SDR-26), L= 6,170.67 m.
- Tipo de Sistema: Bombeo
- Acometidas: 65 unidades rurales.

Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039
	330 habitantes	454 habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019: Qmax/d= 0.72 lps	Año 2039: Qmax/d= 0.98 lps
Qmax/h= 1.03 lps	Qmax/h= 1.42 lps
	Qb= 1.48 lps

MUCHA AGUA - FIRME PUNDUN

Obra de Toma Dique Caucasiano. (Rio Mucha Agua)
18°26'27.10" N
70°14'48.82" O

L.A. Ø6" PVC (SDR-21).

Planta de Tratamiento 12 Lps y Tanque Adosado, cap= 50 m³ con Estación de Bombeo.
18°26'2.27" N
70°14'49.43" O

Deposito Regulador Superficial H.A., Cap= 200 m³
18°25'56.54" N
70°14'40.42" O

Deposito Regulador Superficila H.A., cap= 45 m³.
18°26'34.57" N
70°13'40.33" O

Cisterna 30 m³.
18°25'57.38" N
70°14'21.24" O

Fuente publica con 3 Llaves Chorro con caseta para proteccion.

MUCHA AGUA
EL MAMEY
EL CEDRO
BOTONCILLO
HUMACHON
LA GUAMA
JUAN ROMAN
LA PANGOLA
LA JAGUITA
FIRME PUNDUN

ENVALSE PRESA VALDESIA

LEYENDA

Obra de Toma
Dique Caucasiano.

Línea de Aducción:
Ø6" PVC (SDR-21), L= 855.35 m.

Tratamiento:
Planta Potabilizadora Filtración Rapida 12 lps con Tanque Adosado, cap= 50 m³.
Estación de Bombeo.

Línea de Impulsión:
Ø6" PVC (SDR-21), L= 788.67 m.

Almacenamiento:
Deposito Regulador Superficial H.A., Cap= 200 m³

Línea de Matriz:
Ø6" PVC (SDR-26), L= 80.00 m.

Red de Distribucion:
Ø4" PVC (SDR-26), L= 2,691.36 m
Ø3" PVC (SDR-26), L= 6,442.37 m
Tapón Ø4", Ø3".
V.C. Ø4", Ø3" HF

Extension Firme Pundun

Línea de Conducción:
Ø3" PVC (SDR-26), L= 974.02 m

Estacion de Bombeo:
Cisterna 30 m³, nicho para paneles de control, equipo de bombeo y verja de malla ciclonica.

Línea de Impulsión:
Ø3" PVC (SDR-13.5), L= 2,388.65 m

Almacenamiento:
Deposito Regulador Superficial H.A., Cap= 45 m³.

Línea Matriz:
Ø4" PVC (SDR-26), L= 100.00 m

Red de Distribución:
Ø3" PVC (SDR-26), L= 6,170.67 m
Tapón Ø4", Ø3".
V.C. Ø3" HF.

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE LAS COLES – LA ESTANCIA, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

El sistema a construir que abastecerá de agua potable a las comunidades de: Las Coles, El Macao y La Estancia, teniendo como fuente las aguas subterráneas ubicadas en la margen de Cañada Fría, teniendo como componentes:

- Obra de Toma: Un (1) Pozo con Estación de Bombeo (transformador, nicho para paneles de control, equipo de bombeo y verja de malla ciclónica).
- Línea de Impulsión: Ø4” PVC (SDR-21), L= 1,016.00 m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 70 m³ (a construir)
- Línea Matriz: Ø4” PVC (SDR-26), L=183.00 m. (a colocar)
- Red de Distribución: Ø3” PVC (SDR-26), L= 2,782.05 m. (a colocar)
- Tipo de Sistema: Bombeo
- Acometidas: 125 unidades rurales.

Habitantes flotantes: 600

Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	1,235 habitantes	1,472 Habitantes

Dotación: 120 lts/hab./día.

Caudales:

Año 2019:	Qmax/d= 2.14 lps	Año 2039: Qmax/d= 2.56 lps
	Qmax/h= 3.22 lps	Qmax/h= 3.68 lps
		Qb= 3.83 lps

LAS COLES - LA ESTANCIA

Campo de Pozo.

18°28'6.51" N
70°15'28.50" O

Cloración Simple

L.I. Ø4" PVC (SDR-21).

L.I. Ø4" PVC (SDR-21).

L.I. Ø4" PVC (SDR-21).

Fuente Publica con tres (3) Llaves Chorro con caseta para protección.

Ø3" PVC (SDR-26).

18°27'44.39" N
70°15'17.91" O

Deposito Regulador
Superficial H.A., Cap= 70 m³

L.I. Ø4" PVC (SDR-21).

V.C. Ø3" HF.

L.M. Ø4" PVC (SDR-26).

V.C. Ø3" HF.

Tapon Ø3"

V.C. Ø3" HF.

LAS COLES

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø3" HF.

V.C. Ø3" HF.

Tapon Ø3"

Tapon Ø3"

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

EL MACAO

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

LA ESTANCIA

Ø3" PVC (SDR-26).

Tapon Ø3"

LEYENDA

Obra de Toma: Campo de Pozos.
Pozos.

Línea de Impulsión:
Ø4" PVC (SDR-21), L= 1,016.00 m.

Almacenamiento:
Deposito Regulador Superficial H.A. cap= 70 m³.

Línea Matriz:
Ø4" PVC (SDR-26), L= 183.00 m.

Red de Distribución:
Ø3" PVC (SDR-26), L= 2,782.05 m.

Fuente Publica con tres (3) Llaves Chorro.

Tapon Ø4", Ø3".

V.C. Ø3" HF.

Tratamiento:
Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE ZONA BAJA DE RESOLI, NAJAYO ARRIBA, LA PANADERIA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES:

El sistema a construir abastecerá de agua potable a las comunidades de: Zona Baja de Resoli, Najayo Arriba, Tierra Amarilla, Zorra Buena (El Refugio), La Penca, Pozo Prieto, Maricao y La Panadería. Teniendo como componentes las siguientes unidades:

- Fuente: Aguas Subterráneas ubicada en la comunidad de La Panadería
- Obra de Toma: Campo de Pozos. (a construir)
- Línea de Impulsión: Ø6" PVC (SDR-21), L= 2,204.00 m y Ø6" Acero, L= 1,766.05 m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 300 m³ (a construir)
- Línea Matriz: Ø6" PVC (SDR-26), L= 60.00 m. (a colocar)
- Red de Distribución: Ø4" PVC (SDR-26), L=10,359.76 m y Ø3" PVC (SDR-26), L= 8,119.20 m. (a colocar)

Tipo de Sistema: Bombeo

Acometidas: 778 unidades rurales.

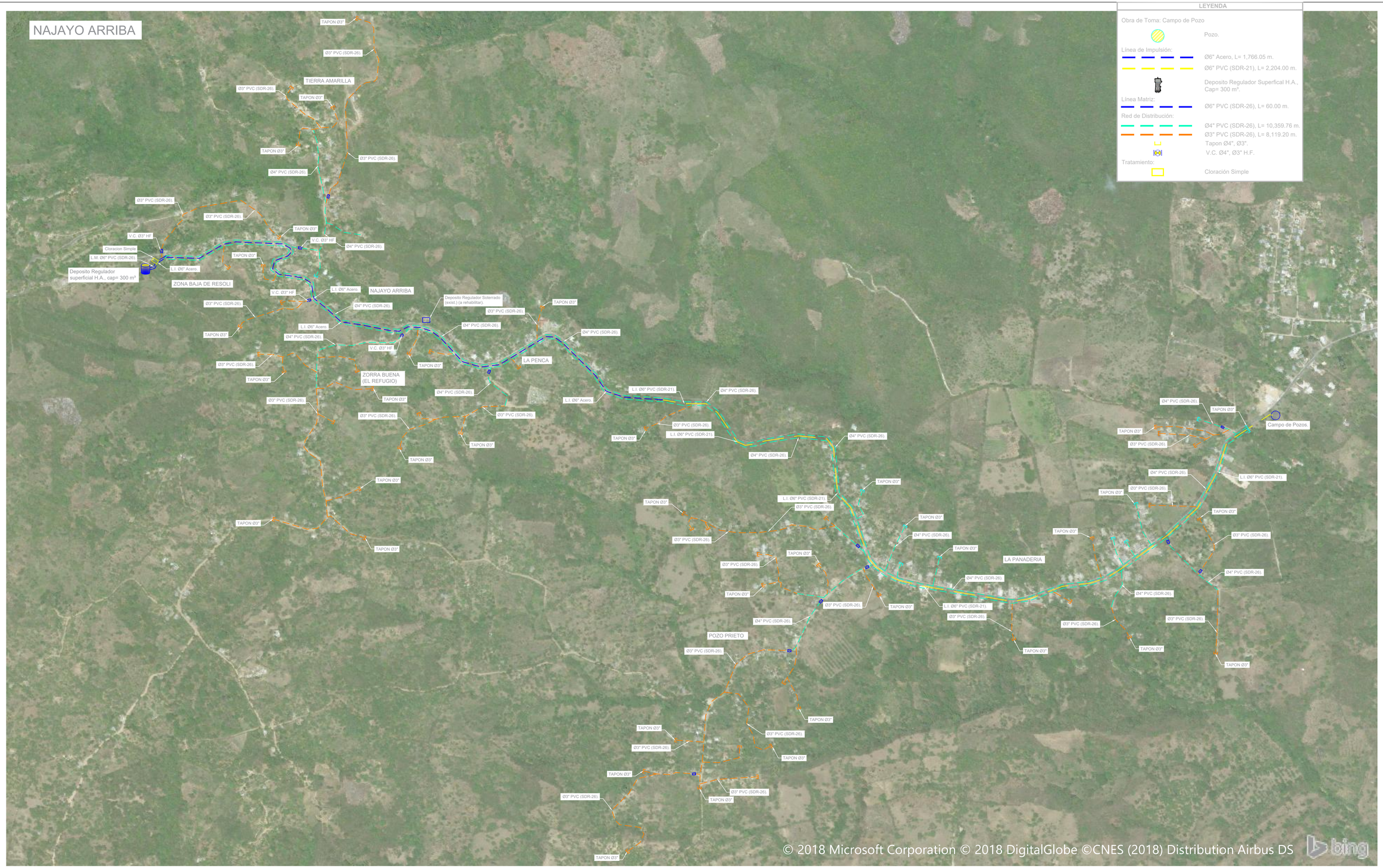
Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	3,891 habitantes	5,345 Habitantes

Dotación: 150 lts/hab/día.

Caudales:

Año 2019: Qmax/d = 8.44 Lps.	Año 2039: Qmax/d = 11.60 Lps.
Qmax/h = 12.16 Lps.	Qmax/h = 16.70 Lps.
	Qb = 17.40 Lps.


NAJAYO ARRIBA
TAPON Ø3"
Ø3" PVC (SDR-26).
TIERRA AMARILLA
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
V.C. Ø3" HF
Cloracion Simple
L.M. Ø6" PVC (SDR-26).
L.I. Ø6" Acero.
Deposito Regulador superficial H.A., cap= 300 m³.
ZONA BAJA DE RESOLI
V.C. Ø3" HF
TAPON Ø3"
Ø4" PVC (SDR-26).
L.I. Ø6" Acero.
NAJAYO ARRIBA
Deposito Regulador Soterrado (exist.) (a rehabilitar).
Ø3" PVC (SDR-26).
TAPON Ø3"
Ø3" PVC (SDR-26).
L.I. Ø6" Acero.
Ø4" PVC (SDR-26).
Ø4" PVC (SDR-26).
V.C. Ø3" HF
TAPON Ø3"
LA PENCA
Ø3" PVC (SDR-26).
TAPON Ø3"
ZORRA BUENA (EL REFUGIO)
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø3" PVC (SDR-26).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
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TAPON Ø3"
L.I. Ø6" PVC (SDR-21).
Ø4" PVC (SDR-26).
L.I. Ø6" Acero.
TAPON Ø3"
Ø3" PVC (SDR-26).
L.I. Ø6" PVC (SDR-21).
Ø4" PVC (SDR-26).
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TAPON Ø3"
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L.I. Ø6" PVC (SDR-21).
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LA PANADERIA
Ø4" PVC (SDR-26).
L.I. Ø6" PVC (SDR-21).
Ø3" PVC (SDR-26).
TAPON Ø3"
Ø4" PVC (SDR-26).
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Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
POZO PRIETO
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø4" PVC (SDR-26).
TAPON Ø3"
Campo de Pozos.
TAPON Ø3"
Ø3" PVC (SDR-26).
L.I. Ø6" PVC (SDR-21).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
LEYENDA
Obra de Toma: Campo de Pozo
Pozo.
Línea de Impulsión:
Ø6" Acero, L= 1,766.05 m.
Ø6" PVC (SDR-21), L= 2,204.00 m.
Deposito Regulador Superficial H.A., Cap= 300 m³.
Línea Matriz:
Ø6" PVC (SDR-26), L= 60.00 m.
Red de Distribución:
Ø4" PVC (SDR-26), L= 10,359.76 m.
Ø3" PVC (SDR-26), L= 8,119.20 m.
Tapon Ø4", Ø3".
V.C. Ø4", Ø3" H.F.
Tratamiento:
Cloración Simple
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INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

REHABILITACION Y AMPLIACION ACUEDUCTO MIRA CIELO- DIOS DIRA, INGENIO NUEVO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema múltiple construido en el año 1990, para abastecer de agua potable a las comunidades de Mira Cielo y Dios Dirá con una población proyectada a 20 años (2010) de 3,560 habitantes, operando por bombeo, además teniendo como componentes las siguientes unidades:

- Fuente: Aguas Subterráneas
- Obra de Toma: Campo de Pozos (3)
- Línea de Impulsión: Ø4" y Ø3" PVC SDR-26 con L = 1,122.00 M.
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito regulador, superficial de hormigón armado de 52,800 Gls.
- Línea Matriz: Ø6" PVC SDR-26 con L = 20.00 M.
- Red de Distribución: Ø4", Ø3" y Ø2" PVC SDR-26 y 2, L = 10,817.38 M.

Acometidas: 371 unidades.

Tasa de Crecimiento: 3%

Población:	**Al año 1990**	**A 20 años 2010**
	2,225 habitantes	3,560 habitantes
Dotación:	150 lts/hab/día	
Caudales:	4.83 Lps	7.72 Lps

En el año 2013, debido a la deficiencia con que operaba el sistema ocasionada por el crecimiento poblacional de la zona y que de los tres (3) pozos existentes solo uno está en servicio por lo que se elaboró rediseño de Rehabilitación y Ampliación del sistema múltiple, para ser ejecutado a través del INAPA-BID-AECID, siendo las componentes del sistema rediseñado:

- Fuente: Aguas Subterráneas.
- Obra de Toma: campo de pozos (3) existente a rehabilitar (limpieza, aforo y estudio físico-químico y bacteriológico) y construcción de un nuevo campo de pozos (3).

- Línea de impulsión: Ø4” Acero, L=1,014.94 m; Ø3” Acero L= 75.63 m y Ø2” Acero, L=202.40 m.
- Almacenamiento: depósito regulador, soterrado de hormigón armado capacidad 200 m^3 (52,800 Gls) existente a rehabilitar (resane, pintura y verja)
- Línea matriz: Ø6" PVC, L= 15.00 m. (existente)
- Red de distribución: Ø4", Ø3" y Ø2" PVC, L= 10,817.38 m (existente) y a colocar Ø6" PVC (SDR-26), L = 13.30 m; Ø2" PVC (SDR-21), L=2,044.77 m.

Tratamiento: Cloración

Acometidas totales: 585 unidades; 371 unidades (existente) y 214 unidades a instalar

Tasa de crecimiento: 1.6%

Población:	**Año 2013**	**20 años (2033)**
	2,925 habitantes	3,861 habitantes

Dotación: 125 lts/hab/día

	Qmax/d	Qmax/d= 6.982 lps.
Caudales:	5.290 lps	Qmax/h= 11.172 lps.
		Qb. = 10.474 lps.

Este proyecto no se ejecutó, ya que el BID a inicio del año en curso cerró todas sus actividades. En la actualidad 04/2018, dicho proyecto fue evaluado para ser sometido al programa de ejecución de obras del IDDI, a dicho proyecto se le modificaron algunas de sus partidas, siendo los componentes del sistema:

- Fuente: Aguas Subterráneas.
- Obra de Toma: Tres (3) pozos existentes a rehabilitar (limpieza, aforo y estudio físico-químico y bacteriológico), sólo uno (1) está operando y construcción de un nuevo campo de pozos (3). (a construir)
- Línea de impulsión: Ø4” PVC, L=1,062.40 m y Ø2” PVC, L=213.00 m, desde nuevo campo de pozos.
- Tratamiento: Cloración Simple.
- Almacenamiento: depósito regulador, soterrado de hormigón armado capacidad 200 m^3 (52,800 Gls) existente a rehabilitar (resane, pintura y verja)
- Línea matriz: Ø6" PVC. (Existente), L = 10.00 m

- Red de distribución: Ø4” PVC (exist.), L= 2,225.00 m; Ø3” PVC (exist.), L= 1,061.76; Ø2” PVC (exist.), L= 108.00 m y a colocar Ø4" PVC (SDR-26), L =1,061.76 m; Ø3" PVC (SDR-26), L= 9,598.30m y Ø2" PVC (SDR-21), L=190.00 m.

Acometidas totales: 643 unidades; 371 unidades (existente) y 272 unidades a instalar

Tasa de crecimiento: 1.6%

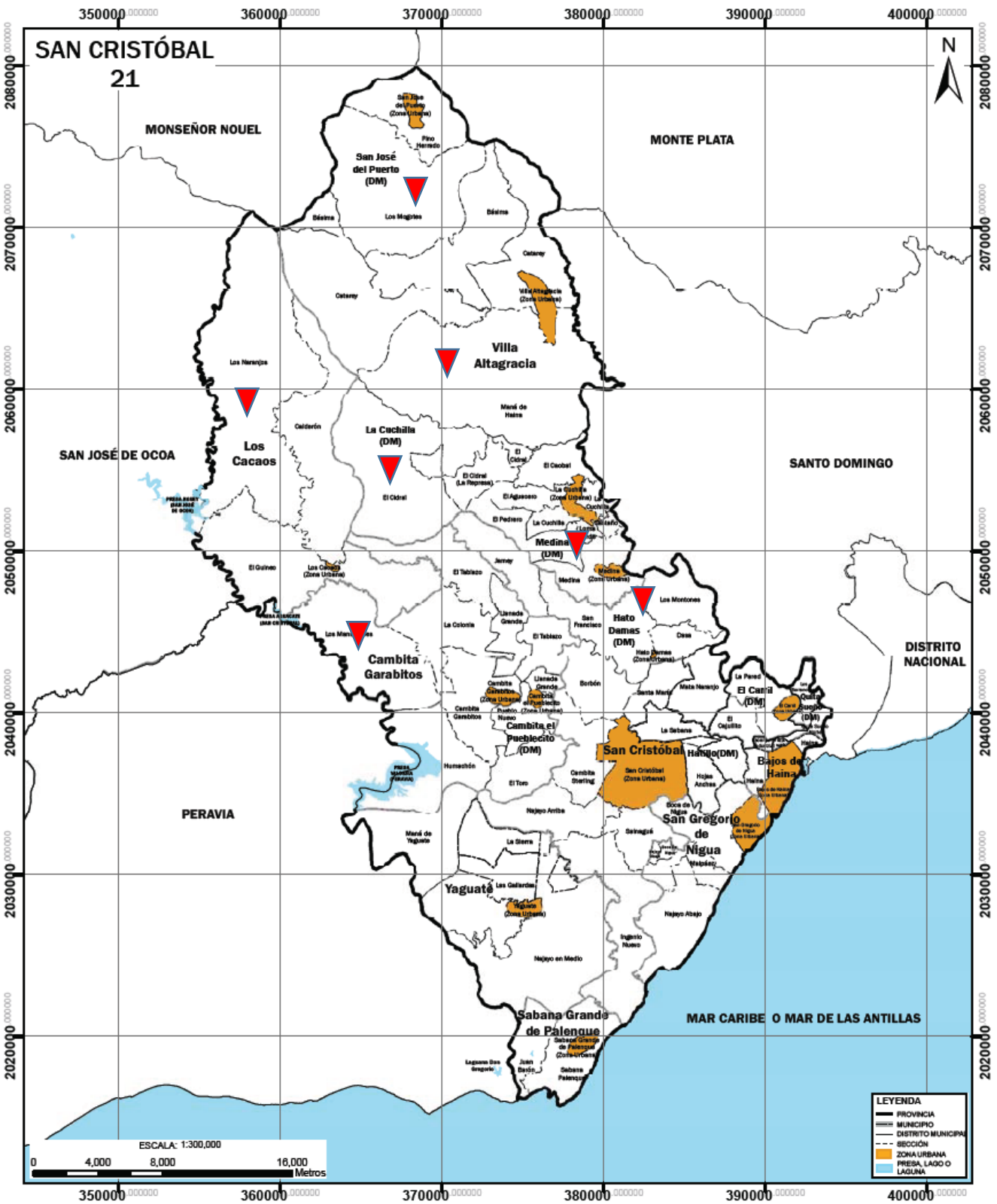
Dotación: 120 lts/hab/día (esta debido a que la zona de fuente de aguas subterráneas es de baja producción).

Población:	**Año 2019**	**20 años (2039)**
	3,217 habitantes	4,419 habitantes

Caudales:	**Año 2019**	**20 Años (2039)**
	Qmax/d= 5.59 lps	Qmax/d= 7.67 lps.
	Qmax/h= 8.04 lps	Qmax/h= 11.05 lps.
		Qb. = 11.51 lps.


MIRA CIELO - DIOS DIRA
LEYENDA
Obra de Toma: Campo de Pozos
Tres (3) Pozos (a rehabilitar).
Línea de Impulsión:
Ø4" PVC (exist.), L= 1,062.40 m.
Ø2" PVC (exist.), L= 213.00 m.
Almacenamiento:
Deposito Regulador Soterrado
H.A., Cap= 200 m³ (a rehabilitar).
Línea Matriz:
Ø6" PVC (exist.), L= 10.00 m.
Red de Distribucion:
Ø4" PVC (exist.), L= 2,225.00 m
Ø4" PVC (SDR-26), L= 1,061.76 m
Ø3" PVC (exist.), L= 2,273.39 m
Ø3" PVC (SDR-26), L= 9,598.30 m
Ø2" PVC (exist.), L= 108.00 m
Ø2" PVC (SDR-21), L= 190.00 m
Tapón Ø4", Ø3", Ø2".
V.C. Ø3" HF
Tratamiento:
Cloración Simple
18°20'55.26" N
70° 7'3.96" O
Deposito Regulador Superficial
H.A. Cap= 200 m³ (a rehabilitar).
Cloración Simple
L.M. Ø6" PVC (exist.).
Ø4" PVC (exist.).
L.I. Ø4" PVC (exist.).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
Ø2" PVC (exist.).
Ø3" PVC (exist.).
Pozo Ac. Niza
Ø3" PVC (SDR-21).
POZO #3 (exist.)(a rehabilitar).
18°20'37.87" N
70° 6'41.12" O
L.I. Ø2" PVC (exist.).
POZO #2 (exist.)(a rehabilitar).
18°20'37.06" N
70° 6'38.58" O
POZO #1 (exist.).
18°20'34.32" N
70° 6'40.35" O
MIRA CIELO
DIOS DIRA
Ø2" PVC (SDR-21).
2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018) Distribution Airbus DS

4. Location of Communities Included on the Programme


SAN CRISTÓBAL
21
N
MONSEÑOR NOUEL
MONTE PLATA
SAN JOSÉ DE OCOA
SANTO DOMINGO
DISTRITO NACIONAL
PERAVIA
MAR CARIBE O MAR DE LAS ANTILLAS
San José del Puerto (DM)
Villa Altagracia
Los Cacaos
La Cachilla (DM)
Medina (DM)
Hato Damas (DM)
Cambita Garabitos
Cambita el Pueblecito (DM)
El Carril (DM)
San Cristóbal
Bajos de Haina
San Gregorio de Nigua
Yaguate
Sabana Grande de Palenque
350000
360000
370000
380000
390000
400000
2080000
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2050000
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ESCALA: 1:300,000
0
4,000
8,000
16,000
Metros
LEYENDA
PROVINCIA
MUNICIPIO
DISTRITO MUNICIPAL
SECCIÓN
ZONA URBANA
PRESA, LAGO O LAGUNA

Annex 2. Total Budget and Output-level Notes (in USD)

Description		Total	Y1	Y2	Y3	Y4	Notes
Outcome 1: Implemented climate resilient management of water resources by 30 small rural communities of San Cristóbal							
Output 1.1 Community water supply and sanitation management plans developed for 30 communities to incorporate climate change-related risks							
	Local expert	31,200.00 ok	7,800.00	7,800.00	7,800.00	7,800.00	20% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	19,800.00 ok	4,950.00	4,950.00	4,950.00	4,950.00	15% of Field Coordinator @ $2,750/month x 48 months.
	Goods and services	29,695.00 ok	12,595.00	5,700.00	5,700.00	5,700.00	Meeting organization and venue costs for communities, government and key local institutions. 7 training events @ $2,850/event + short-time consultancy on planning @ $9,745
	Travel	8,750.00 ok	1,250.00	2,500.00	2,500.00	2,500.00	Travel support for workers and community members to attend workshops to develop community water supply and management plans @ $1,250/event.
	Travel	24,000.00 ok	6,000.00	6,000.00	6,000.00	6,000.00	12.9% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.1		**113,445.00**	**32,595.00**	**26,950.00**	**26,950.00**	**26,950.00**	
Output 1.2: Water supply increased for 30 small communities under change climate impacts							
	Local expert	70,200.00 ok	17,550.00	17,550.00	17,550.00	17,550.00	45% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	79,200.00 ok	19,800.00	19,800.00	19,800.00	19,800.00	60% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	50,400.00 ok	15,120.00	20,160.00	15,120.00	-	70% of Community Specialist @ $2,400/month x 30 months.
	Goods and services	6,133,830.00 ok	613,383.00	1,840,149.00	2,453,532.00	1,226,766.00	Detailed design, implementation and community training for: water supply for 4,260 households @ $725.11/home + doméstic sanitation sercives for 2,695 households @ $941.11/home.
	Travel	84,000.00 ok	12,000.00	24,000.00	24,000.00	24,000.00	45.2% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.2		**6,417,630.00**	**677,853.00**	**1,921,659.00**	**2,530,002.00**	**1,288,116.00**	
Output 1.3: Measures for water conservation under climate impacts implemented for 2,722 hectares							
	Local expert	39,000.00 ok	9,750.00	9,750.00	9,750.00	9,750.00	25% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	26,400.00 ok	6,600.00	6,600.00	6,600.00	6,600.00	20% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	21,600.00 ok	6,480.00	8,640.00	6,480.00	-	30% of Community Specialist @ $2,400/month x 30 months.
	Goods and services	1,518,925.00 ok	151,892.50	455,677.50	607,570.00	303,785.00	Detailed design, implementation and community training for re-afforestation schemes for 2,722 ha @ $558.02/ha.
	Travel	63,000.00 ok	9,000.00	18,000.00	18,000.00	18,000.00	33.9% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.3		**1,668,925.00**	**183,722.50**	**498,667.50**	**648,400.00**	**338,135.00**	
TOTAL OUTCOME 1		**8,200,000.00**	**894,170.50**	**2,447,276.50**	**3,205,352.00**	**1,653,201.00**	

Annex 1. Total Budget and Output-level Notes (in USD)

Description		Total	Y1	Y2	Y3	Y4	Notes
Outcome 2: Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according their respective competences							
Output 2.1: A set of manual and other materials on best practices for water and sanitation management are developed, including a fully operational website							
	Local expert	4,500.00 ok	-	-	-	4,500.00	12.5% of Communications Expert @ $3,000/month x 12 months.
	Goods and services	8,550.00 ok	-	-	-	8,550.00	Meeting organization and venue costs for communities, government and key local institutions. 3 training events @ $2,850/event.
	Goods and services	3,750.00 ok	-	-	-	3,750.00	Travel support for workers and community members to attend workshops on best practices for resilient water and sanitation management @ $1,250/event.
	Goods and services	3,500.00 ok	-	-	-	3,500.00	Detailed design, implementation and training for: a fully operational website and relevant social networking and social media.
	Goods and services	8,700.00 ok	-	-	-	8,700.00	Promo materials, including printing, broadcasting and social media.
	Travel	15,000.00 ok	-	3,000.00	6,000.00	6,000.00	8.1% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 2.1		**44,000.00**	**-**	**3,000.00**	**6,000.00**	**35,000.00**	
Output 2.2: A Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal							
	Goods and services	6,000.00 ok	1,500.00	1,500.00	1,500.00	1,500.00	4 annual meetings with ministries and other policy-makers @1,500 $/meeting
	Local expert	14,000.00 ok	3,500.00	3,500.00	3,500.00	3,500.00	Local expert @ $350/day x 10 days x annual meeting.
	Travel	12,000.00 ok	3,000.00	3,000.00	3,000.00	3,000.00	Travel support for top institutional members to attend high level meetings @ $3,000/meeting.
Sub total Output 2.2		**32,000.00**	**8,000.00**	**8,000.00**	**8,000.00**	**8,000.00**	
Output 2.3: Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihoods activities institutionalized in 30 communities							
	Local expert	15,600.00 ok	3,900.00	3,900.00	3,900.00	3,900.00	10% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	6,600.00 ok	1,650.00	1,650.00	1,650.00	1,650.00	5% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	31,500.00 ok	-	-	-	31,500.00	87.5% of Communications Expert @ $3,000/month x 12 months.
	Goods and services	19,950.00 ok	-	5,700.00	5,700.00	8,550.00	Meeting organization and venue costs for communities, government and key local institutions. 7 training events @ $2,850/event.
	Goods and services	8,750.00 ok	-	2,500.00	2,500.00	3,750.00	Community planning workshops: Travel support for workers and community members to attend workshops to develop community water supply and management plans @ $1,250/event.
	Goods and services	19,600.00 ok	-	-	-	19,600.00	Promo materials, including printing, broadcasting and social media.
Sub total Output 2.3		**102,000.00**	**5,550.00**	**13,750.00**	**13,750.00**	**68,950.00**	
TOTAL OUTCOME 2		**178,000.00**	**13,550.00**	**24,750.00**	**27,750.00**	**111,950.00**	

Annex 1. Total Budget and Output-level Notes (in USD)

Description	Total	Y1	Y2	Y3	Y4	Notes
Programme Implementation / Execution						
Total Implementation Cost	**8,378,000.00**	**907,720.50**	**2,472,026.50**	**3,233,102.00**	**1,765,151.00**	
Programme Execution Costs	795,910.00	251,530.00	179,080.00	181,460.00	183,840.00	Less than or equal to 9.50%
Total Programme Costs	**9,173,910.00**	**1,159,250.50**	**2,651,106.50**	**3,414,562.00**	**1,948,991.00**	
Implementing Entity Fee	779,782.35					Less than or equal to 8.50%
Total Amount Requested	**9,953,692.35**					

Annex 2a - NIE Management Fee

The programme management fee (8.5 % of the total budget) will be used by IDDI, the National Implementing Entity, to cover the costs associated with the provision of general management support of the portfolio of projects. Following table shows a breakdown of NIE estimated costs

ITEM	Amount	
	USD	%
Finance and Budget Management	249,530	32.0%
Performance Management and M&E	413,285	53.0%
Information and Communications	46,787	6.0%
Legal Support and compliance with audit requirements	38,989	5.0%
Traveling	31,191	4.0%
TOTAL	**779,782**	**100%**

1. **Finance and Budget Management:**

- Ensuring that financial management practices comply with AF requirements and support audits as required
- Manage, monitor and track AF financial resources including allocating and monitoring expenditures
- Ensuring financial reporting complies with AF standards; and
- Ensure cost-efficient procurement processes

2. **Performance Management and M&E:**

- Supervision of preparation of annual projects reports and projects evaluations,
- Provide oversight of the monitoring and evaluation function of the Executing Agencies
- Provide technical support in the areas of risk management, screening of financial, social, environmental and risk criteria;
- Provide guidance in establishing performance measurement processes; and
- Technical support on methodologies, TOR validation, identification of experts, results validation, and quality assurance.

3. **Information and Communications:**

- Information management systems
- Project management databases to track and monitor project implementation
- Dissemination of results.

4. **Legal Support and compliance with audit requirements:**

- Legal advice during the implementation of the project.

5. **Travel:**

- Project supervision mission and steering committee meetings.

Annex 2b - breakdown of the execution costs

Increase 0.0%
Inflation 2.2%

	Y1				Y2				Y3				Y4				TOTAL
ITEM	Qty	Unit	$/Unit	Cost	Qty	Unit	$/Unit	Cost	Qty	Unit	$/Unit	Cost	Qty	Unit	$/Unit	Cost	
Programme Manager	12	m	4,000	48,000	12	m	4,088	49,056	12	m	4,178	50,135	12	m	4,270	51,238	198,429
Climate specialist	12	m	2,000	24,000	12	m	2,044	24,528	12	m	2,089	25,068	12	m	2,135	25,619	99,215
Financial specialist	12	m	2,000	24,000	12	m	2,044	24,528	12	m	2,089	25,068	12	m	2,135	25,619	99,215
Accountant	12	m	1,600	19,200	12	m	1,635	19,622	12	m	1,671	20,054	12	m	1,708	20,495	79,372
Tech. officer	12	m	1,250	15,000	12	m	1,278	15,330	12	m	1,306	15,667	12	m	1,334	16,012	62,009
Adm. officer	12	m	1,250	15,000	12	m	1,278	15,330	12	m	1,306	15,667	12	m	1,334	16,012	62,009
Driver/ messenger	12	m	700	8,400	12	m	715	8,585	12	m	731	8,774	12	m	747	8,967	34,725
Office furniture				9,736													9,736
Computers and IT				18,000				300				300				300	18,900
Stationary & supplies				3,500				1,600				1,600				1,600	8,300
Vehicle				40,000				2,500				2,500				2,500	47,500
M&E and Audits				24,000				15,000				17,500				20,000	76,500
TOTAL				**248,836**				**176,379**				**182,333**				**188,362**	**795,910**

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Annex 3. Disbursement Schedule

	Upon signature of Agreement	1st Disbursement	One Year after Project Start	Year 3	Year 4	Total
Schedule date	Jan-19		Jan-20	Jan-21	Jan-22	
Programme funds		718,673.46	2,818,412.18	3,757,882.91	1,878,941.45	9,173,910.00
Implementing Entity Fee	233,934.71	42,761.07	167,695.52	223,594.03	111,797.02	779,782.35
Total	**233,934.71**	**761,434.53**	**2,986,107.71**	**3,981,476.94**	**1,990,738.47**	**9,953,692.35**

Annex 4. Project Plan and Gantt Chart

	Activity	Y1				Y2				Y3				Y4			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Programme Inception																
Outcome 1: Implemented climate resilient management of water resources by 30 small communities of San Cristóbal																	
1.1	**Community water supply and management plans developed for 30 small communities to incorporate climate change-related risks (Output 1.1)**																
1.1.1	Series of training workshops																
1.1.2	Community plans established via participatory approaches																
1.1.3	Support to communities in the continued evolution and implementation of the plans by the programme																
1.1.4	Periodical workshops for all communities																
1.2	**Water supply increased fo 30 communities under climate impacts (Output 1.2)**																
1.2.1	Design and construction of water supply and storage infrastructure and training of communities in use and maintenance of this																
1.2.2	Support to communities in the use and maintenance of infrastructure by the programme																
1.4	**Measures for water conservation under climate impacts implemented for 2,722 hectares (Output 1.3)**																
1.4.1	Design and development of reafforestation schemes and training of communities in use and maintenance of this																
1.4.2	Support to communities iin the ongoing management of schemes by the programme																
Outcome 2: Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according their respective competences																	
2.1	**A set of manual and other materials on best practices for water management and resilient livelihood are developed, including a fully operational website (Output 3.1)**																
2.1.1	Identification and documentation of best practices																
2.1.2	Dissemination of best practices																
2.1.3	Production and printing of lessons learnt documentation																
2.2	**A Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal (Output 3.2)**																
2.2.1	High level validation workshops ensuring ministerial level adoption of the plans and the importance of integrating these into community level plans																
2.2.2	Ongoing technical support and regular meetings to reach committee long-term development																
2.3	**Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihoods activities institutionalized in 8 municipalities (Output 3.3)**																
2.3.1	Production and printing of lessons learnt documentation																
2.3.2	Dissemination events																
3. Programme Implementation / Execution																	
3.1	**Programme Management Unit Established and Operational**																
3.1.1	Programme Staff Recruited																
3.1.2	Office facilities established																
3.1.3	Management Unit operational																
3.1.4	Establish programme exit strategy																
3.2	**Programme Monitoring and Evaluation**																
3.2.1	Inception report																
3.2.2	Quarterly reporting																
3.2.3	Continuous monitoring of activitiesn the ground																
3.2.4	Annual audits																
3.2.5	Programme evaluation (2)																
3.2.6	Programme Technical Report																

Annex 5. Selection of Target Communities based on Vulnerability Assessment

Following the recommendation made by stakeholders during the various consultation meetings, the level of vulnerability of water resources and current livelihoods are the key consideration in selecting the target municipalities under this programme. In the absence of a comprehensive municipal-level vulnerability ranking, a simple method was developed to rank the vulnerability of municipalities within the San Cristobal province, building on existing literature.

The process consists of the following steps:

1) The municipalities within the province were ranked according to the programme inclusion criteria, which include:

    a. Communities which 50% or more of its households are poor

    b. Communities with a population of at least 500 people; and

    c. Other criteria such as commitment, reasonableness or inclusivity.

Data about socioeconomic conditions of municipalities was obtained from the most recent National Households Survey for Multiple Purposes (ENHOGAR), cross-checked with the statistics reported by IX National Census of Population and Housing (ONE, 2014). The Municipalities' vulnerabilities to climate-induced stress regarding to water resources livelihoods, agriculture (under droughts and floods) and health, were obtained from *Critical Points of the Vulnerability to Climate Change and the Variability in the Dominican Republic* (Izzo et al., 2012). Based on these and other information, data reported by international organizations, a workshop with community key-players, a preliminary climate change vulnerability assessment was prepared[1].

Above mentioned study provides a municipality-level breakdown for the eight most vulnerable regions in the province (Municipalities of *Los Cacaos*, *Villa Altagracia*, and *Cambita Garabitos*, y Municipal Districts of *Medina*, *Cambita el Pueblecito*, *La Cuchilla*, *Hato Damas*, and *San José del Puerto*). This municipal-level analysis was then used to rank the vulnerability of the communities within the eight territories. It is worth noting that the study's findings are consistent with earlier studies showing that the above-mentioned territories are the most vulnerable in terms of water resources and livelihoods. A major limitation of the study is it does not have a strong research background (i.e., academic literature to build on), so obtained results are highly empirical.

[1] *Informe 1: Pre-Identificación de Comunidades Beneficiarias*, elaborated by Brightline Institute. This report implies a preliminary a Community-based Climate Vulnerability Assessment and Adaptation Planning, which applied four tools: (i) an *Adaptive Capacity Assessment* checklist; (ii) a *Household Vulnerability Survey*; (iii) a *Community Climate Vulnerability and Risk* analysis; and (iv) a *Priority Risk Identification Tool*.

2) Therefore, a scoring system was developed to approximate vulnerability. The municipalities were scored according to several indicators or which necessary data was available, according following categories:

   - agriculture under droughts,
   - agriculture under floods
   - water drinking water
   - water for irrigation
   - Protected areas and Biological diversity

Other categories included energy, tourism, human settlements, livelihood, flora and fauna, public health, food security, community organization, and disaster risk management. A vulnerability index was calculated for all communities and, based on the total points, the communities were then ranked vis-à-vis to other municipalities of the province.

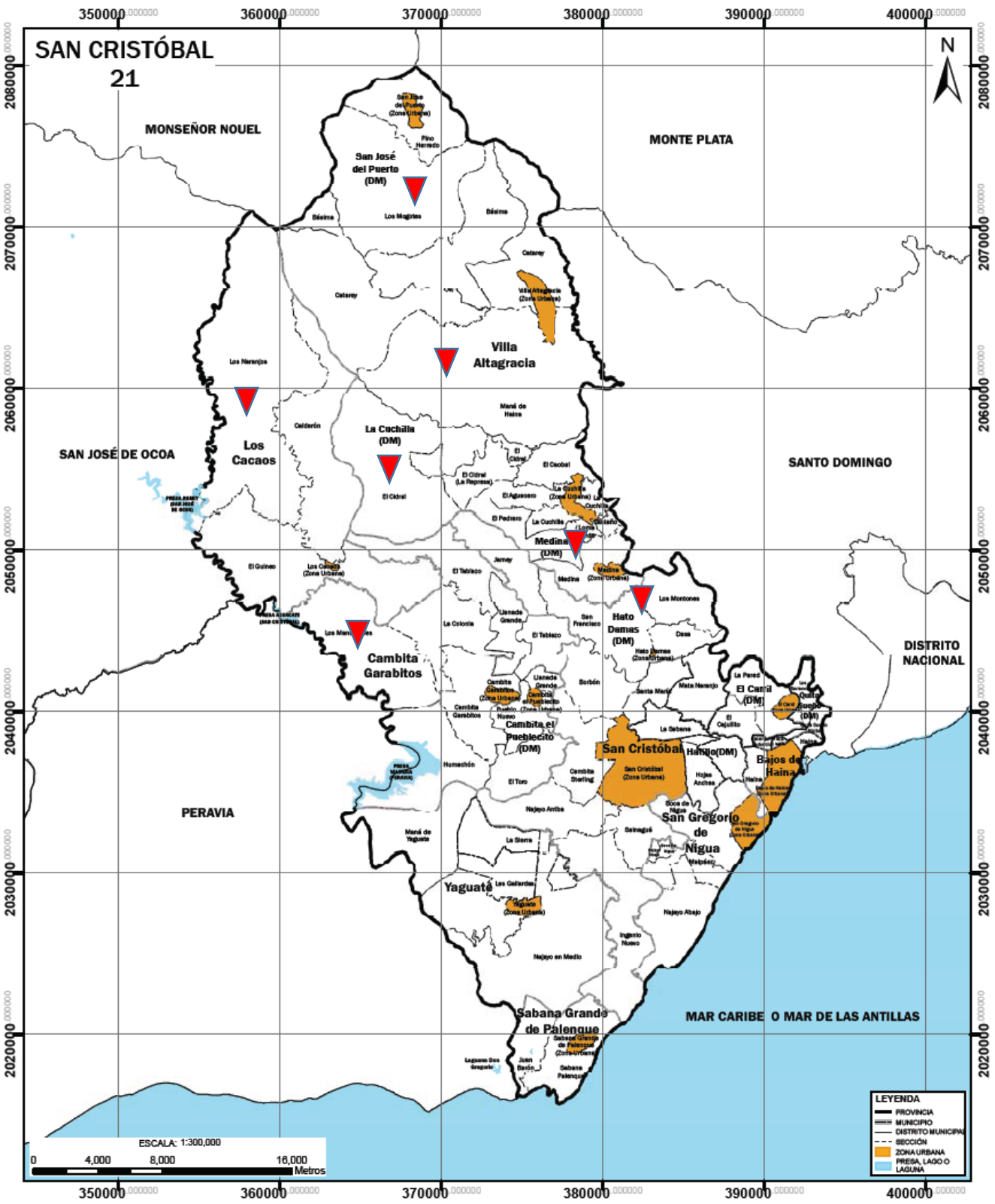
3) Finally, a "global index" each territory (municipality and/or municipal district) vis-à-vis other territories in the province was calculated. The municipality with the highest index is the most vulnerable. The eight most vulnerable municipalities of the province were then selected to serve as the target territories. Initially, it was planned to do a correction to make sure that the target municipalities are sufficiently spread out across basins and ecological zones, thereby ensuring that AF funds provide optimized learning and knowledge. However, at the end of the ranking process, it was realized that the selected municipalities are already sufficiently spread out in various locations and exhaustively cover all major sub-basins and ecological zones in the province of San Cristobal.

Another factor that was initially considered in municipalities selection is the number of ongoing development projects in a particular municipality that is relevant to adaptation. After mapping of relevant ongoing initiatives in the Dominican Republic, it was revealed that there are no-other projects that are relevant to the proposed programme (i.e., water resources management livelihood diversification, agricultural improvement, sustainable water management, etc.).

Municipalities Profiles

Communities	Households in Poverty	Water			Livelihoods				Flora and Fauna		Human Health	Food Security	Community Organization	Risks Management	Global Vulnerability
		Consumption	Irrigation	Ecosystem	Agriculture	Livestock	Forestry	Others	Flora	Fauna					
Los Cacaos	**1,586**	**4.25**	**4.00**	**2.75**	**5.00**	**4.75**	**4.00**	**5.00**	**3.00**	**3.00**	**4.00**	**5.00**	**4.50**	**4.50**	**3.73**
Los Cacaos		4	2	2	5	5	4	5	3	3	4	5	4	4	
El Guineo		4	5	3	5	5	4	5	3	3	4	5	5	5	
Los Naranjos		5	4	3	5	5	5	5	3	3	4	5	4	5	
Calderón		4	5	3	5	4	3	5	3	3	4	5	5	4	
Medina (D.M.)	**1,084**	**4.20**	**4.00**	**3.60**	**4.60**	**4.00**	**4.40**	**4.00**	**3.00**	**3.00**	**4.20**	**4.20**	**4.40**	**3.80**	**3.56**
Medina		4	2	2	4	4	4	4	3	3	3	3	4	3	
Loma Verde		4	5	4	5	4	5	5	3	3	4	4	5	4	
El Pedrero		5	5	4	5	5	5	4	3	3	5	4	4	5	
Castaño		4	4	5	4	4	5	4	3	3	5	5	4	3	
Medina		4	4	3	5	3	3	3	3	3	4	5	5	4	
Cambita Garabitos	**3,013**	**4.33**	**3.83**	**3.50**	**4.00**	**4.00**	**4.00**	**4.17**	**3.00**	**3.00**	**4.50**	**4.50**	**4.17**	**3.83**	**3.51**
Cambita Grabitos		4	1	2	3	4	4	5	3	3	4	5	4	4	
Cambita Garabitos		4	4	5	4	4	5	4	3	3	5	5	4	3	
El Fundo		5	5	3	4	4	3	4	3	3	4	4	5	4	
Arroyo Higuero		4	4	5	4	4	5	4	3	3	5	4	4	3	
Los Manantiales		5	4	3	5	4	3	4	3	3	4	4	4	5	
El Tablazo		4	5	3	4	4	4	4	3	3	5	5	4	4	
La Cuchilla (D.M.)	**1,350**	**4.17**	**3.50**	**2.33**	**4.33**	**4.17**	**3.83**	**3.83**	**3.00**	**8.00**	**4.00**	**4.50**	**4.00**	**3.50**	**3.44**

La Cuchilla (urban area)		4	2	2	3	3	2	4	3	33	3	4	4	4	
Los Algarrbos		4	1	2	5	5	4	5	3	3	4	5	4	4	
El Aguacero		5	4	3	5	5	5	4	3	3	4	5	4	4	
El Caobal		4	5	3	5	4	3	4	3	3	4	4	5	4	
El Cidral		4	4	2	4	3	5	3	3	3	5	5	4	2	
El Cidral (La Represa)		4	5	2	4	5	4	3	3	3	4	4	3	3	
Cambita El Pueblecito (D. M.)	**1,301**	**4.25**	**3.00**	**2.50**	**5.00**	**4.25**	**4.25**	**3.75**	**3.00**	**3.00**	**4.00**	**4.25**	**3.75**	**4.25**	**3.39**
Cambita El Pueblecito		4	3	2	5	4	4	4			3	3	3	4	
Llanada Grande		4	1	2	5	5	4	3	3	3	4	5	4	4	
Pueblo Nuevo		5	4	3	5	4	5	3	3	3	4	5	4	4	
El Toro		4	4	3	5	4	4	5			5	4	4	5	
Hato Damas (D.M.)	**2,198**	**3.40**	**2.00**	**2.40**	**4.20**	**4.20**	**4.00**	**4.60**	**3.00**	**3.00**	**4.20**	**4.80**	**4.60**	**3.40**	**3.29**
Hatos Damas		3	1	2	4	4	4	4	3	3	4	5	5	3	
Los Montones		4	2	2	5	4	4	5	3	3	4	5	4	4	
Dasa		4	3	3	4	4	5	5	3	3	4	5	4	3	
San Francisco		3	2	3	4	5	3	5	3	3	4	4	5	4	
Jamey		3	2	2	4	4	4	4	3	3	5	5	5	3	
Villa Altagracia	**6,697**	**3.00**	**2.67**	**2.67**	**4.00**	**4.00**	**4.00**	**4.00**	**3.00**	**3.00**	**4.33**	**5.00**	**3.67**	**4.00**	**3.25**
Villa Altagracia		3	2	3	4	4	3	4	3	3	4	5	4	4	
Catarey		3	3	2	4	5	5	4	3	3	4	5	4	4	
Maná de Haina		3	3	3	4	3	4	4	3	3	5	5	3	4	
San José del Puerto	**1,485**	**3.00**	**2.50**	**3.50**	**4.00**	**4.00**	**3.75**	**4.00**	**3.00**	**3.00**	**4.00**	**4.00**	**4.25**	**3.50**	**3.19**
San José del Puerto		3	1	3	3	3	3	3	3	3	5	4	5	4	
Básima		2	2	4	4	5	4	4	3	3	4	5	4	3	
Los Mogotes		4	3	4	5	4	3	5	3	3	3	4	5	4	
Pino Herrado		3	4	3	4	4	5	4	3	3	4	3	3	3	
Households in Poverty	**18,714**														
Included communities	**37**														
Municipalities/ Districts	**8**														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SAN JOSÉ DE OCOA
SANTO DOMINGO
DISTRITO NACIONAL
PERAVIA
MAR CARIBE O MAR DE LAS ANTILLAS
San José del Puerto (DM)
Villa Altagracia
Los Cacaos
La Cuchilla (DM)
Medina (DM)
Hato Damas (DM)
Cambita Garabitos
Cambita el Pueblecito (DM)
El Carril (DM)
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DISTRITO MUNICIPAL
SECCIÓN
ZONA URBANA
PRESA, LAGO O LAGUNA

Annex 6. Summary on Community Consultation

Consultation Meeting with Community Representatives from San Cristobal

Proposal Development "Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme"

Minutes of Meetings

Date 1: 11 December 2017
Time: 8:30 AM to 6:30 PM
Place 1: Casa de la Mujer Villa Altagraciana (CAMUVA), Villa Altagracia

Date 2: 11 December 2017
Time: 8:30 AM to 6:30 PM
Place 2: Instituto Politécnico Loyola (IPL), San Cristóbal

1. Introduction

(a) As the host of the consultation meetings, executives from CAMUVA and IPL (in respectively meetings) welcomed the participants. Executives of Brightline Institute served as co-chair and primary facilitator of the meetings. It was explained that the meetings are a part of a broader effort of the Dominican Institute of Integral Development (IDDI) to elicit stakeholder inputs to the Dominican Republic's programme proposal to the Adaptation Fund Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme.

(b) It was reiterated the commitment of IDDI, and key government institutions as the Ministry of Environment and Natural Resources and the National Institute for Drinking Water and Sewerage (INAPA), to make the programme proposal development a participatory process. They motivated and encouraged participants to participate in the discussions and to share their ideas on how to adapt to climate change in their communities.

(c) Following, participants self-introduced themselves. Vast majority of them are leaders in their respective communities and/or representatives of local organizations and committees. There was a total of 40 participants representing areas as Villa Altagracia, Medina, Los Cacaos, San Cristóbal, etc. and women organizations, groups of farmers, neighbors' boards, and others. The list of participants participant in the consultations (and some pictures) are attached.

(d) Representatives from provincial offices of the Ministry of Environment and INAPA, also introduced themselves. They spoke about its technical background and nature of their work,

and also delivered their remarks about the proposal. In general, they were supportive and encouraged the participants to share ideas and contribute to strengthening the proposal.

2. Discussion on the Proposal

(e) An officer from Brightline Institute presented the draft project proposal with focus on the concrete activities that the government institutions and local organizations will carry out if the proposal is successful. She explained that Adaptation Fund main strength is the emphasis is on concrete activities that have been successfully tested in communities. She also explained how the proposal fits in with the Dominican Republic's National Development Strategy 2030.

(f) The presentation was followed by a general discussion on the draft proposal. The key issues that emerged from the discussion covered the process of proposal development, activities that the community representatives want to carry out to help them manage climate change impacts, and the principles of implementation that should be integrated into the proposal.

(g) The participants asked about the process of developing the proposal. In this context, it was explained that a series of meetings among IDDI and Government Institutions, mostly the Ministry of Environment and Natural Resources have been carried out starting with a first meeting in August 2016. Other meetings with government agencies (as INAPA) and civil society organizations representatives (ProNatura, INTEC, etc.) that were carried out were also recalled. Current meetings with community representatives is the key aspect of consultation.

(h) It was also explained that IDDI is the National Implementation Entity and the Ministry of Environment and INAPA are top Execution Agencies. Brightline Institute has been requested by IDDI to assist in developing the proposal and to support advice and other requirements from the Adaptation Fund.

(i) The participants lauded the proposal's focus on livelihoods. They mentioned that in the Province, there is a strong link between inability to manage climate impacts on livelihoods and environmental degradation. For example, if the government could support them the communities during the off-season (when farming is not possible), cutting trees for charcoal could be minimized. Similar, some women told that if more jobs are created they can to receive more income and support even more their families, improving their lives.

3. Stakeholders Inputs

(j) Participants suggested the inclusion of the following activities in the proposal:

a. Concern that programme is more focused on to build new water infrastructure (more expense) instead to rehabilitate the existing one.

b. To include livestock and animal husbandry.

c. Concern that community development brings non-climate problems that aggravate the impacts of adverse climates, such as growing population, deforestation, and non-sustainable agriculture.

d. Concern that dry season gardening activities be compromised if any water shortage occurs. This case would be terrible for women and their employees under.

e. For fishing farming, gender roles should be clarified: the construction of fish ponds would be more suitable for men, and women will be capable of fish processing-related activities.

f. Concern that measures for re-afforestation be lost if occurs any forest fire.

g. Planting of trees with economic value, such as mango, avocado, macadamia, etc.

h. The implementing/ executing agencies should make sure that the activities are implemented on the ground as envisioned in the project design.

i. Development interventions in the past have created unsustainable or duplicated associations and committees in addition to the statutory bodies.

j. To include interventions related to processing and commercialize bottled water and drinking water to increase the community income.

k. Processing activities should be recommended by women, particularly processing of fish, butter, honey. Soap-making could be included.

(k) The participants welcomed the initiative to access funding and praised the Adaptation Fund. they hace some concerns that implementation should be carried out properly and that the implementing agencies should learn from the weaknesses of earlier projects of similar nature. The following implementation principles were suggested:

a. Establishment of any infrastructure/ livelihoods schemes should be supplemented by awareness raising and education so that the people could see its importance.

b. Take into account the social fabric of communities, particularly their structures, institutions, knowledge and experience, and traditional practices.

c. The IDDI and executing agencies should make sure that the activities are implemented on the ground as envisioned in the programme design.

With respect to implementation arrangements, the participants empathized the importance of to invest most of the resources directly on the communities, trough the existing governance structures, but at the same time recognize that in some communities, existing structures may not be necessarily the most supportive for delivering adaptation. The management structure at the community level could vary from one community to another. However, participants are optimist when points out that some communities have created associations, committees and bodies (i.e., risk management committees, water user associations, etc.) highly successful. The participants upheld the important role of the Ministry of the Environment as a key player.

4. Group Discussions

After lunch, workshop was focused to deeper discussions on the advantages and disadvantages of specific water resource management and livelihoods interventions. The participants formed work tables. The group discussions were guided by a questionnaire that probes (in their opinion) the advantages and disadvantages of proposed interventions under the proposal and whether or not the participants recommend the implementation of such measures in their communities.

At the end, tables reported the results of their discussions at a plenary discussion. Key results are summarized below.

1. Community Water Management

Technology	It has been used in your community?	Advantages?	Disadvantages? Problems?	Would you recommend it?
Water Supply / Storage				
Wells	Yes	Well-known in many places.	Requires too much labour to build.	Yes
Contour bunds	Yes	Prevent soil erosion. Leads to more available water in farms.	Could lead to a water excess.	Yes
Small scale dams	Yes	Best for human and animals. Can provide irrigation during dry season. Easy to build. Provide reliable water.	Difficult to control the water if is used with different purposes. Expensive.	Yes
Boreholes	Yes	Good for supply domestic needs. Safe for drinking. Reliability/ diseases-free.	Very expensive for the communities. It takes a lot of maintenance.	Yes
Conservation tillage techniques	No	n/A	n/A	n/A
Rainwater harvesting	Yes	Suitable for drinking purposes. Can be placed close to houses or schools.	Water can be polluted if not appropriated storage/ covered.	Yes
Dugouts	Yes	Useful for dry season gardening. Keeps animals with farms. Reduces water shortages. Can be used to grow fish/ recreation.	Person or animals can fell into them if are not fenced. Can be polluted easily and dry-up quickly.	Yes
Irrigation				
Shallow well irrigation	Yes	n/A	n/A	n/A
Pitcher irrigation	Yes	Can improve the lands productivity to more water-demanding crops.	Very expensive for the communities. It takes a lot of maintenance.	Yes
Sub-surface pipe irrigation	No	n/A	n/A	n/A
Flood management				

Drain channels/ ditches to manage flood waters.	Yes	Can avoid the loss of crops and soil during flood.	n/A	n/A

2. Livelihood Diversification

Technology	It has been used in your community?	Advantages?	Disadvantages? Problems?	Would you recommend it?
Dry season gardening	Yes	Increase income. Reduce food shortages. Provide feed for animals during dry season. Create jobs.	Can potentially degrade land if you don't leave land fallow. Could be sensitive to pest/ disease attacks if there's rain in the dry season.	Yes
Bee keeping	Yes	Can provide food, medicine, and cosmetic. It's an opportunity for income generation. It's an incentive to protect trees.	Bees can be dangerous to animals and humans. It needs a lot of attention and to establishment would be difficult to manage without support.	Yes
Products processing (food, medicinal, soap, handicrafts, cosmetics, etc.)	Yes	Can be useful to create jobs, medicines, food and other economic assets.	Necessary knowledge and experience could be not available in all places. Takes a lot of time and can be expensive.	Yes
Tree nurseries/ wood lots	No	n/A	n/A	Yes
Community based fish farms	No	Helps to preserve water bodies. Provides income	Initial capital requirement could be high. Community has no technical know-how. Uses a lot of water.	Yes
Small ruminants	Yes	Manure can be uses as fertilizer. Livelihood is diversified. Can to be used to create value chains.	Dependence of the rainfall/ water availability.	Yes
Bottling water facilities	Yes	Easy to install and to operate. Increase income/ jobs. Can be suitable for hotels and commerce.	Initial capital requirement could be high. Community has no technical know-how. Uses a lot of water.	Yes

5. Community Selection Discussion

The final part of the meeting was dedicated to a discussion on the factors that should guide the selection of programme target areas. The facilitators made it clear that the communities will not be decided in this meeting. The participants unanimously suggested that the extent of vulnerability to livelihoods be the key criterion that should guide the selection of community.

In selected municipality, communities will then be chosen based on the following considerations:

a. For selecting target communities for community-based water management activities:

- Communities are very committed to do activities themselves already
- seriousness of the community and/ or interest of the people
- Population of the community
- Availability of resources (land, water) in the community to carry out the intervention
- Accessibility of community
- Severity of water problem
- Sustainability (i.e. how the community propose to sustain the project after-programme)

b. For selecting target communities for livelihood diversification activities:

- Levels of poverty
- Peaceful and stable communities that can show potential to deliver the project
- Availability of markets
- Availability of raw materials
- Availability of similar projects at the community level
- Communities with high gender sensitivity
- Viability of an activity in a particular community
- Suitability of the weather
- Group that is viable and not just formed because there is money
- Availability of human resource/technical persons
- Consistency of proposed activity with customary beliefs
- Experience from past projects
- Existence of local expert knowledge
- Sustainability (i.e. how the community propose to sustain the project after-programme)

6. Closing

As participants expressed interest into participate cooperatively and collaboratively as partners with the programme, they understand that the programme and communities cannot create over-expectations in order to create more trust. In opinion of the attendants, the proposed programme has been developed in considerably greater detail, most important elements of the proposal development were explained, and the results of the community consultation have been included rationally in the context of the full proposal. They are in agree into provide more information and/or support if it's requested. In general, all of them endorsed the proposal.

Executives from CAMUVA and IPL closed the (respective) meetings. Representatives of Brightline Institute explained the next steps of the process and thanked the participants for their active participation during the meeting. Everybody was very satisfied with the programme.

7. Attendance of Stakeholders

Enhancing climate resilience in San Cristóbal Province, Dominican Republic
Integrated Water Resources Management and Rural Development Programme

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Reunión de: Consulta Comunidades Lugar: Villa Altagracia (CAMUVA)

Fecha: 11/12/17

Nombre	Institución	Teléfono	Correo	Firma	Sexo
1. Esteban [illegible]	Federacion	809-386-4123	—	[illegible]	M
2. Cnel. Misael Alexis	Policía Municipal	829-216-4406	Km.alexis@gmail.com	Misael Alexis	M.
3. Anadiz Hernandez	CAMUVA	829-723-3513	[illegible]	Anadiz Hernandez	F
4. Alberto Ramirez	Batallon communitario	809-352-9187	[illegible]@Gmail.com	[illegible]	M
5. Perfecto Jacinto S	JUVAC	809-964-2680	PerfectoJacinto@gmail.com	[illegible]	M
6. Yudelka Alt. Reyes	CAMUVA	849-752-4688	Yudelka59@Hotm	[illegible]	F
7. [illegible] Peralta	Quisqueya [illegible]	809-319-9466	—	[illegible]	F
8. Yissell Baret	Ministerio de la Mujer	829-884-9751	oscaricamill@gmail.c	Baret	F
9. Carmen D. Mateo	Liceo Felix E. Mejía	829-7122058	[illegible]	Carmen [illegible]	F.
10. Delia Ma. Maul M.	Alc. Municipal	829-333-6130	neao68@Hotmail.com	[illegible]	F
11. Altagracia Corre[illegible]	[illegible]	252-2432	—	[illegible]	F
12. Miguel de la Cruz	Casa de la Mujer	829-396-5384	—	Miguel [illegible]	M
13. Susana [illegible]	[illegible] Municipal	809-559-2059	—	[illegible]	F
14. Felix Castro	CAMUVA	809-[illegible]-0149	raulcastro[illegible]@gmail.com	[illegible]	M
15. José Roberto Brea	UAFAM	(809) 660-3938	Josebrea[illegible]@gmail.com	[illegible]	M

Responsable: [illegible]

@AdaptationFund - Project Proposal Development Listado de Participantes

1/1

Enhancing climate resilience in San Cristóbal Province, Dominican Republic
Integrated Water Resources Management and Rural Development Programme

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Reunión de: Consulta Comunidades Lugar: Villa Altagracia (CAMUVA)

Fecha: 11/12/17

	Nombre	Institución	Teléfono	Correo	Firma	Sexo
1.	Gloria Santana Pie	MADHA	829-716-0858	gloria Santana@hotmail.com		F
2.	Salvador R. Montesino	CAMUVA	809-917-6798	Salvadorsmontesino@hotmail.com		M
3.	Sergio Gregorio	FEDNAC-J. Viejo	809-297-8258	—		M
4.	Yaniris Morillo A	CAMUVA	809-977-0304	Yaniris.m.acuba		F
5.	Reyes Antonio G.P.	Camuva	809-438-4254	—		M
6.	Cirilo De los Carmen	UNAPA	809-330-7724	INEcarmona2@gmail.com		M
7.	Victor Flores	COCOVA	809-415-1582	victorflores@hotmail.com		M
8.	José A. Núñez	UAFAM	829-639-7327	tony007nunez@gmail.com		M
9.	Kimberling Paniagua	B.L	809-590-1332	paniaguaxargas27		F
10.	Elizabeth Paniagua	B.L.	829-308-1777	elizabethpaniagua@gmail.		F
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Responsable:

Enhancing climate resilience in San Cristóbal Province, Dominican Republic
Integrated Water Resources Management and Rural Development Programme

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Reunión de: Consulta Instituciones Lugar: San Cristóbal (Loyola)

Fecha: 12/12/17

	Nombre	Institución	Teléfono	Correo	Firma	Sexo
1.	Fidel Cuello S.	Inapa	8295215911	FIDELCUELLO2@HO.		M
2.	FRANCISCO CORDERO	PATRONATO los cacaos	809-909-1017	OFICINA-JURIDICA@HO.		M.
3.	Isabel Robles A.	ASOCAES	829-752-4575	ASOCAES@gmail.		F
4.	Elisbetth Grullón C.	Asocaes	829-779-0805	grullonelisbeth@gmail.com		F
5.	Alcala Edward	Cadocaz	829 281 5546	"		M
6.	Juan Doria	" " "	829-719-0073	JA1034@hotmail.com		M
7.	Wilmin Pozo	ASOCAES	809 8630931	—		M
8.	Altagracia Salas	ASOCAES	849 6380366	—	Altagracia	F
9.	Lima Peralta	Camara de Comercio	809-440-4905	camaradecomercio@hotmail.com		F
10.	Jorge Roberto Brea	UAFAM	809-660-3938	superbrea@gmail.com	Brea	M
11.	Milton Brito	PEDSC	809-288-3800	pedsc@hotmail.com		M
12.	Ing: Manuel Flores	INAPA	829-961-4623	mafvaladi@hotmail.com		M
13.	José A. Núñez	UAFAM	829-639-7327	tony007nunez@gmail.com		M
14.	Elizabeth Paniagua	B.L.	829-308-1777	elizabethpaniagua@gmail.com		F
15.	Kumberling Paniagua	B.L.	809-596-1332	paniaguaxorgos27@gmail		F

Responsable:

Annex 7. Acronyms

AF	Adaptation Fund
ADEMI	Association for the Development of Microenterprises (a local savings and loan bank)
CAMUVA	House of the Women from Villa Altagracia
CC/CG	Communities Committees or Communities Groups
CBD	United Nations Convention on Biological Diversity
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CNCCMDL	National Council for Climate Change and CDM
CTCN	Climate Technology Centre & Network
COE	Emergency Operations Center
COP	Conference of the Parties (of UNFCCC)
CSW	Commission on the Status of Women
DOP	Dominican Peso
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
EGEHID	Dominican Hydropower Utility
ENHOGAR	National Households Survey for Multiple Purposes
ESP	Adaptation Fund's Environmental and Social Policy
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization of the United Nations
FEDA	Special Fund for Agricultural Development
FOI	Freedom of Information
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gases
HDI	Human Development Index
IDDI	Dominican Institute of Integral Development
INAPA	National Institute of Drinking Water and Sewerage
INDC	Intended Nationally Determined Contributions

INDRHI	National Institute of Hydraulic Resources
IPCC	Intergovernmental Panel on Climate Change
IPL	Loyola Polytechnic Institute
MSME	Micro, Small and Medium-sized Enterprises
MUDHA	Dominican-Haitian Women Organization
M&E	Monitoring and Evaluation
NAPA	National Adaptation Programmes of Action
NIE	National Implementing Entity
NGO	Non-governmental organization
PNACC-RD	National Action Plan for Adaptation to Climate Change in the Dominican Republic
PESC	Strategic Plan for San Cristobal
RIO+20	United Nations Conference on Sustainable Development
SDG	Sustainable Development Goals
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
UN WOMEN	United Nations Entity for Gender Equality and the Empowerment of Women
WHO	World Health Organization
WUB	Water Users Board
ONAMET	National Meteorological Office
ONE	National Statistics Office
PNCC	National Policy on Climate Change
REDDD+	Reduce Emissions from Deforestation and Forest Degradation
MESCYT	Ministry of Higher Education, Science, and Technology
MEPYD	Ministry of Economy, Development and Planning
DM	Municipal District
ADOPEM	Association for the Development of Women (a local savings and loan bank)
PEB	Programme Executive Board
PM	Programme Manager
PCCAMC	Provincial Climate Change Adaptation Monitoring Committee
PMU	Programme Manager Unit
PSC	Programme Steering Committee

@AdaptationFund
Project Proposal Development

Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme

#ClimaSanCristobal

Report:
Environmental and Social/Gender Impact Assessment

Prepared by:

Brightline Institute, Inc.
proyectos@brins.org

Commissioned by:

Instituto Dominicano de Desarrollo Integral (IDDI)

Date: July 30th, 2018

Content

Figures

Tables

Acronyms

AF	Adaptation Fund
EIS	Environmental Impact Study
EIA	Environmental Impact Assessment
CBD	United Nations Convention on Biological Diversity
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CSW	Commission on the Status of Women
DOP	Dominican Peso
FOI	Freedom of Information
GCF	Green Climate Fund
GHG	Greenhouse gases
IDDI	Dominican Institute of Integral Development
INAPA	National Institute of Drinking Water and Sewerage
INDC	Intended Nationally Determined Contributions
INDRHI	National Institute of Hydraulic Resources
IPCC	Intergovernmental Panel on Climate Change
MSME	Micro, Small and Medium-sized Enterprises
NGO	Non-governmental organization
PESC	Strategic Plan for San Cristobal
RIO+20	United Nations Conference on Sustainable Development
SDG	Sustainable Development Goals
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
UN WOMEN	United Nations Entity for Gender Equality and the Empowerment of Women
WUB	Water Users Board

Definitions

Adaption to climate change: All initiatives and measures to reduce the vulnerability of natural and human systems to the actual or expected impacts of climate change (IPCC, 2014). Adaptation is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects. In the context of the proposed program, adaptation is also understood as the efforts by social groups, individuals and countries to adapt to the current and potential impacts of climate change.

Afforestation: Planting of new forests on lands that historically have not contained forests.

Biodiversity: The variability among living organisms from terrestrial, marine, and other ecosystems. Biodiversity includes variability in the genetic, species, and ecosystem levels.

Climate change: refers to a change in the state of the climate that can be identified by changes in the mean and/ or the variability of its properties, and that persists for an extended period, typically decades or longer.

Community organizations: covers a series of activities at the community level aimed at bringing about the desired improvement in the social well-being of individuals, groups, and neighborhoods. it is often used synonymous with community work, development and mobilization. It can represent both community-based organizations, operating as civil society and/ or non-profits, and also as a function of organizing within communities defined by geographical location, shared workspace, and/or shared experience or concerns. Community organizing is a democratic instrument to create sustained social change. Examples of community organizations are churches, sports groups, and neighborhoods.

Ecosystem services: The benefits freely gained by humans from the services provided by the natural environment in the areas of provision, regulation, and support[1].

Environmental impact: The set of qualitative, quantitative and functional changes in the environment caused by a project, process, method, one or more organizations and one or more products from design to "end of life".

[1] These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food, fiber, or fish, (3) regulating services such as climate regulation or carbon sequestration, and (4) cultural services such as tourism or spiritual and aesthetic appreciation.

Food security: A state that prevails when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development, and an active and healthy life.

Gender: social and economic attributes and opportunities associated with being male and female and the relationships between women and men and girls and boys, as well as the relations between women and those between men. These attributes, opportunities, and relationships are socially constructed and are learned through socialization processes (difference from its biological counterparts).

Gender differentiated vulnerability to climate change impacts: Gender is one of many components of vulnerability to climatic change. Changes in the climate affect genders differently, magnifying existing gender inequality. Both women and men are affected by and vulnerable to climate change but women often bear more of the burden. This higher vulnerability is mostly not due to biological or physical differences but is formed by the social, institutional and legal context.

Gender-sensitive: Approaches and tools for understanding and assessing impacts, vulnerability, and adaptation to climate change refer to methodologies and practices applied to ensure that both men and women's concerns, aspirations, opportunities, and capacities are taken into account in all climate change adaptation activities, including identifying, assessments, planning, implementation, monitoring and evaluation and technology development.

Gender-disaggregated data: it's all data that are collected and analyzed separately for both men and women, boys and girls.

Governance: A comprehensive and inclusive concept of the full range of means for deciding, managing, and implementing policies and measures. Whereas government is defined strictly in terms of the nation-state, the more inclusive concept of governance recognizes the contributions of various levels of government (global, international, regional, local) and the contributing roles of the private sector, of nongovernmental actors, and of civil society to addressing the many types of issues facing the global community.

Greenhouse gas: means a greenhouse gas as defined in the United Nations Framework Convention on Climate Change which states that such those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation.

Pollutant: includes any dredged spoil, solid or liquid waste, incinerator residue, sewage, garbage, sewage sludge, chemical waste, hazardous waste, biological material, radioactive materials, heat, wrecked or discarded equipment, oil and oil residue, rock, sand and industrial, municipal or agricultural waste and other such substances which causes pollution of the environment.

Pollution: means the introduction, either directly or indirectly, of substances or energy into the environment, which results in deleterious effects such as harm to living resources and marine life, hazards to human health, hindrance to marine activities including fishing and other legitimate uses of the sea, impairment of quality for use of water, air or soil, reduction of amenities or the creation of a nuisance and includes the release or deposit of any pollutant or waste onto land, the air or the water.

Reforestation: planting of forests on lands that have previously sustained forests but that have been converted to some other use.

Resilience: capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintain the capacity for adaptation, learning, and transformation[2].

Risk: is often used to refer to the potential, when the outcome is uncertain, for adverse consequences on lives, livelihoods, health, ecosystems and species, economic, social and cultural assets, services (including environmental services), and infrastructure.

Vulnerability: The impact level where humans and/or natural systems are sensitive to or unable to cope with the adverse effects of climate change. Generally, vulnerability depends on the magnitude of the variation in climate, exposure, sensitivity, adaptive capacity and access to economic resources.

Waste: includes any matter prescribed to be waste and any matter, whether liquid, solid, gaseous or radioactive, which is discharged, emitted, or deposited into the environment in such volume, composition or manner as to cause an adverse effect.

Watershed: means an area of land where all of the water that is under it or drains off and into a larger body of water such as a river, river system, the sea or a pond;

Wildlife: includes all forms of flora and fauna, including any animal, vertebrate or invertebrate, birds, mammals, reptiles, amphibians, crustacean and arthropods and their eggs and young thereof, shoots, or seeds but does not include domestic animals.

[2] Applied to human systems, factors that build resilience may include diversification of resources, smart agriculture, risks management, insurance schemes, food and monetary reserves, wise infrastructure, etc.

Executive Summary

The Dominican Republic is in the Caribbean tropical zone[3], which is impacted by heavy rainfalls from cyclones and El Niño-induced drought. The Climate Risk Index places the country among the most affected globally by climate change, resulting in increased frequency of extreme weather events including floods, droughts and cyclones. All projections indicate a dryer and warmer future.

The overlap between climate shocks exposure and poverty is evident: integrated management of land and water resources in farmers' fields and watersheds is critical for rural livelihoods. However, around 34% of the land is currently used for activities in conflict with its vocation, mainly affecting the upper part of watersheds in mountain zones. This is causing soil erosion, siltation and degradation of watersheds, reducing their hydrological capacity to absorb and buffer against extreme climate events. The result is high impacts from floods and periods of water scarcity.

Rural poor people's livelihoods are also affected by the complex land tenure situation (less than 50% of land is titled) and unequal land distribution. The water provided through irrigation systems has drastically increased in the last decade (IDIAF, 2012)[4] but access to irrigation for small producers is still low. Inadequate land use and the poor health of watersheds put the sustainable provision of water at risk and increase operation and maintenance costs. Despite progress in strengthening water user associations, water is still used inefficiently[5]. In southeastern coastal areas, over-extraction of groundwater resources is causing sea water intrusion up to 50 km inland.

Similar to other provinces of Dominican Republic, in general terms San Cristóbal has a mid-to-high degree of exposure to climate variability and climate change characterized by increasing temperatures and decreasing and erratic rainfall, which, when coupled with low socio-economic development, produce as higher vulnerability to climate change and high opportunities areas for

[3] Annual average rainfall is 1,500 mm, which is unequally distributed from arid zones receiving 350 mm (*Valle de Neiba*) to very humid zones receiving 2,750 mm (*Laguna de Limon*). Average annual temperature is 28˚C with little variation over the year.

[4] This finding is reported in the document *Rural Territories and Adaptation to Climate Change in the Dominican Republic*. Elaborated by the Dominican Institute of Agricultural and Forestry Research (IDIAF).

[5] It is important to consider water resources as a natural resource in tandem with forestry and direct land uses, rather than a commodity, as this undermines its judicious use. The availability of water affects socio-economic conditions, and its variations under extremes events present a serious hazard to the development.

climate change adaptation, mainly in the water sector. Despite showing some indication towards commerce and industries, but subsistence agriculture remains prevalent for most of the people.

The objective of the Programme is to enhance the resilience and adaptive capacity of rural communities to climate impacts and risks on water resources in San Cristóbal. This objective will be achieved through key results focused on improving access to potable water and sanitation services, with reforestation activities in line with a correct planning of land use, and increasing institutional and community capacity and coordination for integrated management of water that supports other uses of water resources, especially for the diversification of the livelihoods of rural communities. The ways in which this will happen include: (a) Improved planning and management of water resources taking into account climate change impacts on surface and groundwater sources; (b) Climate resilient management of water resources by communities; and (c) Improved knowledge and institutional capacity for coordination, management of water resources and diversification of livelihoods.

There are also inherent risks and potentially negative side effects from project activities. These can be summarized as follows:

1. Contamination during construction of infrastructure by pollutant emissions, wastewater, inadequate disposal of solid waste, and noise.
2. Disproportionate exclusion of the most vulnerable, including women, elderly and persons with disabilities regarding taking-decisions.
3. Issues related to buy-in the Programme by communities and institutions to reach a long-term climate change adaptation.

All these such impacts can be eliminated or minimized with an adequate management plan. As is stated in the programme's Environmental Impact Study, mitigation measures include, but are not limited to:

- Protection of the affected areas removing waste promptly or storing it adequately to prevent its affects soils and/or watercourses.
- Inclusion of guidelines for environmental protection and caring disposal of waste when upgrades are being made for climate adaptation.
- Monitoring of water and air quality, at key stages of programme interventions to ensure there is no deterioration of the environment.
- Prompt re-afforestation of the banks of the watercourses to minimize erosion, and not introduce any exotic or invasive species.

- Deliberate targeting of vulnerable groups and training for inclusion of women at as many stages and activities as possible, including procurement.
- To establish special institutional arrangements to reduce costs, fees, tariffs and taxes, so the resources provided by AF will go directly to beneficiaries.

After conclude the assessment, it can be concluded that the proposed programme meets the requirements of the Adaptation Fund's Environment and Social Policy and Gender Policies (ESP). Also, the programme has adequate provisions to manage its expected environmental and social impacts, and rational strategies to mitigate, reduce or avoid any gender-related impacts. These such potential impacts include climate change effects and GHG emissions.

1. Scope and Methodology

1.1 Scope of Work

The programme targets San Cristobal, a high risk and populated province on the southwest part of the Dominican Republic. Thirty small rural communities of San Cristóbal have been included:

Table 1: Targeted Communities / Included on the Programme

Sub-project	Included Communities	Beneficiary Population	Poverty	Climate Change Vulnerability
El Caobal	1. El Caobal 2. Cuco 3. Delgado 4. Puyenes 5. Los Mosquitos 6. La Yaguita 7. Domingo 8. Peleopoldo 9. Los Pinedas	15,500	41.4%	High
Loma Verde	10. Loma Verde (parcial)	3,500	72.6%	Very High
Castaño	11. Castaño 12. Los Jesús 13. Nuñez Abajo 14. Los Mejías 15. Vietnan 16. La Cuaba 17. La Cuabita 18. Loma Verde (parcial)	3,250	76.3%	Very High
Los Algarrobos	19. Los Algarrobos 20. Ochoa	900	82.2%	Very High
San Francisco	21. San Francisco	500	84.2%	Very High
Arroyo Higüero	22. Arroyo Higüero	450	84.6%	Very High
El Fundo	23. El Fundo 24. Toronja 25. Esperanza 26. Juanita 27. Medina Abajo 28. La Sabana 29. Pachín 30. Juliana Abajo	200	90.4%	Very High
TOTAL	**30**	**21,300**		

The main objective of the programme is to enhance the resilience and adaptive capacity of rural livelihoods to climate impacts and risks on water resources in the San Cristóbal Province. This objective will be achieved through key results centered on the improvement of water access and

also increase institutional and community capacity and coordination for integrated water management to support other uses of water resources especially for the diversification of livelihoods by rural communities. Socioeconomic, demographic environmental and cultural characteristics of the provinces were all considerations in choosing this area for the programme.

1.2 Methodology

Programme interventions were assessed for gender responsiveness and consistency with the needs of the most vulnerable populations in targeted areas (meaning at least 30 communities). The methodology included a literature review, meetings with technical staff of the Government, twenty (20) days of fieldwork, two community consultations, and unstructured interviews with key informants (all of them from of community-based organizations). The output of the analysis is an Environmental, Social and Gender Impact Assessment across the two components of the project.

The following analytical approach was utilized for the assessment:

1. Review existing data (environmental and social/ gender-differentiated development indicators and constraints) and relevant analyses. The assessment discusses such data, challenges, priorities, concerns, and approaches in such a way that it not only informs updates to the relevant strategy but also provides useful guidance to use in the next phase of programme development. Where appropriate, it does include examples that demonstrate the application of environmental and social/ gender analyses and lessons from past and ongoing initiatives.
2. Identify linkages between environmental and social/ gender and development objectives that are relevant to the programme strategy, both in outlining the overall community context and in describing the programme proposal. Relevant Adaptation Fund policies were used as guide.
3. Identify environmental and social/ gender-related factors to be taken into account by the IDDI in subsequent operational plans, analyses, activity, and designs. These are to be presented in the form of issues and recommendations for further examination. Some statements of the key environmental and social/ gender-based are provided -including relevant constraints to the programme, IDDI, beneficiary communities, local organizations and key institutions.
4. Identify resources and sources of sex-disaggregated data (and possibly other variables as appropriate) and how these factors are important for developing environmental and social/ gender-appropriate indicators, taking into account standard and custom indicators.
5. Advice on how to analyze the potential impact of programme proposed strategic approaches can mean the next step regarding climate change adaptation from a gender point of view. Identify local expertise on environmental, social and gender (e.g., NGOs, academics, research institutions, government officials) that can be called on to provide further technical assistance.

6. Draft recommendations for developing an environmental and social/ gender management plan, which lays out the steps to address risks and impacts towards the proposed programme implementation. Recommendations are as practical as possible and include the perspective of both environmental and social / gender technicians and community leaders. The draft action plan is not a deliverable, but a document that will develop based on this assessment.

1.3 Responsibilities

This assessment has been produced independently by Brightline Institute, Inc., on request of the Dominican Institute of Integral Development (IDDI). This report has been prepared as part of the development of the programme's full proposal to be summited by IDDI to the Adaptation Fund (AF). The views expressed in this document are not necessarily the views neither IDDI nor AF.

2. Programme Description

2.1 Description

The project, titled "***Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme***" aims to increase resilience to climate change through both immediate and long-term adaptation measures by way of rural development activities, projects, and actions. Such outputs are organized according to two main components:

(1) Community-level implementation of water resource management activities;

(2) Capacity building and capacity development to manage climate-related risks.

Table 2 below gives a summary of the project components and expected outcomes.

Table 2: Programme Components, Outputs, and Outcomes

Programme Components	Expected Concrete Outputs	Expected Outcomes
1. Community-level implementation of climate resilient water resource management activities	1.1 Community water supply and management plans developed for 30 communities to incorporate climate change-related risks.	Implemented climate resilient management of water resources by 30 small rural communities of San Cristóbal
	1.2 Water supply increased for multiple uses and users in 30 communities during the period of shortages under climate impacts (as droughts, heat stress, etc.).	
	1.3 Measures for water conservation under climate impacts (as catchment/river bank, re-afforestation schemes) implemented for 2,722 hectares.	
2. Capacity building and capacity development in key institutions and communities to manage long-term climate change-related risks	2.1 A set of manual and other materials on best practices for water management and resilient livelihood are developed, including a fully operational website.	Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according to their respective competencies.
	2.2 A Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal.	
	2.3 Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihoods activities institutionalized in 30 communities.	

2.2 Approach

The Programme will address key vulnerabilities of identified areas regarding agriculture and water resources management and thus contribute to the immediate and long-term development and resilience needs of communities, households, and vulnerable farmers/ producers, with a particular focus on extremely vulnerable groups: women, elderly, children and young, and local producers.

3. Policy Approach

3.1 National Legislation

Law 1-12: National Development Strategy

The National Development Strategy was signed into law in January 2012. It contains a central theme that mandates national adaptation to climate change. The Law establishes a binding commitment to achieve a reduction in GHG emissions of 25% by 2030, compared to 2010 levels and mandates a review of targets to reduce emissions every five years until 2030.

In the context of the proposed programme, the programme is aligned with provisions from the law regarding adaptation to poverty reduction, climate change, water resources management, women empowerment, livelihoods diversification, environment protection and gender equality.

General Law on the Environment and Natural Resources (64-00)

The objective of this law is to establish standards for the conservation, protection, enhancement and restoration of the environment and natural resources, ensuring their sustainable use. To reach such objective, this law creates the Ministry of Environment and Natural Resources and provide guidelines for sustainable environmental protection and management, to establish effective allocation of administrative responsibilities for environment management, the undertaking and coordination of environmental management and related activities, and the incorporation of international treaty obligations with respect to the environment into national and law matters.

Specific to this programme, the Law 64-00 provides for preventative and remedial measures for mitigation of all forms of environmental degradation. The law allows for public participation in and transparency of the decision-making process regarding environmental protection.

Sectorial Law of Protected Areas (202-04)

This la aims to guarantees the conservation and preservation of representative samples of the different ecosystems and of the natural and cultural patrimony of the Dominican Republic, in order to secure the permanence and optimization of environmental and economic services that these ecosystems offer or may offer to the Dominican society in the present and future generations.

The law creates the National System of Protected Areas (SINAP), including its management, finance, norms, and sanctions. In conjunction with the Law 64-00, this law is very important to the programme due to some rural communities in San Cristobal are located close to protected areas.

General Youth Law (49-00)

This law is the main legislative tool for youth in the Dominican Republic and was introduced in order to promote the comprehensive development of young people. The national youth policy establishes seven priority areas: health, culture, education, training, community participation, legislation, and sports and recreation. Also sets out strategies for achieving the policies goals.

The proposed programme will be aligned with the youth law due to it focuses on key areas such: strengthening social fabric, education and training, employment and sustainable livelihoods, health, participation and empowerment, and gender equality and gender relations. Resilient livelihood includes ensuring that youth is mainstreamed in environmental and climate actions.

Freedom of Information Law (200-04)

The freedom of information (FOI) law gives effect to those parts of the Constitution that grants rights to receive and disseminate information. It promotes maximum disclosure of information and requests the creation of an information officer for every public authority. Although IDDI is a local NGO, their management is compromised to submit all relevant information to government institutions (as Ministry of Environment, INAPA, and INDRHI) according to such legislation.

Important as well for the program is the provision which requires that the public institutions make available on an annual basis. It does include the content of all decisions and policies adopted which affect the public, along with the reasons for them, any authoritative interpretations of them, any important background material; and any mechanisms or procedures by which the citizens may make representations or otherwise influence the formulation of policy or the exercise of powers.

Risk Management Law (147-02)

Dominican Republic has taken steps to advance disaster risk management, including developing a comprehensive legal and institutional framework for Disaster Risk Management (DRM). This Law established the National System for Disaster Prevention, Mitigation, and Response. To build on its DRM goals, the government's priorities include: (a) Supporting provinces, municipalities and communities to establish their own Disaster Prevention, Mitigation, and Response Committees and to develop and implement their own emergency and DRM plans; (b) Integrating DRM criteria into building codes, regulations, and zoning laws to increase the resilience of education and health infrastructure (including works for water supply and sanitation services); and (c) Developing a financial strategy that will support the mitigation of disaster impacts, specially natural hazards.

Under the programme, expected interventions will be aligned with this law, due to its create specific devices for water supply facilities, including additional funding in case of extreme events.

Law 86-99 (Creation of Ministry for Women)

The most important institutional mechanism established to promote equality between the sexes and empower women in the Dominican Republic. Under this regulation, Ministry for Women takes responsibility for establishing standards and coordinating the implementation of policies, plans, and programmes for the achievement of gender equity and the exercise of full citizenship by women, at the sectorial and interdepartmental, level and in conjunction with civil society.

3.2 International Agreements

United Nations Framework Convention on Climate Change (UNFCCC, 1992)

This convention, which entered into force in 1994, provides a framework for intergovernmental efforts to deal with climate change and its effects. The governments meet and share data on greenhouse gas emissions, national policies, and best practices. The convention allows for the development and implementation of strategies for tackling emissions and the challenges of expected impacts and provides for financial and technical assistance for developing countries.

Each country formulates its Intended Nationally Determined Contributions (INDC) to the UNFCCC. The Dominican Republic had a climate action target that will be directly addressed by the programme (integrated water management). In its INDC, the country aims to reduce the risks of flooding and droughts, climate-related health impacts, and damages to infrastructure.

The UNFCCC aims for gender balance in bodies established pursuant to the Convention and the Kyoto Protocol, to improve women's participation and inform more effective policy that addresses the needs of women and men equally. The UNFCCC calls for the national adaptation plan (NAP) process to be gender-sensitive and calls on the Green Climate Fund (GCF) to promote environmental, socioeconomic, and development co-benefits under a gender-sensitive approach.

Sustainable Development Goals (SDGs, 2015)

The Sustainable Development Goals are a collection of 17 global goals set by the United Nations. The broad goals are interrelated though each has its own targets to achieve. SDGs cover a broad range of social and economic development issues. These include poverty (1), hunger, health (3), education, climate change (13), gender equality (5), water and sanitation (6), energy, environment and social justice. The Dominica Republic participates actively on several the SDGs platforms.

United Nations Conference on Sustainable Development (Rio+20, 2012)

Rio+20 affirms that green economy policies in the context of sustainable development and poverty eradication should enhance the welfare of women, mobilize their full potential and ensure the equal contribution of both women and men. "*The Future We Want*", the outcome document adopted in the context of this meeting, resolves to unlock the potential of women as drivers of sustainable development, including through the repeal of discriminatory laws and the removal of formal barriers. It also commits to actively promote the collection, more participation of women on sustainable public policy, and use of gender-sensitive indicators and sex-disaggregated data.

Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW, 1979)

The principal instrument for the protection of women's rights is CEDAW, which was adopted in 1979 by the General Assembly of the United Nations. Dominican Republic ratified CEDAW in 1982 aiming that women are given the opportunity to represent their governments at the international level and to participate in the work of international organizations; that women have equal rights to bank loans, mortgages and other forms of financial credit; and that women in rural areas can:

(a) participate in and benefits from rural development;

(b) participate in development planning at all levels;

(c) obtain training, education, and extension services;

(d) have access to agricultural credit and loans, marketing facilities and appropriate technology;

(e) are treated equally in the land, agrarian reform, and land resettlement schemes.

Commission on the Status of Women (CSW, 1962)

The 52nd session of the CSW (2008) identified gender perspectives on climate change as its key emerging issue. The Commission on the Status of Women urged governments to integrate a gender perspective in the design, implementation, monitoring and evaluation and reporting of national environmental policies, strengthen mechanisms and provide adequate resources to ensure women's full and equal participation in decision making at all levels on environmental issues, in particular on strategies related to climate change and the lives of women and girls.

United Nations Convention on Biological Diversity (CBD, 1992)

The convention deals with biodiversity and all direct and indirect facets of its role in development. The major goal is the conservation and sustainable use of biodiversity. CBD promotes women's knowledge and practices in the conservation and sustainable use of biological diversity in the agricultural sector. It also promotes gender-specific ways in which to document and preserve women's knowledge of biodiversity and calls for gender balance in various bodies and activities.

Dominican Republic has submitted a National and Strategic Biodiversity Action Plan covering the full scope of the CBD[6]. Ministry of Environment and Natural Resources is the National Authority.

3.3 National Policies

Other relevant policies to the programme are:

- National Policy on Climate Change
- National Literacy Plan ("*Quisqueya Aprende Contigo*")
- National Strategy for Water and Sanitation
- Strategy Plan for Science, Technology, and Innovation
- National Plan on Violence Against Women
- Climate Compatible Development Plan of the Dominican Republic
- National Regularization Plan for Foreigners
- National Policy for Integral Solid Waste Management
- National Strategy for the Conservation and Sustainable Use of Biodiversity
- National Public Policy for Youth Development
- Multi-Year Public Sector Plan
- National Contingency Plan for Hydrometeorological Events
- National Plan for Systemic Competitiveness of the Dominican Republic
- National Plan for Climate Change Adaptation in the Dominican Republic
- National Plan for Comprehensive Disaster Risk Management
- National Health Quality Policy
- National Plan on Land Titling
- Strategy Planning of INAPA
- National Policy for Climate Change

[6] Available at: https://www.cbd.int/doc/world/do/do-nbsap-01-es.pdf.

3.4 Administration

Programme administration will be carried out by IDDI, in its role of Implementation Entity. Main IDDI policies and procedures related to procuring, acquisitions, account, auditing, and ethics, have been reviewed by the Adaptation Fund during the implementation entity accreditation process. Programme execution entities are the Ministry of Environment and Natural Resources (Ministry of Environment) and INAPA (National Institute of Drinking Water And Sewerage).

4. Environmental and Social/ Gender Assessment

4.1 Environmental Conditions

4.1.1 Geography and Geology

The topography of San Cristóbal consists of mid-to-high hills. Highest elevations are Loma Majagua (1,969 m), *Loma El Grito* (1,800 m), *Loma Pio* (1,400 m), *Loma Vieja* (1,400 m), *Loma La Humeadora* (1,315 m), etc. This general slope appears furrowed by several fluvial courses, between which, the most important are the rivers *Nigua*, *Nizao*, *Itabo*, *Najayo*, and *Haina*. Landslides are dispersed, being larger and more frequent on the slopes of the valleys of Nigua and Nizao rivers.

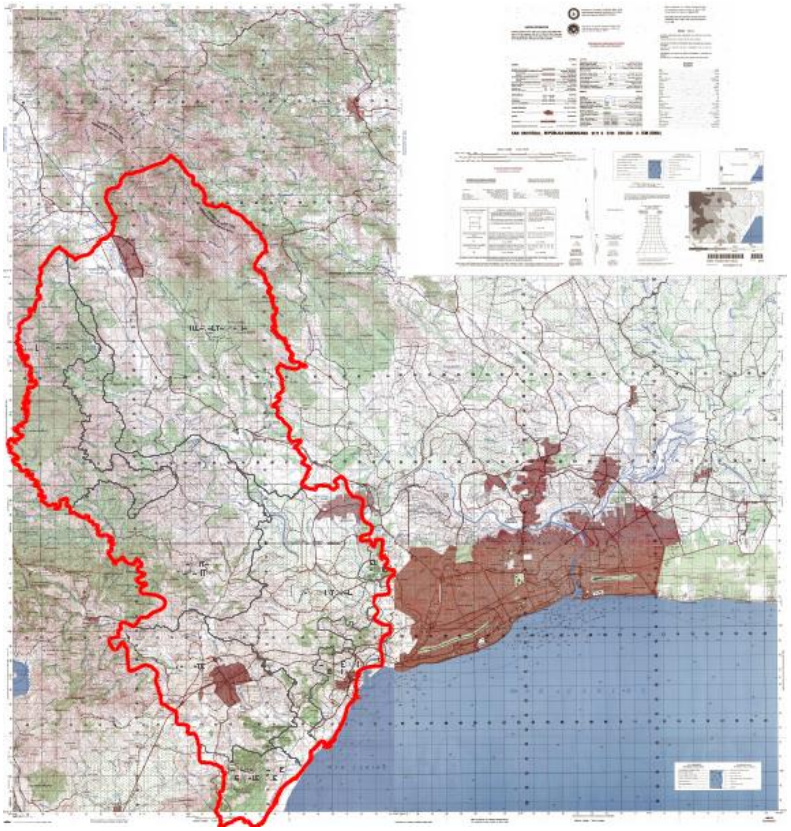

Figure 1: Topographic Map of San Cristóbal
Source: Environmental Study of the Programme.

Most of the soils in the target area are Type VII, with some zones of Type VI. Soils VII are rugged mountain terrains, with rugged topography, not cultivable, and suitable for logging purposes. Soils VI are most suitable for forests, pastures and mountain crops, with limitations of topography,

depth and rockiness. The rest of the soils are a mixture of class II, III and IV, which means that they can be cultivated using moderate to intensive conservation and management practices.

4.1.2 Hydrology and Climate

The climate of the San Cristóbal province is influenced basically by the orographic characteristics of the *Cordillera Central* and the *Sierra de Yamasá*, constituting the main climate driver of the area, with variations due to the climate of the Caribbean coast in the southern part of the province.

Hydrology: main rivers of the province are Haina, which constitutes the eastern boundary of the province; Nizao, that forms the limit with Peravia province, and Nigua. Other important rivers are *Mana*, *Yubaso* (*Blanco*), *La Toma* and *Itabo*, *Sainaguá* and *Najayo* streams. Humid areas are found across intermontane and hilly zones, with the longest wet periods occurring up to 5-7 months.

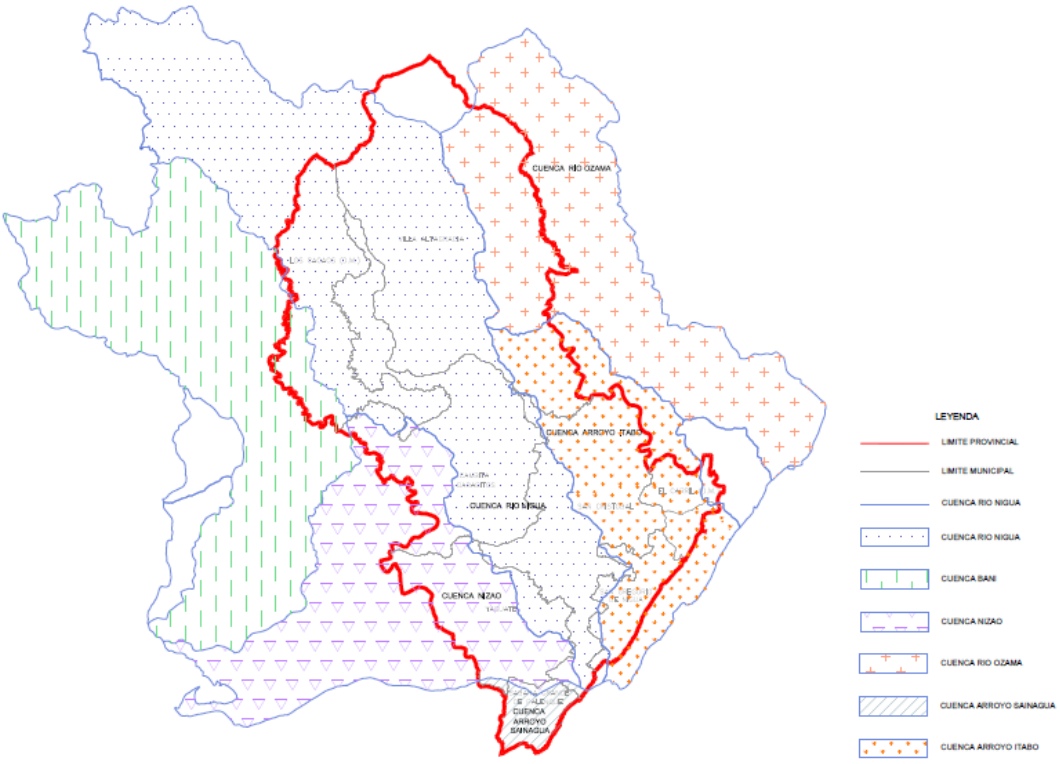

Figure 2: Map of Watersheds of San Cristóbal
Source: Environmental Study of the Programme.

Pluviometry: province average rainfall is 2,270 mm. January is the driest month (86 mm), while the rainiest is August (291 mm). The rainfall variation (the difference between the precipitation of the driest month and the rainiest month) is 205 mm. Los Cacaos is the rainiest area of the province.

Winds and Humidity: winds occur with speed between 12.2 km/h in September and 14.1 km/h in January, and their annual average is 13.3 km/h. The predominant direction of the winds is towards the northeast. The relative humidity goes from 72% to 79%, being the annual average 76%.

Temperature: average annual temperature of the area is 25.9 °C. The hottest month is September (26.2 °C) while January is the coldest (24.0 °C). The variation in temperature of the province (the difference between the hottest and coldest months) is 2.2 ° C.

4.1.3 Recent Extreme Events

Most relevant climate related events in the country with the incidence in the Province are:

1980 Hurricane ALLEN affected to the south of the island, sufficiently close to create great waves in all the south coasts and hurricane conditions in Barahona.

1987 Hurricane EMILY, with an atypical parabolic trajectory penetrated on the south coasts near Nizao and the Neiba's Bay leaving by the Atlantic north of Haiti.

1998 Hurricane GEORGES passes through the entire country, with great destruction, and heavy rainfall in the central mountain range, causing overflows and floods.

2003 Tropical Storm ODETTE enters the southwestern part of the country, causing abundant rainfall and landslides along the southwest coast.

2007 Tropical Storms OLGA and NOEL impacted the south of the country, with heavy rainfall, winds, and thunderbolts, causing floods and many fatalities.

In 2016, the Dominican Republic suffered from the most severe drought on record there is an accumulated deficit of an entire year's worth of rainfall since the beginning of the drought late in 2014. According to official records, these such 16 months (November 2014 to February 2016) have been the driest ever period for the country. A similar or even worst drought is expected in 2020[7].

4.1.4 Land Use and Land Planning

According to most recent map of Land Use and Coverage prepared by the Ministry of Environment (2012), San Cristóbal have different agricultural uses occupying an area of 567.19 km^2, of which cocoa, grass, citrus, cane and intensive cultivation occupying 536.99 km^2, equivalent to 95% of its agricultural area, while the remaining 5% is occupied by mixed agriculture, coconut, and coffee.

[7] Clima-Info (USAID-INTEC, 2017).

Land Use and Coverage Study (2012) shows a forest cover of 554.1 km² (44.8% of the surface of the province), where the coniferous has 79 km² (6.4%), and the broad-leaf 474.8 km² (38.3 %). The agricultural area composed of perennial or permanent crops, annual intensive crops and pasture has an area of 617.6 km². Long-term plans of land use shall be addressed by local governments.

4.1.5 Water Resources

Fresh water is perennially available from reservoirs on the western border and from streams throughout the province. Very large quantities are available from the Jigüey, Aquacate, Las Barías, and Valdesia Reservoirs, which are on the Nizao River. According with INDRHI, sedimentation had reduced the capacity of the Valdesia Reservoir by 42.6%. The capacities of Jigüey and Aquacate Reservoirs are also seriously reduced by sedimentation. The fresh water availability from Nizao and Haina rivers are critically minimal if any. Similarly occurs with the water from the Nigua River. The rest of the province has a meager to moderate quantities of fresh water available from intermit tent streams. All surface water should be considered biologically contaminated, especially near and downstream from populated places. Surface water is usually moderately hard and very turbid.

Regarding ground water, the best areas for ground water exploration are the alluvial aquifers in the southwestern and southeastern parts of the province (5%). Small to large quantities of fresh water are available from Quaternary to recent age alluvial aquifers. These aquifers consist primarily of sand and gravel interbedded with clay at depths ranging from 5 to 50 m, but locally up to 200 m. Large quantities of ground water are available as the percentage of clay content in the aquifer decreases. Ground water is soft to moderately hard. Within or near urban areas, shallow ground water may be contaminated with biological and/or chemical wastes. Care should be taken to avoid excessive pumping along coastal areas where saline water underlies fresh water zones.

Very small to very large quantities of ground water are available from Tertiary to Quaternary age limestone at depths ranging from 5 to 25 m in low-lying areas and 100 to 200 m in mountainous areas (20% of the province in the southern part). Ground water quality is generally fresh and very hard, except near coastal areas where it is brackish to saline. Within or near urban areas, shallow ground water may be contaminated with biological and/or chemical wastes. Major aquifers include the karstic limestone in *La Toca*, *Cevicos*, *Arroyo Blanco*, *Higuerito*, *Arroyo Seco*, *Sombrieto*, *Lemba*, *Florentino*, *Abuillot*, *Plaisance*, and *Neiba* Formations. *Villa Trina* formation, is also present.

Very small to large quantities of fresh water are available from differentiated and undifferentiated Tertiary age sedimentary rocks with minor metamorphic rocks at depths ranging from 5 to 25 meters in low-lying areas and 100 to 200 meters in mountainous areas (15% in the south-central part of the province). Ground water is locally very hard only in areas with high hydrogen-ion concentration (pH) where limestone is encountered. Within or near urban areas, shallow ground

water may be contaminated with biological and/or chemical wastes. Primary aquifers include the Miocene age *Arroyo Blanco*, *Arroyo Seco*, and *Via* formations. Other aquifers include the Oligocene age *Luperón* Formation and the Eocene age *La Isla* formation. In the rest of the province ground water exploration is not recommended in these areas without site-specific local references.

4.1.6 Environment Issues

According with the Ministry of Environment and Natural Resources, the pollution and environment degradation should be raising alarm as a major health risk for San Cristobal. According to recent environmental research (carried by *Ozama Green Foundation*), many areas of the country shows water and soil contamination, smog, and light, sound, and electromagnetic pollution. According to such organization, 21 out each 30 illness reported are related to lack of access to water and/or the consumption of contaminated water. Such illnesses include dengue, parasites, amebiasis, etc.

Figure 3: Water Sources Contamination in San Cristobal
Source: field visits (November 2017).

According to relevant regulation, the Ministry of Health has established the national standards for the drinking water. Samples of water taken from superficial sources supplying water to San José del Puerto, Cambita, Medina and Villa Altagracia, as part of the programme Environmental Impact Study. The findings are indicative of a high level of pollution (similar to many other areas of the country), which obligates the population to use bottled water affecting the household's economy.

Table 3: Aggregated Results of Water Quality Tests

Parameter	Unit	Value	Acceptable	Permitted	Comment
Mesophilic aerobic count	UFC/ml	291	<200	<200	non-compliant
Total coliforms	NMP/100ml	43.3	<1	<1	non-compliant
Fecal coliforms	NMP/100ml	2.00	<1	<1	non-compliant

Echericihia Coli	NMP/100ml	present	absent	absent	non-compliant
Mushrooms and Yeasts	/100ml	<1	absent	absent	compliant
Pseudomonas	/100ml	present	absent	absent	non-compliant

Source: Programme's Environment Impacts Study.
Sample and tests realized by Institute of Innovation in Biotechnology and Industry -IIBI (November 2017).

Other analyses reviewed on the documental research, indicates other non-compliant related to nitrates, phosphates, and ammonia. The source of these is most likely untreated human sewage, animal waste and for those areas downstream of farms, fertilizers. Ammonia is directly toxic to freshwater organisms while the nitrates and phosphates can lead to algal blooms. The depletion of dissolved oxygen by the large concentrations of algae is further compounded by an increase in organic material attracting large numbers of aerobic bacteria which also deplete oxygen.

Figure 4: Precarious Water Supply and Community Response
Source: field visits (October 2017).

Identified problems also occur by other aspects as:

- Inadequate or poor legal and institutional framework
- Inadequate operation and maintenance of equipment;
- Lack of trained professionals and technicians;
- Insufficient knowledge of water resources;
- Deficiency of water resources itself, which requires the transfers from one basin to another;

- Inadequate cost-recovery framework;
- Preferred solutions are not the best technically;
- Lack of definite government policy and lack of planning;
- Funding limitations and logistical problems.

4.2 Socioeconomic Conditions

4.2.1 Socioeconomic Context

The population of San Cristóbal is 0.57 million. According to last National Homes Survey for Multiple Purposes, 36.2% of the population has an income below the upper poverty line, while 6.4% is below the extreme poverty. Poverty is predominantly severe in rural areas, where more than 82% is poor. In 6 out of the 14 municipalities, more than 50% of the people live in poverty.

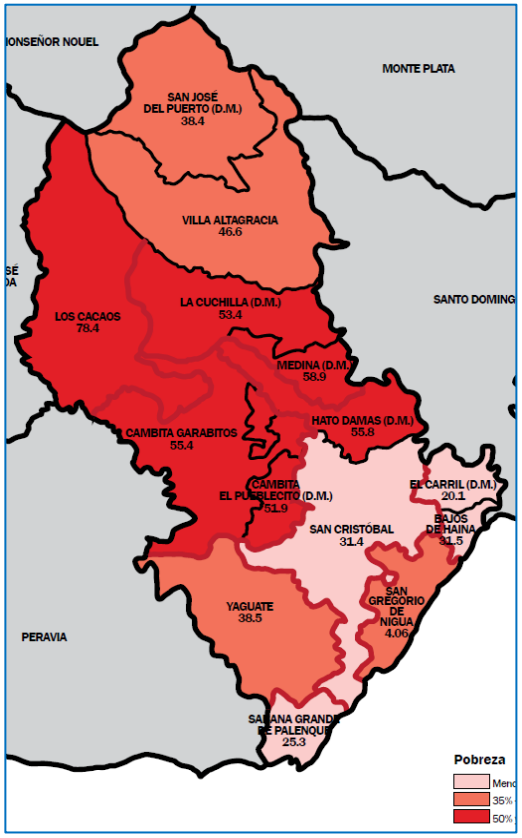

Figure 5: Poverty by Municipality in San Cristóbal
Source: Oficina Nacional de Estadísticas, 2014

According to official statistics, of an economically active population of 447,270 inhabitants, only 39.1% are employed (formal, informal, permanent, temporary). This indicates that unemployment

is a bigger issue in the province, especially for vulnerable segments such as women, the elderly, people with disabilities, and discouraged[8]. The distribution of employment is indicated below.

Table 4: Employed Persons by Economic Activity

Activity	Men	Women	Total	%
Agriculture, Livestock and Fishing	9,253	905	10,158	5.8
Industry and mining	20,658	9,130	29,788	17.0
Financial and real estate services	5,196	2,181	7,377	4.2
Transport and relatives	14,639	752	15,391	8.8
Commerce and hospitality	28,976	13,764	42,740	24.5
Domestic services	1,075	17,136	18,211	10.4
Goverment	7,479	8,429	15,908	9.1
Building	12,295	299	12,594	7.2
Other services	5,096	9,425	14,521	8.3
Not declared	4,988	3,062	8,050	4.6
TOTAL	109,655	65,083	174,738	100.0

Source: IX Censo Nacional de Población y Vivienda 2010 (ONE, 2014).

San Cristóbal shows higher school attendance rates for all ages, which shows a high turnover of capacity development through formal educational programmes. According to official statistics, 88% of the population is literate. The dominance of men over women, in terms of land's ownership and other assets, access to and control of resources, and in decision-making, is overwhelming. Together with the low access of women to land ownership, women also have limited access to formal employs in non-agriculture activities (43.3%). All these impose time constraints on women and tend to limit their awareness about opportunities, participation, and development in general.

The intervention areas of the program are essentially rural communities, whose main vocation is self-subsistence agriculture, and extensive family farming. As established in the selection criteria of beneficiary communities, most of these communities are economically and socially depressed. This is exacerbated by the presence of Haitian descents and immigrant Haitian nationals, many of

[8] Discouraged is a person of legal employment age who is not actively seeking employment or who does not find employment after long-term unemployment. This is usually because an individual has given up looking or has had no success in finding a job. In general, discourage people does not study anymore.

whom live in conditions of profound marginality. The infrastructure of services of these places ranges from low to precarious, reason why the community values positively the programme.

Figure 6: Conditions of Marginality in Target Communities
Source: field visits (November 2017).

4.2.2 Gender Socioeconomic Analysis

There are significant differences in vulnerability and exposure that are a result of non-climatic factors and systemic, multidimensional forms of inequalities such as discrimination based on gender. As is stated by the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women), gender equality refers to:

> "the e*qual rights, responsibilities, and opportunities of women and men and girls and boys. Equality does not mean that women and men will become the same but that women's and men's rights, responsibilities and opportunities will not depend on whether they are born male or female. Gender equality implies that the interests, needs, and priorities of both women and men are taken into consideration – recognizing the diversity of different groups of women and men.*"
>
> - Women, UN coherence, and you (2000).

This definition implies gender inequality, is often due to systemic, institutionalized and culturally based forms of marginalization. This inequality has led to differentiated vulnerability, given that gender dynamics in the society contribute to shaping the power, roles, and resources that are available to men and women. Because of this, the programme has a strong focus on women.

Although both boys and men are affected by climate change, women bear more of the burden, which is due to biological or physical differences but is formed by the social, institutional and legal context, which reinforces differences in women and men. These differences are seen in the productive and social-reproductive roles and responsibilities, differential access to productive

resources, including land, credit, technology, and employment. As well, women still have limited participation in political decision-making both at the community and governmental levels.

As it relates to climate change, gender refers to how the socio-political relations between men and women affect the planning and implementation of adaptation actions, access to resources, the ways in which climate change impacts and adaptation measures differentially affect men and women, and the ways in which men and women contribute differently to adaptation actions.

The Country Gender Assessment (USAID, 2009)[9] for the Dominican Republic forms a backdrop for situating gender equality in the country. The report reveals that approximately 35% of households are headed by women. More men consider themselves to be heads of household than women, and subsequently more women consider themselves to be the spouses or partners of male heads. Of the population of persons surveyed for the 2010 Census, 94,666 households of San Cristobal are headed by males (62.5%), while 56,932 (37.5%) declared that they were headed by females.

Poor female-headed households, particularly those with children, tend to experience greater negative impacts than male-headed households even with adaptation practices, therefore, they would be worse off without adaptation. The components of the programme will be instrumental in improving the lives of everyone in the community, particularly female-headed households.

The USAID assessment reveals that women's restricted access to and control over the means of production -land, and credit in particular- act as hurdles, which make them and their families more vulnerable to poverty. Land tenure and access to credit are serious constraints for all farmers (as any small businesses) in the Dominican Republic, but the constraints are magnified for women.

Regarding access to credit, for example, ADEMI and ADOPEM, two local based development banks that began as credit institutions for micro-enterprise, to provide agricultural credit to member associations. Despite both project's intents to be responsive to the gender-based constraints facing women, only about one percent (1%) of their loans have gone to women. A study carried by the Food and Agriculture Organization of the United Nations (FAO) in 1998, found that in the Dominican Republic, 22% of the women-owned lands received as an inheritance (being men 72%), and just 5% of farmers benefited by the settlements of the agrarian reform are women[10].

[9] Gender Assessment - USAID/Dominican Republic, Prepared by Virginia Lambert, DevTech Systems, Inc. Available at: http://pdf.usaid.gov/pdf_docs/Pnadq847.pdf.

[10] Aspectos jurídicos en el acceso de la mujer a la tierra Cuba, Honduras, Nicaragua y República Dominicana. Prepared by Available at: http://www.bio-nica.info/biblioteca/Galan2002Genero.pdf.

Despite the limited collection of sex-disaggregated data, it is critical for an effective response to climate change for a disaggregated analysis to provide insights to improve policies and strategies. As there no exist an official gender policy in the country, programme will be undertaking tools developed by international organizations (i.e., USAID, United Nations, GIZ and JICA) most of which aims gender capacity building, training, and development to ensure that programs and adaptation strategies are genders responsive to benefit both men and women equally.

To mitigate potentially negative impacts during project implementation, gender inequalities have been factored into the analysis. The 2014 Beijing Declaration and Platform for Action report for the Dominican Republic[11] highlighted challenges to achieving gender equality nationally which includes issues such as social security not catering to women in unpaid sectors who end up working all their lives, but cannot be cared for in their old age due to limited savings and the absence of adequate resources through government pension schemes. As such, elderly women within the community who have contributed to the care economy more vulnerable and at risk. Similarly, the lack of resources is pointed as the biggest challenge to developing better policies.

Further, a Country Poverty Assessment prepared by the World Bank in 2006[12] highlighted women, single mothers and elderly as most vulnerable groups. However, through consultations and focus groups meetings, members of the community participated which comprised of single mothers, unemployed and underemployed women. Some women who participated in such consultations explained their difficulties to access to the make-decisions levels in their respective communities and/ or organizations, and even worst to bring the attention of authorities to their problematic (meaning employment, housing, market-barriers, basic services as water, sanitation, and health).

Therefore, the proposed climate change adaptation programme recognizes the challenges individuals face particularly women in access to livelihoods. The project has a mainstream strategy designed to benefit vulnerable groups (mainly women) which offer diversification of livelihoods of rural communities under climate change. Therefore, a component of the programme involves capacity building and capacity development in key institutions and communities to manage long-term climate change-related risks, should be specifically targeted to benefit women so that they can access the necessary financing to improve their lives to withstand disaster and climate impacts.

[11] Informe nacional REPUBLICA DOMINICANA (Country Report towards Beijing+20). Available at: https://www.cepal.org/mujer/noticias/paginas/3/51823/Informe_Republica_Dominicana_Beijing_20.pdf.

[12] Dominican Republic - Poverty Assessment: achieving more pro-poor growth. Available at: http://documents.worldbank.org/curated/en/295161468236090493/pdf/32422.pdf.

5. Stakeholder Consultations

5.1 Stakeholders inputs

The methodology and collection instruments are described in detail in the Annex. The aim included gauging interest in Component 1 of the proposal, which deals with water resources management under climate change impacts such as flooding, hurricanes, storms, water-related diseases, and extended droughts. Table 5 summarizes the results from both focus groups.

Table 5: Stakeholder Inputs to Programme Design

Stakeholders Comments and Suggestions	Relevant Options for Programme Design
Concern that programme is more focused on to build new water infrastructure (more expense) instead to rehabilitate the existing one.	Output 1.2 include water supply increased, based on community management plans from Output 1.1. Where be economically feasible and technically viable, new infrastructure is built but existing one could be rehabilitated, retrofitted, or upgraded.
Concern that measures for re-afforestation be lost if occurs any forest fire.	Under capacity building activities, training for fire volunteer can be included, due to it will become more frequent as climate conditions get drier). This task can be developed jointly with forest firefighters of Ministry of Environment and Natural Resources.
Planting of trees with economic value, such as mango, avocado, macadamia, etc.	To sure that activity maximizes economic benefits for communities, the suggestion will be adopted in the context of the programme. However, this shall be done after evaluating the technical and environmental viability of these such trees.
The implementing agencies should make sure that the activities are executed on the ground as envisioned in the project design.	The proposed programme interventions will be executed with support of Ministry of Environment, INAPA, INDRHI, and others key institutions, which grant fulfillment with laws and norms. Also, the programme will be implemented with community organizations and shall meet the Adaptation Fund's requirements related monitoring and report.
Development interventions in the past have created unsustainable or duplicated associations and committees in addition to the statutory bodies.	The implementation arrangements are designed to look for programme long-term sustainability. In this context, there is no need to create and/or duplicate social structures but of strength the existing one.
How communities can be sure their approaches/ comments/ inputs are taken under consideration.	Programme has established a specific mechanism for grievances and disputes trough the Complaints System of the Ministry of Environment, which is publicly accessible. Contact info was shared.

Concern that community development brings non-climate problems that aggravate the impacts of adverse climates, such as growing population, deforestation, and non-sustainable agriculture.	Attention should be also given to non-climate problems that aggravate the impacts of climate change, such as growing population, settlement pattern, etc. This puts pressure on forests as people cut trees to build settlements or farms.
To include interventions related to processing and commercialize bottled water and drinking water to increase the community income.	To make sure that the activity maximizes the benefits for women, the suggestion will be adopted in the context of the programme.

Source: Programme's Environment Impacts Study.

Approaches that are geared towards climate change adaptation require a multi-disciplinary, multi-sector strategy. Regarding this matter, gender and environmental/social impacts are crosscutting issues that require a partnership-based approach. Therefore, the consultation process included a diverse group of stakeholders whose inputs are included in the programme final design. The consultations included a participatory approach with key presentations and space for stakeholder engagement and input that informed the final design of programme components and activities.

Programme information was disseminated through various media, including (*i*) letters, phone calls, and email (direct communication); (*ii*) socialization efforts; and (*iii*) through communities' leaders. Also, meetings had good facilitation led by members of Brightline Institute, INAPA, IDDI and the Ministry of Environment, so everyone had an adequate explanation of project goals, participants, etc. The project team was responsive and open to adapting their plans and activities as required when information came from community members. Participatory approach increased community buy-in and ownership for sustainability of the programme efforts. Throughout stakeholders' analyses and consultation process, the project team used early-identified community champions to assist dissemination, data, meetings and with consultations.

The consultation process also promoted guidance about environmental issues (as public health, solid waste management, and education, etc.) and gender equality (and other aspects as domestic violence), as outlined in the Adaption Fund Environmental and Social/ Gender Policy. This was evident through the hosting of the meetings; community representatives had equally access independently of their gender. A person spoke about his disabilities, but it was created a space for him, in order to secure his participation in community consultations and focus group sessions.

5.2 Other Partnerships

The project team partnered with the *Plan Estratégico de San Cristobal* (Strategic Plan for San Cristobal, or PESC) to ensure that the plans and implementation are sensitive to province's vision. PESC is available to and interested in the host the Provincial Climate Change Adaptation Monitoring Committee (Output 2.2) and to contribute to the programme long-term sustainability.

Also, among other development structures, PESC already have established a water and sanitation-dedicated committee, so other cooperation opportunities and synergies have been identified[13].

[13] Plan Estratégico de San Cristobal is a public-private partnership created to promote a more inclusive and resilient development in the Province of San Cristóbal. PESC acts a multi-institutional and multi-dimensional cluster to promote: a) the province be entrepreneurial, modern, competitive and sustainable; 2) integration and social cohesion; 3) land planning and citizen security; 4) education, sport, art and culture; and 5) identity.

6. Environmental and Social/ Gender Impacts

6.1 AF Social and Environmental Policies

6.1.1 Compliance with the Law

The following project activities will require permits and permission from the respective institutions:

- Construction and/or rehabilitation of water supply infrastructure, as works for water collection, treatment, storage and distribution (piping) requires plans to be submitted to INAPA, the Ministry of Environment and Natural Resources, and communication to the municipality.
- Construction and/or rehabilitation of water infrastructure for agricultural/livestock purposes, as dams, waterways, and reservoirs, requires plans to be submitted to INDRHI, the Ministry of Environment and Natural Resources, and communication to the municipality.
- Clearing of vegetation and/ or re-afforestation schemes shall be approved by the Ministry of Environment and Natural Resources to secure biodiversity and ecosystem not be damaged.

All infrastructure and facilities interventions will be located on public land (which shall be provided by government, community, municipality, private sector, third parties, or charity). Where proposed locations are on private properties, permission will be obtained from the owner. In these such cases, permission must be granted to personnel to access the property for maintenance or check.

All infrastructure and facilities, and another material change in the infrastructure and/or buildings that require technical drawings which must be communicated to the Ministry of Environment and Natural Resources, INAPA, INDRHI or the acting municipality, according to with the nature of such changes. This includes any extension of buildings, changing of roofs, the addition of toilet facilities, movement of buildings, digging of cisterns and wells, waste collection, etc. The cost of such preparation and/or review is included in the budget of each intervention, but IDDI also can:

(a) Ask for a grant to the Ministry of Environment and Natural Resources for its fees/ tariffs.

(b) Ask for INAPA/INDRHI provide in-kind preparation and/or reviewing of the plans.

(c) Ask for a grant to the respective municipalities for its fees/ tariffs/ municipal taxes.

(d) Ask to DGII (National Direction for Internal Taxes) a tax exemption for local purchases.

(e) Any combination of the above-mentioned options.

In this case, the resources provided will be used to fund as much concrete adaptation projects as possible. This has been consulted with institutions representatives, which are in favor and understand IDDI can require all of them when programme obtain the resources (inception phase).

6.1.2 Access and Equity

The geographical area that will be directly affected by the program includes 30 small rural communities belonging to San Cristobal (other 15 has been identified at feasibility level). The benefits of the programme should include:

- Upgrade the water infrastructure to deal with the climate impacts.
- Improved the public health and reduction of water-related diseases.
- Diversification the livelihoods which shall be affected by hurricanes, flooding, and droughts.
- Improve the water quality and availability for multiple uses and users.
- Hiring local people and communities' groups to build and to maintain the infrastructure.
- Work with the community to preserve water resources and use it more rationally.
- Create a sharing vision among the communities about climate change adaptation.
- Create more employment for vulnerable women and other favorable conditions.

Potential beneficiaries of the project include all members of the communities in the target area, including private residents, community-based organizations, and micro, small and medium-sized enterprises (MSME). Specifically, community groups will benefit from education and training in water resources management (including soil and forest), improved infrastructure, and support for women, youth and vulnerable groups, technical assistance and more climate-resilient livelihoods.

The programme interventions do not have potential rivals, due to relevant government agencies with similar competencies (INAPA and Ministry of Environment) are execution entities within the programme. This permit streamlining, efficiency and viability of the proposed interventions.

The marginalized or vulnerable groups in the communities include the disabled, single mothers who are heads of households, the elderly including those who on a subsidized income (if any), small children and Haitian migrants of questionable immigration status and their children.

Although climate change activities such as flooding and hurricanes affect everyone in its proximity it also results in gender-differentiated impacts. Vulnerable groups such as women, children,

persons with disabilities and the elderly bear more burdens. Therefore, it is important to assess women's vulnerabilities given their disproportionate responsibilities for domestic and child-care, reduced income, limitations to access to economic resources, and most vulnerable livelihoods.

Women participants in the public consultation and focus group discussion held in the community, sharing their experiences about how the dependence of deficient water supply have resulted in many difficulties for them. For example, they can't work if the health of their children is affected or if they need look for water from far distances. Extreme events, as storms and hurricanes, impact children's access to school and makes mobility difficult (for both genders) impeding them to travel around. Lack of mobility means a decrease in economic empowerment for all groups, particularly women since they may not be able to get to work or to participate in income earning activities.

Women also described how they need to buy bottled water for their households which drains a significant amount of their income. However, this does not secure the health of their families. Often, with poor water supply systems, it is usually followed by an equally poor health and hygiene as is demonstrated in this report, thus such conditions have caused many economic and social losses due to unsolved situations. Participants of the focus group within the community spoke about any health-related problem for them or their families can result in significant losses.

Thus, the upgrade of the water infrastructure would mean that the water would flow more freely with less back-up and floods which would improve the lives of the vulnerable groups within the community and the overall lives of families and women and men. Haitian immigrants are especially vulnerable as they seek housing that is cheap or affordable, and feel they cannot complain if there is an issue with the water and/or sanitation services. The search for cheap housing may also explain the vast congregation of migrant groups in many communities, increasing their vulnerability.

On the other hand, there is a high propensity to employ women in domestic work caregiving roles, and services, including administrative and secretarial services, which characterizes the principle available employment options for women in almost all the country. Men are largely found in management and supervisory roles, and construction and operation, which all tend to be better paid, yet requiring no higher educational attainment. Further as discussed in the Country Gender Assessment elaborated by USAID, female workers are further made vulnerable by labor issues that are particularly gendered: sexual harassment, forced labor, inflexible working hours, low wages, fatigue, victimization, and unfair dismissals. Although the Dominican Labour Code talk about these issues (and many others), women still do not have enough protection for all them.

The programme will contribute to improving livelihoods and conditions of target communities. A significant amount of work must be done in Component 1 (mostly providing goods and services),

not only to improve the infrastructure but to improve water quality. This have a positive impact on domestic economy, commercial activities and employment on systems building and operating.

This programme will not negatively impact access to education, working conditions or land rights. The components ensure that fair treatment for men and women, boys, and girls. It recognizes as enshrined in the adaptation-relevant gender policy the need for differential treatment that is fair and positively addresses systemic gender biases and discrimination due to gender roles and norms. The target vulnerable groups such as women and children with a key focus on achieving gender equality as an end goal. Therefore, the project will provide equal access for both men and women. However, since women, particularly single mothers are more vulnerable the project will ensure that provisions are put in place for vulnerable groups to benefit from programme activities.

6.1.3 Coherence with Other Government Projects and Programmes

As is stated in the National Development Strategy, the Dominican Republic is committed to being prosperous, living with dignity, attached to ethical values and respect a participatory democracy country, that guarantees the social and democratic rule of law and promotes equity, equal opportunities, social justice, and that manages and uses its resources to develop economically in an innovative, sustainable manner, and that is competitively integrated into the global economy.

The strategy is focused in four strategic lines: a) being a social democratic state based on laws; b) to be a society with equal rights and opportunities, c) to reach a more sustainable, inclusive and competitive economy; and d) become a society of environmentally sustainable production and consumption that is adapted to climate change. The programme is aligned with such national priorities in areas as: poverty reduction (specific objective 2.3.3); territorial cohesion (2.4.1); small and microenterprise efficiency and productivity (3.4.3); agricultural value chain development and competitiveness (3.5.3); environmental policies, including the protection and sustainable use of natural capital and biodiversity (4.1.1); water management and security (4.1.4); and integrated management of environmental and climate change risks.

It's very clear that the proposed programme is aligned with national priorities. In consequence, shows coherence with significant ongoing and planned government programmes and projects. Some of such initiatives are:

- **Surprise Visits**: an ongoing program where the President visits vulnerable communities and motivate producers to formalize and organize themselves in order to receive soft loans from the government to finance economic activities. Such activities have mobilized DOP 33.8 bn.
- **Water Table**: Water Resource Coordination Table was established by the President within the Ministry of Economy, Planning, and Development as an intersectoral coordination body for

the preservation of the quality and quantity of water resources, and to strengthen the management of country's largest basins. This body includes relevant government actors such as Ministry of Environment, INDRHI, INAPA, Ministry of Agriculture and many others. FAO and World Bank support this body investment projects for *Yaque del Norte* and *Ozama* basins.

- **Agroforestry**: 2017 has been declared as the year of agroforestry. A reforestation programme has been established with an Executive Director and a programming unit within the Presidency, a coordinator of the agroforestry subcomponent, and a coordinator of the forest protection subcomponent (including reforestation and forest management by local communities). The projects under this programme have a micro-watershed management approach and they begin with an assessment and zoning in which, Ministry of Environment and Natural Resources, INAPA and INDRHI must work together and reach agreements at the local level. In addition, the projects must ensure productive benefits for most disadvantaged population in the micro-watersheds. The selection of micro-watersheds projects under this programme is carried out within the framework of the Surprise Visits of the President.

- **Water Bill:** Since 2000, the Congress is discussing a new law that regulates the use of water resources. Such bill is not foreseen to be approved in short/mid-term. However, Programme shall monitor it and its impacts if implemented. A positive coordination and communication with the Ministry of Environment and Natural Resources -which coordinates environmental policy - can facilitate the inclusion of potential Programme results and outcomes in the law when it is finally approved. This approach could be useful for complementary regulation.

- **Progressing with Solidarity**: implies conditional cash transfer to different target populations (as single mothers, elderly and persons with disabilities). It has also contributed to the creation of a social provision network (small businesses or commercial establishments) in priority areas of poverty, to which have access programme beneficiaries, ensuring the availability of food stocks of the basic food basket and strengthening small businesses by increasing their income and their integration into the formal banking system.

- **Water Users Organizations and Irrigation Management Transfer Program**: The Irrigation Management Transfer Program (IMTP) shift responsibility for the administration, operation and maintenance of irrigation infrastructure to WUAs while remaining state-owned. There is a total of 28 Irrigation Users Boards (WUB) represent a total of 71,800 water users (of a total of 89,300) covering 270,500 ha. The WUB are in charge of budget preparation, fee collection, operation, administration, and expenditures. WUB are composed of Water Users Associations (WUA), and are legally considered as Non-profit organizations. Contrary to some WUBs, which have received extended support from IMTP, WUAs are mostly weak when their characteristics.

- **SENASA**: is a subsidized regime primarily insures low-income households. Insurance coverage overall varies from 42% in the poorest income quintile to 70% in the highest. As coverage under these schemes grows, the government looks to promote prevention in order to reduce the public health expenses (or at least to re-allocate it in other areas or sectors).

6.1.4 Marginalized and Vulnerable Groups

The project targets marginalized groups who are affected and will ensure that there is no further disproportionate impact on these groups. Therefore, the impact of each activity, output, and outcome will be assessed to consider the impact on the vulnerable groups within the community.

Marginalized and vulnerable groups present in target communities include women and girls, the disabled, single mothers who are heads of households, the elderly including those who do not have any fixed income (pension), children and Haitians migrants (especially those of questionable immigration status) and their families. The programme will be extended to cover more sites and/or beneficiaries if can meet its priority goals with economic and environmental efficiency.

The specific vulnerabilities of these groups were described in access and equity section.

6.1.5 Human Rights

The Dominican Republic has ratified important international treaties related to human rights, a the Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment (CAT), the Optional Protocol of the Convention against Torture (CAT-OP), the International Covenant on Civil and Political Rights (CCPR), the Second Optional Protocol to the International Covenant on Civil and Political Rights aiming to the abolition of the death penalty (CCPR-OP2-DP), the Convention for the Protection of All Persons from Enforced Disappearance (CED), the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the International Convention on the Elimination of All Forms of Racial Discrimination (CERD), the International Covenant on Economic, Social and Cultural Rights (CESCR), International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (CMW), the Convention on the Rights of the Child (CRC) Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict (CRC-OP-AC), the Optional Protocol to the Convention on the Rights of the Child on the sale of children child prostitution and child pornography (CRC-OP-SC), and the Convention on the Rights of Persons with Disabilities (CRPD).

The Dominican Republic has no national human rights institution set up in accordance with the Principles relating to the status of national institutions for the promotion and protection of human rights (the Paris Principles). The country has established the National Commission for the Human Rights, created a Legal Aid Clinic to assist the poor and underprivileged in gaining access to courts. Migrants have been offered a route to citizenship by forgiving the gaps in their residency that prevented them from regularizing their status (National Regularization Plan for Foreigners).

All programme activities and interventions have been developed and will be implemented within the International and National Human Rights Framework. The programme activities will ensure that the rights and freedom of all are protected. Also, the programme has also adopted a rights-based approach, grounded in international principles and frameworks, according to the laws.

6.1.6 Gender Equality and Women's Empowerment

The programme activities need to ensure that it promotes a fair and equal access of men and women, and should take into consideration differential impact. The programme should also promote equal participation in decision-making processes by assuring women representation in key decision-making processes and a balance of representation in relevant programme forums and activities. A gender analysis was also conducted to ensure that needs and realities of men and women are taken into consideration with further recommendations for mainstreaming gender.

6.1.7 Core Labour Rights

Dominican Republic has ratified 7 fundamental ILO conventions. The country has a comprehensive legislation to protect the labour rights in aspects as forced labour (C029), freedom of association and protection of the right to organize (C087), right to organize and collective bargaining (C098), equal remuneration (C100), abolition of forced labour (C105), discrimination (employment and occupation) (C111), minimum age (C138), and worst forms of child labour (C182).

The programme will ensure that national working standards (Labour Code) are respected totally. Also, programme will ensure that appropriate wages will be paid per assigned task and that no child labor will be employed. Security and safety standards will also be respected and enforced.

6.1.8 Indigenous Peoples

There are no indigenous people in the Dominican Republic, so this principle is not applicable.

6.1.9 Involuntary Resettlement

During the consultations, some participants expressed their concern about if the programme implies any involuntary relocation. Community leaders cited the recent experience (August 2016) of *Valle Nuevo* (a national park and protected area located in the middle of the country), where the Ministry of Environment and Natural Resources pulled out all persons living and/or working in such area, citing agriculture/livestock were polluting the biggest water resources of the country.

In all these cases, technicians explained the programme will not result in involuntary resettlements. No livelihoods or businesses are expected to be at risk of involuntary resettlement as a result of the programme intervention, conversely in many cases is expected the land will increase its value.

For waterworks on private land, the Ministry of Environment, INAPA, and INDRHI will consult and obtain the signed consent of property owners. (similar the process through which roads and public areas are established and maintained). All these authorizations will be documented and socialized.

6.1.10 Protection of Natural Habitats

Some targeted areas host major natural resources that must be preserved under this programme. Many areas within Los Cacaos, San José del Puerto and Villa Altagracia are an important habitat for many species (there is a protected area in the northwest of the province). The vulnerability of such areas is well documented and has been described in the programme's Environmental Impact Study. As such areas has been negatively affected by various factors over the years (mainly the deforestation to uses the land for agriculture purposes, the urban expansion, the illegal cut of trees to produce coal, extensive livestock, the discharge of wastewater, unappropriated solid waste disposal, etc.), the programme will reduce effectively the impacts of the human activity on the natural habitat, specifically with activities as re-afforestation and training of communities.

Figure 7: Contamination of Water Resources
Source: field visits (November 2017).

Most populated towns and nearby areas, shows several signs of contamination. As it was verified during field visits, in these such areas water sources receive constantly discharged oil, domestic grey water, septic effluents, and solid waste (in the form of plastics, garbage, paperboard, textile, paper, glass, batteries and appliances). There are places where fish are no present anymore. These fish kills have been due to reduced freshwater recharge (drought), depleted levels of oxygen, high water temperatures, discharge of potentially toxic elements and untreated sewage among others.

The programme interventions could cause some negative impacts in some areas (most of them in the construction of infrastructure) as the landscape modification, the generation of solid waste and eventual affectation on soils and air (pollutants, noise, dust, etc.). However, as is stated in the programme's Environmental Impact Study, by properly managing these risks, the programme will have significantly benefits to the ecosystem health, due to infrastructure and facilities will operate under an environment management system than avoid the foreseen impacts on the air, soil, water and biodiversity, and by increasing the freshwater recharge through improved infrastructure.

6.1.11 Conservation of Biological Diversity

Within the programme's Environmental Impact Study, a species inventory was prepared (which is annexed to this document). Among species presents are: Garza Ganadera (*Bubulcus ibis*), Aura Tiñosa (*Cathartes aura*), Petigre (*Tyrannus dominicensis*), Zumbadorcito (*Mellisuga minima*), Cigüita (*Coereba flaveola bananivora*), Cigua Palmera (*Dulus dominicus*), Nightingale (*Mimus polyglottos*), Cigua Saltarina (*Seiurus aurocapillus*), Rolita (*Columbina passerina*), Rana Lucia (*Celestus spp.*), Lagarto verde (*Anolis chlorocyanus*), Lagarto Cabezón (*Anolis cybotes*), Lagarto Común (*Anolis distichus*), Culebrita sabanera negra (*Antillophis parvifrons*), Julian chivi (*Vireo altiloquus*), Zumbador Grande (*Anthracothorax dominicensis*), Carpintero (*Melanerpes striatus*), Cotorra (*Amazona ventralis*), Barrancolí (*Todus subulatus*), Guinea Cimarrona (*Numida meleagris*); and Perico (*Aratinga chloroptera*). None of these such species are threatened nor endangered[14].

Introduction of invasive species presents a low risk to the programme, since the programme nurseries can propagate the species for planting and landscaping, and furthermore the programme will not introduce any exotic or invasive species. As activities that could promote the spread of invasive species is a greater risk, identification and control of invasive species will be necessary during project implementation, particularly under Component 1. The Programme will adopt agricultural practices that increase biodiversity compared to the baseline scenario, including conservation agriculture. However, the inclusion of the Ministry of Environment and Natural Resources ensures the proposed interventions respects and care the biological diversity[15].

6.1.12 Climate Change

The programme is focused on climate change adaptation through sustainable water management which, from a climate perspective incorporates resilience (adaptation) but some mitigation of greenhouse gases (GHG) is possible (i.e., with the utilization of gravity-system based system that

[14] Results were compared with *Lista Roja de Especies en Peligro* published by the Ministry of Environment and Natural Resources. This inventory was cross-checked with The IUCN Red List of Threatened Species.

[15] Infrastructure may impact biodiversity particularly in the construction and installation of facilities.

displaces pumps or increasing the forest cover in some areas). Some GHG emissions can occur by the increases of the energy consumption on productive and processing schemes.

All adaptation actions undertaken under the programme will need to be assessed constantly in order to understand whether they contribute to building of resilience under increasingly variable climate. Potential impacts on land use will also be registered, thus contributing to the assessment of GHG emissions reductions (mitigation) In this case, methodologies from IPCC will be utilized to account the GHG emissions, specially the default emissions factors for fossil fuel and electricity[16].

6.1.13 Pollution Prevention and Resource Efficiency

Clearing of vegetation from the intervention areas, removal of solid waste, civil works, construction of infrastructure and facilities will all generate varying amounts of pollution as fossil fuels will be used to power equipment directly or indirectly (electricity generated by fossil fuels). There is also the possibility that construction debris and other forms of waste generated by the activities of the project may find its way into poorly-managed disposal sites (or even worst, water courses).

The programme carried out an Environmental Impact Study which describe strategies and actions to minimize waste and pollution production from programme activities, considering applicable local, national and international regulations regarding any waste and pollution, or minimization of resource use. Within the study, all such these activities and strategies (and measures to reduce or avoid such impacts) are differenced for Programme's construction and operational phases.

6.1.14 Public Health

Health is more complex than the absence of diseases. It is the result of interactions between individual characteristics and factors of the environment. Initial screening of the programme reveals the potential for many positive health impacts regarding avoiding water related diseases.

Additionally, when water is not managed properly creates ideal breeding environments for disease vectors such as mosquitoes. This includes the *Aedes aegypti* which is a known carrier for diseases such as Dengue, Chikungunya, Zika, Malaria and yellow fever, all of which have been positively confirmed in the Dominican Republic. Regarding to the Zika virus, the clear link between this virus and women's sexual and reproductive health and pregnancy outcomes have been established; specifically, the link to microcephaly. This condition affects the population and treat the tourism.

[16] Regarding this matter, a good practice is to utilize the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, available at: https://www.ipcc-nggip.iges.or.jp/public/2006gl/.

In screening of the program suitability, it was determined that a full Health Impact Assessment (HIA) would not be necessary due to the limited scope and scale of potential impacts of the programme interventions. The programme's Environmental Impact Study address health impacts.

6.1.15 Physical and Cultural Heritage

There are no physical heritage sites in the programme targeted area and no cultural heritage properties that may be impacted by it. The chances of damage to physical assets are zero.

6.1.16 Lands and Soil Conservation

The soils in the area were described in section 4.1.1. The soils are generally limited for agricultural purposes but are adequate for other uses in special if water availability is improved. There are no particular fragile lands that would be lost or degraded by the activities of this programme. Lands are expected to be preserved from erosion due to implementation of re-afforestation schemes.

Also, the programme will have positive impacts on the landscape of the intervention areas through the establishment of agro-forestry systems and conservation agriculture. Soil conservation and restoring fertility is a key practice in smart-agriculture (which can be fostered with compost).

6.2 Identified Risks to the Programme

6.2.1 Component 1

This component refers to *Community level implementation of climate resilient water resource management activities*, which presents following impacts:

Environmental Impacts

Clearing of vegetation will be necessary during construction of infrastructure and facilities (i.e., stations, tanks, ponds, dams, reservoirs, etc.). The vegetation around the place shall not contain any rare or vulnerable species and care must be taken that the removed vegetation not be dragged or dumped into water courses. Same applies for any other solid waste or organic matter.

Re-vegetation and re-afforestation schemes may result in the introduction of plant species which may out compete native plants, require extensive tending including watering. This is a special concern considering the scarcity of water. Also consider that some native plants grow very tall and become top heavy especially during the fruit bearing stage. They therefore need sufficient room

for proper root development to support them. Inadequate plant source material for replanting along the banks is also a consideration. The soil on the banks of the watercourse must not be left exposed to potential erosion especially from water which may carry the soil into the waterway.

Soil and water may be affected by inadequate disposal of solid waste, so all solid waste must be stored appropriately and removed quickly. Construction activity may also generate solid and liquid waste such as oil from equipment which may pollute the soil and watercourses.

With the expected increase in temperature as a result of climate change, mosquito breeding can occur and this may exacerbate the vector problem and contribute to potential disease outbreaks. The *Aedes aegypti* (which is the vector for Zika, Dengue, and Chikungunya) breeds preferentially in stagnant water. Simply eliminating places where water can stagnate will ease this problem.

Interventions may create additional issues as noise, pollutants and dust. All these impacts can to affect the flora and fauna, and even the nearby communities. This may occur if for example with excavations, operation of heavy machinery, and transit of trucks. Measurements to reduce such impacts limit operations to what is strictly necessary. Although these impacts are temporary and non-permanents, its incidence will be monitored during construction and post-implementation.

Social Impacts

Conflicts with residents could occurs due to in many areas, landowners have developed their agricultural practices, which no necessarily be open to change their current land use to other more sustainable in long-term. As well, many communities use to dump solid waste to watercourses. So, some degree of resistance is expected the programme shall invest into change the status quo.

Resistance of property owners to some mitigation measures (i.e. planting of trees, location of infrastructure, and clearing of vegetation) is highly possible. During consultations, residents were very aware and concerned about the sustainability issues and the problems of their communities. All of them are committed to support the programme efforts regarding dialogue with any third party in benefit of the programme implementation. However, the programme will need to raise awareness about the climate change expected impacts, and provide actionable solutions for all.

Fair allocation and access to programme interventions and resources (i.e., water), by all residents without discrimination is important. Community groups have members and are led by individuals whose mandate it is to look after the welfare of the members. Someone must be responsible and have final say in the use of assets owned or controlled by the groups. The possibility exists that

some community members may be discriminated based on their status as a member of the group or the community, or based on the conscious or unconscious prejudices of those in charge.

The major challenge is that all these groups do not have the provision of this type of public service as their primary focus and so training must address this as well as preparation for maintenance.

Gender Impacts

Since climate change is one of the most common hazards that affect the targeted communities (in form of more frequent and intense storms and hurricanes, and more frequent and prolonged droughts), the re-engineering of the water supply for consumption and agriculture will have a positive impact on the community. This is particularly important for women, which families will be less exposed to water-related diseases, will have les expenses purchasing drinking water, and will have more access to water for agriculture and livestock under climate change conditions.

As current participation of communities, and in particular women, is highly limited and results in a lack of transparency, inequity in access and distribution of water resources in planning and decision-making processes. One potential risk of the empowerment of the communities to manage their water resources is that men could dominate the process and the decision-making. A mitigation measure is to assign coordinator roles to women representatives of the communities.

Better access to water resources will reduce the domestic storage that can become the breeding for mosquitoes and other insects identified above which can increase vector-borne diseases such as Dengue and Zika, thus affecting women and children disproportionately. Pregnant women and women among childbearing age would be more vulnerable to the Zika virus. Since there are currently no vaccines to protect against the infection according to the World Health Organization, the improvement of the water infrastructure, will reduce any possible negative health impact.

In general, potential gender impacts of the Component 1 will be positive for vulnerable women as much as can be for the whole communities.

6.2.2 Component 2

This component refers to *Capacity building and capacity development in key institutions and communities to manage long-term climate change-related risks*, which presents following impacts:

Environmental Impacts

There are no foreseeable impacts or risks to the environment associated with this component.

Social Impacts

Consultations with key institution and community-based organizations revealed that a good strategy for communication could maximize the programme impacts beyond San Cristobal. As different ways of dissemination (i.e., social media, infographics, papers and dissertations) has been considered, all these such materials should be women/youth-focused since its designing. Consulted suggested that same materials be focused for different actors (as church, schools, etc.) so these institutions can share them with their peers within and/or outside from San Cristobal.

In relation to livelihood diversification activities, such as community training, regular visits, and field demonstrations shall be done, and also training of extension workers (giving them skills and hands-on experience). This extension workers, who are capable of appreciate and operationalize livelihood adaptation to climate change, can to extend similar support to other communities.

Dissemination of programme results and outcomes will permit to replicate it in other places. As well, the availability of a learning platform can to help to communities to be more accuracy towards other adaptation initiatives. Activities as awareness raising, training and technical assistance for implementation of sub-projects will be carried out by relevant agencies, universities and NGOs. The programme will identify those NGOs working directly in targeted communities.

Regarding the Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal, and is discuses above, programme can to establish a partnership with Plan Estrategico de San Cristóbal (PESC) to create the committee and for its long-term sustainability. In this case, PESC can be beneficed due to the inclusion of the climate change perspective into San Cristobal long-term vision and strategic lines towards development, sustainability, inclusion, and welfare.

Gender Impacts

Men and women should be fully involved in capacity building to manage long-term climate change-related risks. This Component provides an opportunity for community members and key institutions to sustain the adaptation efforts. Women should be considered equal partners in the materials design, who bring unique skills and creativity to climate change adaptation measures.

A potential risk of this component is that systemic gender roles and norms might act as a barrier to women's participation and inclusion in community initiatives to adapt to climate change. Men and women from diverse groups should have the opportunity to participate actively in the planning, design, and implementation of the communication strategy. Together they can work on other aspects as early warning systems, disasters risk management, and protection of livelihoods.

6.2.3 Other Measures

Other actions contributing to reduce the risks are:

- Multi-party agreements will be established to design, implementation and monitoring of sub-projects and specific activities. These agreements will include the process for ensuring that programme funds are distributed specifically to the local communities.
- Stakeholder participation at all programme levels will ensure adequate planning and execution of activities in line with the programme objectives and with the local development and stakeholder priorities, and complementarity with other ongoing and planned interventions.
- Consultative groups will be established to ensure engagement of beneficiaries, to help identify and prioritize activities and interventions as well as to overview the implementation and progress of the targeted activities at field level. These groups include representatives from beneficiary groups, implementing partners, cooperatives, churches, local clubs, and NGOs.

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Appendix

Appendix 1: List of Species

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Angiosperma	Son las plantas que tienen su semilla envuelta en un recipiente llamado ovario.
Antropogénico	Algo que ha sido producto de la acción humana y que está relacionada con las modificaciones del ambiente natural.
Endémica	Cuando una especie es propia de un país o región.
Estípite	Tallo largo y no ramificado (como es el caso de las palmas).
Introducidas`	Son especies de plantas que no pudiéndose valer por sí mismas utilizan cualquier otro soporte para trepar.
in-situ	Que se determinó en el campo, en el mismo lugar del hecho.
Lianas	Son tallos sarmentados de los bejucos que trepan en los árboles, es sinónimo de trepadora.
Nativa	Especies de plantas que además de ser parte de nuestra flora, también se encuentran en la flora de otros países.
Naturalizada	Especies de plantas que no siendo oriunda de un país, medran en él y se propagan como si fuesen autóctonas.
Raro	Que tiene pocos individuos en la zona, o aquellas cuya área de distribución geográfica muy restringida.
Rastreras	Son plantas cuyo tallo crece apoyándose en el suelo.
Relicto	Son plantas de otras épocas, con muy poca representación en la flora actual.
Spp	Se refiere a que hay más de una especie del tipo de género.

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Taxonomía Estudio teórico de la clasificación de organismos teniendo en cuenta sus semejanzas y diferencias.

Forma Biológica (FV)

A = Árbol
Ar = Arbusto
H = Hierba
He = Hierba epifita
L = Liana o Bejuco
R = Rastrera
Et = Estípite

Status Biogeográfico (S)

N = Nativa
E = Endémica
Nat = Naturalizada
Ic = Introducida Cultivada
I = Introducida

Especies		**FV**	**S**
ACANTHACEAE			
Blechum pyramidale	Campeche	H	N
Ruellia tuberosa	Guaucí	H	N
Thunbergia fragrans	Velo de novia	L	N
AGAVACEAE			
Cordyline fruticosa	Cintica, Buena suerte	Ar	Ic
AMARANTHACEAE			
Achyranthes aspera	Rabo de gato	H	N
Amaranthus dubius	Bledo	H	N
Cyathula achyranthoides		H	N
ANACARDIACEAE			
Anacardium occidentale	Cajuil	A	Ic
Mangifera indica	Mango	A	Nat
Spondia cytherea	Ciruela	A	Ic
S. mombin	Jobo de puerco	A	N
S. purpurea	Ciruela	A	Ic
ANNONACEAE			
Annona muricata	Guanábana	A	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

A. reticulata	Mamón	A	N
Oxandra lanceolata	Yaya	A	N
Rollinia mucosa	Candongo, Anón	A	N
APIACEAE			
Eryngium foetidum	Cilantro del monte	H	Nat
Hydrocotyle hirsuta		H	N
APOCYNACEAE			
Allamanda cathartica	Flor de mantequilla	Ar	Ic
Mesechites angustifolia		L	N
Tabernaemontana citrifolia	Palo de leche	Ar	N
T. divaricata	Jazmín	Ar	Ic
ARACEAE			
Alocacia cucullata	Yautía	H	Ic
Anthurium gracilis		H	N
Caladium bicolor		H	Ic
Colocasia esculenta	Yautía	H	Ic
Dieffenbachia seguine	Mata puerco	H	N
Philodendron angustatum		L	N
P. locerum		L	N
Syngonium podophyllum	TraTra, Mano poderosa	L	N
ARALIACEAE			
Dendropanax arboreus	Lengua de vaca	A	N
Didymopanax morototoni	Sablito	A	N
Polyscias guilfoylei	Gallego	Ar	Ic
ARAUCARIACEAE			
Araucaria excelsa	Araucaria, 7 pisos	A	Ic
ARECACEAE			
Bactris plumeriana	Palma catey	Et	E
Chrysalidocarpus lutescens	Palma areca	Et	Ic
Cocos nucifera	Coco	Et	Ic
Roystonea hispaniolana	Palma real	Et	E
Veitchia merrillii	Palma manila	Et	Ic

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Caryota urens	Cola de pescado	Et	Ic
ARISTOLOCHIACEAE			
Aristolochia ringens	Patico	L	N
ASCLEPIADACEAE			
Asclepia nívea	Algodón de seda	H	N
ASTERACEAE			
Bidens cynapiifolia	Puntilla	H	N
Eleutheranthera ruderalis		H	N
Emilia fosbergii	Pincelito	H	N
E. Sonchifolia	Pincel	H	N
Enydra sessilis		H	N
Eupatorium odoratum	Rompezaragüey	Ar	N
Mikania cordifolia	Guaco	L	N
M. micrantha	Bejuco de finca	L	N
Parthenium hysterophorus	Escoba amarga	H	N
Pterocaulon alopecuroides	Lengua de buey	H	N
Salmea scandens	Baiguá	L	N
Synedrella nodiflora		H	N
Vernonia cinerea	Yerba morada	H	N
V. fruticosa	Gustavo de chivo	H	N
V. springeliana	Mata caballo	Ar	E
Wedelia trilobata	Yerba buena cimarro.	H	N
BIGNONIACEAE			
Macfadyena unguis-cati	Uña de gato	L	N
Spathodea campanulata	Amapola	A	N
BIXACEAE			
Bixa orellana	Bija	Ar	Nc
BOMBACACEAE			
Ochroma pyramidale	Lana	A	N
BORAGINACEAE			
Cordia globosa		Ar	N
C. mirabiloides		Ar	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

C. sulcata	Yagua	Ar	N
BROMELIACEAE			
Anana comosus	Piña	H	Ic
Tillandsia balbisiana	Tinajita	He	N
T. fasciculata	Tinajita	He	N
T. juncea	Tinajita	He	N
T. polystachya	Tinajita	H	N
T. setacea	Tinajita	He	N
T. usneoides	Guajaca	He	N
Vriesea tuerckheimii	Tinajita	He	N
BURSERACEAE			
Tetragastris balsamifera	Amacey	A	N
CACTACEAE			
Rhipsalis baccifera		He	E
CAESALPINIACEAE			
Bauhinia monandra	Huella de vaca	A	Ic
Chamaecrista nititan	Tamarindillo	H	N
Hymenaea courbaril	Algarrobo	A	N
Haematoxylon campechianum	Campeche	A	N
Mora abbottii	Cola	A	E
Senna occidentalis	Brusca	H	N
S. siamea	Casia amarilla	A	Ic
CARICACEAE			
Carica papaya	Lechoza	H	Ic
CASUARINACEAE			
Cassuarina equisetifolia	Casuarina	A	Ic
CRHYSOBALANACEAE			
Chrysobalanus icaco	Puerco gordo	Ar	N
Hirtella triandra	Cocuyo	A	N
CECROPIACEAE			
Cecropia schreberiana	Yagrumo	A	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

CLUSIACEAE			
Calophyllum calaba	Mara	A	N
Clusia rosea	Copey	A	N
Mammea americana	Mamey	A	N
COMBRETACEAE			
Buchenavia tetraphylla	Ciruelillo, Guaraguao	A	N
Combretum laxum	Bejuco de barraco	L	N
COMMELINACEAE			
Commelina elegans	Suelda consuelda	H	N
Tradescantia spathacea	Magueyito	H	Ic
CONNAGRACEAE			
Rourea surinamensis	Bejuco, Luis Gómez	L	N
CONVOLBULACEAE			
Ipomoea indica	Bejuco de batata	L	N
I. setifera		L	N
I. tiliacea	Bejuco de tabaco	L	N
Turbina corymbosa	Aguinaldo	L	N
COSTACEAE			
Costus spicatus		H	N
CUCURBITACEAE			
Cucurbita moschata	Auyama	R	Ic
Momordica charantia	Cundeamor	L	N
CYPERACEAE			
Cyperus ochraceus	Cortadera	H	N
C. luzulae	Coquille	H	N
C. odoratus		H	N
C. rotundus	Coquillo	H	N
Eleocharis interstincta	Trati-trati	H	N
Fimbristylis cymosa	Coquille	H	N
F. dichotoma	Coquillo	H	N
Rhynchospora colorata	Coquille	H	N
R. nervosa		H	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

R. elongata		H	N
Scleria lithosperma	Cortadera	H	N
S. scandens	Tibisí	H	N
DIOSCORIACEAE			
Dioscorea alata	Ñame	L	Ic
EUPHORBIACEAE			
Alchornea latifolia	Bija macho	A	N
Aleurites fordii	Javilla extranjera	A	Ic
Chamaesyce hypericifolia	Yerba lechera	H	N
Codiaeum variegatum	Crotón	Ar	Ic
Dalechampia scandens	Fogaraté	L	N
Drypetes lateriflora	Palo blanco	A	N
Euphorbia pulcherrima	Flor de pascua	Ar	Ic
Hura crepitans	Javilla	A	N
Manihot sculenta	Yuca	Ar	N
Sapium laurifolium	Daguilla	A	N
FABACEAE			
Alysicarpus vaginalis	Pela Guebo	H	N
Cajanus cajan	Guandúl	Ar	Ic
Centrosema virginianum	Divierte caminante	L	N
Clitoria pinnata		L	N
Calopogonium mucunoides	L	N	
C. galactyoides		L	N
Crotalaria falcata	Cajita	H	N
C. spectabilis	Cajita	H	N
Desmodium adscendens	Amor seco	H	N
D. barbatum	Amor seco	H	N
D. tortuosum	Amor seco	H	N
Gliricidia sepium	Piñón cubano	A	Nat
Lonchocarpus latifolius	Anón	A	N
Macroptilium lathyroides	Ajai	H	N
Mucuna urens	Ojo de buey	L	N
Pachyrhizus erosus	Auyey	L	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Rhynchosia minima	Frijolito	L	N
Ormosia krugii	Palo de peronia	A	N
Vigna luteola		L	N
FLACOURTIACEAE			
Casearia arbórea	Cascarita	Ar	N
C. guianensis	Cafecillo	A	N
C. sylvestris	Cafecillo	Ar	N
HELICORNIACEAE			
Heliconia caribaea	Plátano cimarrón	H	Ic
H. latispatha	Platanito	H	Ic
HIPPOCRATEACEAE			
Hippocratea volubilis	Jaquimey	L	N
IRIDACEAE			
Trimezia martinicensis		H	N
LAURACEAE			
Persea americana	Aguacate	A	Ic
LAMIACEAE			
Hyptis capitata		H	N
H. suaveolens		H	N
H. verticillata		H	N
H. pectinata		H	N
LAUREACEAE			
Ocotea coriaria	Cigua blanca	A	N
O. floribunda	Aguacatillo	A	N
O. globosa	Aguacatillo	A	N
O. leucoxylon	Cigua prieta	A	N
LOGANIACEAE			
Spigelia anthelmia	Yerba de lombriz	H	N
LYTHRACEAE			
Cuphea hyssopifolia	Yerba de la dicha	H	N
C. parsonsia	Mucha genta	H	NC
MALPIGHIACEAE			

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Byrsonima spicata	Maricao	A	N
Malpighia emarginata	Cereza	Ar	N
Stigmaphyllon emarginatum	Bejuco de manteca	L	N
MALVACEAE			
Hibiscus rosa-sinensis	Sangre de cristo	Ar	Ic
Sida acuta	Escoba	H	N
S. cordifolia	yerba buena	H	N
S. linearifolia	Escoba	H	N
S. rhombifolia	Escoba	H	N
S. urens	Escoba	H	N
Urena sinuata	Cadillo de perro	H	N
U. lobata	Cadillo de perro	H	N
MARICGRA VIACEAE			
Marcgravia brittoniana		Le	N
MELASTOMATACEAE			
Acisanthera quadrata		H	N
Clidemia hirta	Peluda	Ar	N
C. strigillosa	Peluda	Ar	N
C. umbellata	Peluda	Ar	N
Henriettea fascicularis	Petigrene	A	N
Miconia impetiolaris	Auquey	Ar	N
M. dodecandra		Ar	N
M. laevigata	Granadilto	Ar	N
M. mirabilis	Tres filos	Ar	N
M. prasina	Granadillo bobo	Ar	N
M. racemosa		Ar	N
Nepsera aquatica		H	N
Pterolepis glomerata		H	N
Tibouchina longifolia	Cadillo de arroyo	H	N
MELIACEAE			
Cedrela odorata	Cedro	A	N
Guarea guidonia	Cabirma	A	N
Trichilia hirta	Joboban	A	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

T. pallida	Palo amargo	A	N
MENISPERMACEAE			
Cissampelos pareira	Oreja de rat6n	L	N
MIMOSACEAE			
Acacia mangium	Cacia mangium	A	Ic
Anadenanthera peregrina	Tamarindo cimarrón	A	N
Entada gigas	Samo	L	N
Inga fagifolia	Jina extranjera	A	N
I. vera	Guama	H	N
Mimosa seratoria	Zarza	L	N
M. pudica	Moriviví	H	N
MORACEAE			
Artocarpus altilis	Pan de fruta	A	Ic
Ficus benjamina	Laurel	A	Ic
F. maxima	Higo	A	N
F. trigonata	Higo	A	N
Pseudolmedia spuria	Macao	A	N
MYRSINACEAE			
Myrsine coriacea	Palo santo	Ar	N
Wallenia laurifolia	Caimoní	Ar	N
MYRTACEAE			
Eugenia domingensis	Guázara	A	N
Eucalipthus sp	Eucalipto	A	Ic
Psidium guajava	Guayaba	Ar	N
Syzigium jambos	Pomo	A	Nar
NYCTAGYNACEAE			
Bougainvillea glabra	Trinitaria	Ar	Ic
Pisonia aculeata	Uña de gato	L	N
OLEACEAE			
Chionanthus domingensis	Lirio	A	N
ONAGRACEAE			
Ludwigia octovalvis	Yerba de jicotea	H	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

ORCHIDACEAE			
Epidendron	Orquídea	He	N
Oncidium variegatum	Angelita	He	N
OXALIDACEAE			
Oxalis barrelieri	Vinagrillo	H	N
PASSIFLORACEAE			
Passiflora edulis	Chinola	L	Ic
PINACEAE			
Pinus caribaea	Pino	A	Ic
PIPERACEAE			
Peperomia rotundifolia	Guayuyo	He	N
Piper aduncum `	Guayuyo	Ar	N
P. amalago	Guayuyo	Ar	N
P. cuspidatum	Guayuyo	Ar	N
P. jacquemontianum	Guayuyo	Ar	N
Pothomorphe peltata	Aniceto	Ar	N
POACEAE			
Andropogon bicornis		H	N
Bambusa vulgaris	Bambú	H	Nat
Brachiaria brizantha	Grama	H	N
B. decumbens	Pangola	H	Ic
Cynodon dactylon	Pelo de micci	H	N
C. nlenphuense	Yerba estrella	H	Ic
Digitaria ciliaris	Grama	H	N
D. insularis	Grama	H	N
Eleusine indica	Pata de gallina	H	N
Eragrostis amabilis		H	N
Hyparrhenia rufa	Jaragua	H	N
Ichnanthus pallens		H	N
Lasiacis divaricata	Carrizo	H	N
Olyra latifolia	Carrizo	H	N
Oplismenus hirtellus		H	N
Panicum maximum	Yerba de guinea	H	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Pennisetum purpureum	Napier	H	N
Saccharum officinarum	Caña de azúcar	H	Ic
Sporobolus tenuissimus	Pajón	H	N
POLYGALACEAE			
Seguridaca virgata	Marabeli	L	N
PORTULACACEAE			
Portulaca oleracea	Verdolaga	H	N
PROTEACEAE			
Grevillea robusta	Helecho	A	Ic
RHAMNACEAE			
Gouania polygama	Bejuco indio	L	N
RUBIACEAE			
Bertiera guinensis		Ar	N
Coffea arabica	Cafe	Ar	Ic
Diodia sarmentosa		H	N
Policourea crocea	Cafecillo	Ar	N
Psychotria domingensis	Cafetan	Ar	N
Spermacoce assurgens	Juana la blanca	H	N
Vangueria madagascariensis	Tamarindo extranjero	Ar	Ic
RUTACEAE			
Citrus aurantium	Naranaja agria	A	Ic
C.limetta	Limon dulce	Ar	Ic
C.limon	Limon agrio	Ar	Ic
C. reticulata	Mandarina	Ar	Ic
C. grandis	Toronja	A	Ic
Zanthoxylum martinicense	Pino de teta	A	N
SAPINDACEAE			
Allophylus cominia	Parida	A	N
Cupania americana	Guárana	A	N
Serjania polyphylla	Bejuco de costilla	L	N
SAPOTACEAE			

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Chrysophyllum argenteum	Caimitillo	A	N
C. oliviforme	Caimitillo	A	N
Pouteria sapota	Zapote	A	Ic
SCROPHULARIACEAE			
Capraria biflora	Feregosa	H	N
Scoparia dulcis	Escoba dulce	H	N
SIMAROUBACEAE			
Simarouba glauca	Juan primero	A	N
SMILACAEA			
Smilia domingensis	Bejuco chino	L	N
SOLANACEAE			
Physalis angulata	Tope-Tope	H	N
Solanum capsicoides	Berenjena cimarrona	H	N
S. torvum	Berenjena cimarrona	Ar	N
STAPHYLLACEAE			
Turpinia occidentalis	Violeta	A	N
STERCULIACEAE			
Guazuma tomentosa	Guazuma	A	N
G. ulmifolia	Guazuma	A	N
Melochia villosa		H	N
Theobroma cacao	Cacao	A	Ic
Waltheria indica	Tremolina	H	N
TILIACEAE			
Corchorus siliquosus	Escoba	H	N
Triumfetta bogotensis	Cadillo	H	N
T. semitriloba	Cadillo	H	N
ULMACEAE			
Trema micrantha	Memizo de paloma	A	N
URTICACEAE			
Pilea setigera	Yerba buena cimarro.	H	N
Urera baccifera	Pringamosa	Ar	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

VERBENACEAE			
Clerodendrum chinense	Azulejo	Ar	N
Gmelina arborea	Melina	A	Ic
Lantana camara	Dona sanita	Ar	N
Lippia alba	Orégano	Ar	Ne
L. micromera	Orégano	Ar	Ne
Priva lappulacea	Pega pollo	H	N
Stachytarpheta cayennensis	Verbena	H	N
S. jamaicensis	Verbena	H	N
VITACEAE			
Cissus trifoliata	Garito	L	N
C. verticillata	Bejuco caro	L	N
ZINGIBERACEAE			
Alpinia zerumbet	Boca de dragón	H	N
A.purpurata	Jengibre cimarrón	H	N
Renealmia jamaicensis	Jengibre cimarrón	H	N
HELECHOS			
Adiantum fragile		H	N
A. pyramidale		H	N
Anemia adiantifolia		H	N
Blechnum occidentale		Ha	N
Cnemidaria horrida		H	N
Cyathea arborea	Helecho macho	H	N
Dicranopteris flexuosa	Helecho	H	N
Diplazium centrípeta	Helecho	H	N
Nephrolepis multiflora	Camarón	H	N
N. biserrata		H	N
Niphidium crassifolium		He	N
Odontosoria aculeata	Zarza	H	N
Pityrogramma calomelonos		H	N
Polypodium polypodioides		He	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Pteridium aquilinum	H	N
Pteris longifolia	H	N
Tectaria heracleifolia	H	N
T. incisa	H	N
Thelypteris dentata	H	N
T. serrata	H	N

@AdaptationFund
Project Proposal Development

Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme

 # ClimaSanCristobal

Report:
Environmental and Social Management System Plan

Prepared by:

Brightline Institute, Inc.
proyectos@brins.org

Commissioned by:

Instituto Dominicano de Desarrollo Integral (IDDI)

Date: July 30th, 2018

Content

Acronyms

AF	Adaptation Fund
EIAS	Environmental and Social Impact Study
EIA	Environmental Impact Assessment
GHG	Greenhouse gases
IDDI	Dominican Institute of Integral Development
INAPA	National Institute of Drinking Water and Sewerage
INDC	Intended Nationally Determined Contributions
INDRHI	National Institute of Hydraulic Resources
MSME	Micro, Small and Medium-sized Enterprises
NGO	Non-governmental organization
PESC	Strategic Plan for San Cristobal
ESMSP	Environmental and Social Management System and Plan
E&S	Environmental and Social
ESP	Environmental and Social Policy (of Adaptation Fund)
NIE	National Implementing Entity
QA/QC	Quality assurance/ Quality Control
USP	Unidentified Sub-Project
PMU	Programme Management Unit
PSC	Programme Steering Committee
PEB	Programme Executive Board

1. Overview on ESMP

The programme, titled "***Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme***" aims to enhance the resilience and enhance the resilience and adaptive capacity of rural livelihoods to climate impacts and risks on water resources in the San Cristóbal Province. This objective will be achieved through key results centered on the improvement of water access and also increase institutional and community capacity and coordination for integrated water management to support other uses of water resources especially for the diversification of livelihoods by rural communities.

Such objective is organized according to three main outcomes:

(1) Implemented climate resilient management of water resources in 30 small communities of San Cristóbal (under Component 1: ***Community level implementation of water resource management activities***).

(2) Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according their respective competences (under Component 2: ***Capacity building and capacity development to manage climate-related risks***)

The project's environmental and social risks are summarized within the Environmental Social Management System (ESMS) and the resulting plan. The responsibility for the implementation of the Management Plan will be the responsibility of the accredited National Implementing Entity (NIE), the Dominican Institute of Integral Development (IDDI).

This ESMS was developed by conducting studies and consultations over the past year (2017). After several consultations and technical reviews, the environmental, social and gender considerations were reinforced for Component 1 and Component 2 and were integrated into the project design. This approach was also important to maintain the sustainability of the outputs of these such Components itself (water resources management and livelihoods diversification). The integrated approach is therefore such that components themselves be mitigation measure for Environmental and Social risks, and to further improve the likelihood of overall of programme impact and success.

Understanding that the programme design is in itself a response to meet social and environmental considerations, the implementation of the programme may have unintended negative impacts. This ESMS summarizes all identified potential risks and the Management Plan communicates the process and strategy by which the IDDI will comprehensively identify and manage risks.

1.1 Strategic Approach

IDDI is a NGO that was accredited to the Adaptation Fund as National Implementing Entity[1]. As a Entity with vast experience implementing development projects and programmes, understand that management of environmental and social issues are not only dictated by the policies of the funding agencies but also the national laws, policies, project management and financial principles. The ESMP approach is to streamline these two requirements and where appropriate provide separate outcomes documents/reports[2]. The ESMS approach could also to collaborate with other projects being implemented by the IDDI, institutions and/or communities of San Cristobal, and incorporated within the M&E process. This improves efficiency and provides other options for risk management and to track how such initiatives are contributing with climate change adaptation.

The nationally established process to manage the process for the identification of risks related to environment and social (E&S) is the Environmental Impact Assessment (EIA) process defined by the Ministry of Environment and Natural Resources. This process is predicated on detailed baseline studies used to identify risks and the EIA process is generally streamlined to focus on those issues that pose a risk to the programme. Although AF Environment and Social Policy (ESP) can be handled separately for the government process, some aspects of ESP have been streamlined and incorporated within the followed EIA (mainly to be efficient and to include gender issues, which are not typically included in national process). Summarizing, the approach for this Management Plan is to use the EIA process, but have a specific E&S and gender screening process and report.

Further to the approach above, the ESP will normally be tracked as part of the overall Monitoring and Evaluation plan of the programme (M&E) and by the IDDI. This plan will be a subset of this overall M&E plan but will have its own special reporting procedures. This will reflect that the overall project risks are not limited to the ESP, which is particularly important in the context by the nature of the programme.

Further, ESMS also notes that there were pre-existing conditions within the programme targeted sites that would have relevance to the ESP but these are not the results of the climate change impacts. As targeted areas are low-income communities and as such, there are many pre-existing social and environmental factors that pre-date the project. The AF programme scope and budget, limits the programme to address the impacts of the climate aspects of the project and ensure that the impacts of climate change do not further exacerbate within the issues in the targeted area.

The NIE is however working with the relevant key institutions (water and sanitation, environment, forestry, agriculture, irrigation, etc. as members of the Programme Executive Board) to ensure that the project is coordinating with appropriated institutions to reduce risks, increase efficiency, and to maximize any potential synergies with other government and/or community initiatives.

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[1] More info at: https://www.adaptation-fund.org/ie/dominican-institute-of-integral-development-iddi/

[2] For example, the Ministry of Environment and Natural Resources could require a rigorous Environmental Impact and Assessment (EIA) process, while Adaptation Fund requires separate ESP screenings and reports

An important feature of the proposed project is the nature of Component 1, which does not need a separated environmental and social management approach for each one while component 2 does not implies any negative impact. So, the ESMS take advantages of EIA process, and consequent individual and/or cross cutting risks identified and strategies developed.

1.2 Key Premises

The major underlying assumptions for the development of the ESMS are:

- Not all AF's Environmental and Social Principles are equally relevant to the project; some of them are not relevant to the Dominican Republic or to this programme specifically;

- IDDI is a NGO with limited access to the best locally available technical expertise in all fields required by the programme (including social and environmental safeguards), so it's necessary to develop partnerships with key government institutions, community-based organizations, local NGOs, and even individual (academics, experts, consultants, advisors, etc.);

- There are pre-existing socioeconomically and environmental factors that may not be solved by programme implementation. The ESMP is designed to ensure that the actions and outputs of the programme do not further exacerbated existing social and environmental problems;

- The programme is designed to address environmental and social issues related to the risks of climate change, but procuring an appropriated adaptation;

- Under AF mandate for NIEs, risks related to the programme execution may be shared and/or transferred to another entities with key relevant expertise and capabilities (i.e., INAPA, Ministry of Environment and Natural Resources, Community-based organizations, Local NGOs, etc.).

The Management Plan measures are therefore based on the above-mentioned assumptions along with the historical, cultural and environmental knowledge of both the country and targeted areas.

1.3 Responsibilities

Programme risks and the implementation of the ESMS will be managed by the IDDI, through the Programme Management Unit (PMU). IDDI will use its staff, PMU staff as well as independent consultants to effectively monitor the environmental, social and gender impacts. The PMU staff will be highly trained individuals in many specialized areas. Relevant IDDI staff members and their qualifications and experiences were provided to AD during NIE accreditation process, and PMU staff will be concluded and provided during the pre-inception phase. The PMU will undergo sensitization in the AF ESP and other policies and project management expectations of the AF.

A top executive from IDDI (PR) and the Programme Manager (PM) will be responsible for the day-to-day management of project risks and the Programme Steering Committee (PMS) will regularly

assess progress and take necessary decisions when a change is required. These individuals (PR and PM) will be the contact persons to the AF and will provide reports to the AF, and other entities.

IDDI will be the responsible for the management of the Environmental Impact Assessment (EIA) process, and the Ministry of Environment and Natural Resources will oversee its performance in behalf of the government of the Dominican Republic. Besides the Ministry of Environment holds programme key relevant agencies (i.e., INAPA) also works closely with other key Ministries (as Agriculture, Public Health, Public Works, etc.), so it can request to other agencies to conduct other additional site assessment and/or consultations, including private or public applications[3].

Components 1 will also be monitored by the staff of the Ministry of Environment and Natural Resources and INAPA, which comprises engineers (1 electromechanical, 1 environmental, 1 civil, 1 hydraulic and sanitary). Other professionals and technicians will by private sector engineers, consultants and experts that will be hired on contract for on-the-ground interventions. Also, a legal professional (lawyer) from IDDI will also provide assistance to the PMU if necessary.

1.4 QA / QC

After concept note approval, the programme did the necessary internalization process to further incorporate the project actions into the project work plan and risk management processes (as is stated in programme schedule, and in accordance with individual sub-projects already defined). At the same time, project risks were further identified and sufficiently detailed to inform necessary policies and regulations (where appropriate) was obtained. Finally, baseline data was collected to support project M&E and the generation of specific reports to meet AF ESP requirements.

During the pre-inception phase (period between the programme approval and the start of first activities), programme risks will be further appraised and potential or latent risks (not envisaged at designed stage, but which may occur from project activities) will be flagged, in line with the contingency plan developed. This is a good project management practice, which is consistent with a comprehensive risk management approach. In addition to project monitoring, this step will be important to ensure that due diligence is taken to mitigate against pre-existing social issues that the project cannot solve but may however have an impact on programme overall success.

1.5 Foreseen Synergies

The programme does not include neither funds nor activities from other programme/projects. However, potential synergies could be addressed, always within the law and AF relevant policies.

[3] This is particularly important, due to this ministry is the National Designed Authority and/or Focal Point for relevant international funds regarding environment and climate change. This can serve to avoid risks of duplicity, identify synergies with other initiatives, and to monitor the implementation of the programme.

2. Programme Risks

The screening process for overall programme risks included two independent processes: (1) a general project risk for all detailed risks, and (2) a special process to include the AF's ESP. The first one is done via the EIA and other processes to meet national environmental regulations and other decision-making requirements. The last one is to meet AF requirements to fund the programme.

Both the above-mentioned processes were carried by the IDDI, with support and assistance from officials from Ministry of Environment and Natural Resources and INAPA, to streamline the process and to ensure consistency. The ESMS was conducted by an independent consultant which included: AF Policies; national relevant regulation for EIA; consultation with technicians, professionals, communitarians and experts; detailed environmental and social studies within San Cristobal (and/or carried by INAPA); the INDC of the Dominican Republic, historical registries of extreme weather impacts in Dominican Republic, and data from other third parties.

The program, thereafter was screened for environmental and social factors to meet the following:

- The Adaptation Fund's Environmental and Social Principles, as described in the Environmental and Social Policy[4]. The AF's *Guidance document for Implementing Entities on compliance with the Adaptation Fund Environmental and Social Policy* and *Guidance document for Implementing Entities on compliance with the Adaptation Fund Gender Policy*[5] were also used as a reference documents throughout the risk identification and management process.

- The EIA requirements, are the dictated by the laws of the Dominican Republic (Law 64-00) and other regulations adopted by the Ministry of Environment and Natural Resources, specifically the *Guidelines for Social impact assessment* and *Guidelines for Environment impact studies*. As is requested by the Dominican regulation, the factors addressed during the EIA were more specific to the San Cristobal province, and risks associated specifically to the targeted areas.

2.1 Risk Scoring

According to current environmental regulation, a risk management scoring methodology was utilized for all significant risks than can occur during the programme implementation. Typically, is required by the authorities that this methodology shall to include both a qualitative and quantitate assessment of risks and impacts, but quantitative has priority for all foreseen risks.

[4] AF's E&S Policy: https://www.adaptation-fund.org/wp-content/uploads/2013/11/Amended-March-2016_-OPG-ANNEX-3-Environmental-social-policy-March-2016.pdf

[5] Documents are available at: https://www.adaptation-fund.org/apply-funding/policies-guidelines/.

In the case of the proposed programme, the risk analysis was performed according to following criteria to determine the identified risk relevance:

- the probability of occurrence of the event arising (likelihood); and
- the consequences of the event on the programme (impact) if it occurs.

Table 1 below summarizes the adopted risk-scoring.

Table 1: Programme Components, Outputs, and Outcomes

PROBABILITY (P)	IMPACT (I)	RELEVANCY (R)
If relevat data is available, it can be a mix of the future probability and the frequency of past occurrences. Very unlikely (1): The event has never happened or is very unlikely to happen (i.e. more than once in 20 years). Unlikely (2): The event has only happened once in the last 5–10 years or is unlikely to happen in the next ten years. Likely (3): The event has happened once in the last 2–4 years or is likely to happen in the next 2–4 years.	It does refer to the ability to deliver, continuity of operations, financial and/or resource losses and affectations on credibility. Low (1): programme can still achieve its objectives with limited constraints/ delays. Minor (2): programme can still deliver and achieve its objectives, but not fully or in timely manner. Moderate (3): The event hinders programme, its objectives or the systems (partial or totally).	The relevance (score rate) can be calculated mathematically as: $R = P \times I$ Where: R = relevance (importance, seriousness, or overall risk level) P = probability I = Impact risk Low = 1 to 3 Mid = 4 to 7 High = 7 to 9

Following table summarizes the programme risks categorization according the adopted scoring.

Table 2: Baseline Assessment and Risk Categorization

Checklist of AF's E&S principles	Compliance with AF Principles	Relevance for the Programme
1. *Compliance with the Law*	The Programme (and all sub-projects) has been designed to comply with relevant national laws, regulations and policies. The Programme meets with the country's legal framework for water, environment, and specifically: - General Law on the Environment and Natural Resources (64-00) - Sectorial Law of Protected Areas (202-04) and it later modifications - Freedom of Information Law (200-04) to support institutions and to be more transparent	P = 1 I = 1 R = 1 x 1 = 1 (**Low**)

2. *Access and Equity*	Equity begins with the programme staff, and then with the approaches and processes in project design and finally in project implementation. The IDDI approach to access and equity is enshrined in its Code of Conduct and Ethics[6], which staff and consultants of the IDDI are required to sign and adhere throughout their service to the programme. The intervention logic of the Programme is to provide benefits in most vulnerable communities with fair and equitable access to activities, equipment, resources and training throughout both planning and implementation phases. It's necessary note than targeted areas count over 4,200 households that would need additional resources and assistance to build resilience to climate change. All groups which participation has been requested will have an equal opportunity to access to the adaptation activities proposed by the Programme. Eligibility criteria of the Programme has been clear and transparent, and it was defined together with relevant stakeholders, including local authorities. Programme interventions were designed to remove barriers as: difficulty of access to water resources; vulnerability in terms of biophysical and climate risks; social vulnerability; and as defined selection criteria. Through these criteria, the Programme assured participation of lees endowed groups, including women, elderly and particularly poor people. Fairness and access to contracts under the programme, particularly micro and small businesses, is guaranteed through a Department's procurement rules, oversight by Programme Steering Committee (PSC) and planned audits. The proposed Programme's results framework will measure developments related to 'access and equity for vulnerable groups' throughout the Programme duration. Components and activities are designed in consequence.	P = 1 I = 2 R = 1 x 2 = 2 (**Low**)
3. *Marginalized and Vulnerable Groups*	The Programme focuses on marginalized and vulnerable groups (women, youth, elderly, etc.) and aims to assist them to improve their water supply and sanitation services thus its living conditions. A particular focus has been placed on Dominicans citizens decedents from Haitians and Haitian immigrants (especially those of questionable immigration status) and their families. The project will be focusing on reducing the specific impacts of climate change by building resilience in the environment,	P = 2 I = 2 R = 1 x 2 = 4 (**Mid**) Potential impacts will be monitored to ensure they don't affect to any marginalized groups.

[6] Código de Conducta y Ética del IDDI. http://iddi.org/file/repository/Codigo_de_Etica_y_Conducta.pdf

	with both individual households and community services (under Component 1). In this way, all vulnerable groups are expected to be positively impacted notwithstanding pre-existing non-climate factors affecting these persons (under Component 1 and Component 2). The Programme does not have negative impact on these groups. The climate risk awareness activities of the programme, and the community-based water resources management plans, will provide detailed assessments on the impacts of events as droughts, floods, storm and hurricanes. This information (which will be based on the last IPCC AR) will be used to make planning decisions and will also be used by the local community organizations and institutions. It is likely that these such studies will find some properties that will be impacted and may cause the property values to decline.	
4. Human Rights	The Dominican Republic is a democratic nation that ratified important international treaties related to human rights as: *Torture and Other Cruel Inhuman or Degrading Treatment or Punishment* (CAT), *Civil and Political Rights* (CCPR), *abolition of the death penalty* (CCPR-OP2-DP), *Protection of All Persons from Enforced Disappearance* (CED), *Elimination of All Forms of Discrimination against Women* (CEDAW), *Elimination of All Forms of Racial Discrimination* (CERD), *Covenant on Economic, Social and Cultural Rights* (CESCR), *Protection of the Rights of All Migrant Workers and Members of Their Families* (CMW), *Rights of the Child* (CRC), *involvement of children in armed conflict* (CRC-OP-AC), *sale of children child prostitution and child pornography* (CRC-OP-SC), and the *Rights of Persons with Disabilities* (CRPD). The programme will ensure that national working standards (Labour Code) are respected totally. Also, programme will ensure that appropriate wages will be paid per assigned task and that no child labor will be employed. Security and safety standards will also be respected and enforced. The Programme affirms the fundamental rights of people in targeted areas, and thus does not affect their freedom. Furthermore, the Programme does not integrate any activities contrary to custom law or traditions. Participation in the Programme will be participatory, voluntary and free. IDDI and key executing institutions have a demonstrated track record of respecting and to promoting human rights.	P = 1 I = 3 R = 1 x 3 = 3 (**Low**)
5. Gender Equity and Women's Empowerment	In general, in the Dominican Republic, the national laws and programs are equal for men and women, but in the practice,	P = 1 I = 3 R = 1 x 3 = 3 (**Low**) Potential impacts will be monitored to ensure

	men have better access to education, jobs, credit, and other consumer items, so they are better able to get life quality[7]. The programme impacts however may not be equally known and accessible to both genders, due to vulnerable women (mainly whose are head of family) does not have enough time to participate in community institutions and/ or any community-based development activities. However, independent literature, government reports, and consultation with communities and institutions, points that women will disproportionately benefited by programme interventions. The programme logical framework foresees direct participation for women and women's associations so they can benefit directly from the activities (mainly women that are single mothers and/or head of households). Under Component 1, the Programme proposes to support to develop more sustainable income generating activities (ASOCARES) and improve thereby their living conditions, therefore also empowering them in the context of a traditional and male-dominated society. This includes, but not limited to, prioritizing women for programme employment and any demand of goods and services.	women's participation, and empowerment.
6. Core Labour Rights	The Dominican Republic is a democratic nation that has ratified 7 fundamental ILO conventions. The country has a comprehensive legislation to protect the labour rights in aspects as *forced labour* (C029), *freedom of association and protection of the right to organize* (C087), *right to organize and collective bargaining* (C098), *equal remuneration* (C100), *abolition of forced labour* (C105), *discrimination* (employment and occupation) (C111), *minimum age* (C138), and *worst forms of child labour* (C182). The programme will be implemented in compliance with legislation including the Labour Code. No child labour nor forced labour is expected to result from this programme. Core labour rights concern gender, respect, work hours, etc. and any labour standard will be observed and respected on infrastructure interventions and new production facilities. Also, the programme will also ensure that appropriate wages will be paid per assigned tasks, and that no child will be employed. Social security drivers (i.e., access to first aid, health insurance, etc.) will also be respected and enforced.	P = 1 I = 3 R = 1 x 3 = 3 (**Low**) Monitoring on core labour rights will be undertaken throughout the programme.
7. Indigenous Peoples	n/A	n/A

[7] Dominican Republic - Poverty Assessment: achieving more pro-poor growth. Available at: http://documents.worldbank.org/curated/en/295161468236090493/pdf/32422.pdf.

8. Involuntary Resettlement	Involuntary resettlement due to programme activities does not represents a problem. Water infrastructure, processing schemes and facilities and irrigation implementation do not require any resettlement so, there will be no involuntary resettlement under the programme, and mechanisms are in place to ensure unidentified sub-projects do not result in involuntary resettlement. IDDI's *Environmental and Social Policy* states its commitment with AF to embrace to does not support "*any resettlement of people or the removal or alteration of any physical cultural property*"[8]. The major impact on programme that the works within the Component 1 could need heavy equipment that cannot access to all targeted areas, so building of roads could be necessary. This will slow down the work and increase costs if property owners believe their property boundaries are being infringed on. Public consultations suggest that this risk is low because there is high awareness and concern about programme benefits and impacts, and its transparency. Baseline studies did not identify any significant formal or informal livelihood-based economic activities within the area that shall be affected by the programme interventions. Public, municipal, or organizational lands will be used to avoid any conflict with third parties that be landowners. A grievance/ complains mechanism will be put in place in order to protect any potential affected by the programme.	P = 2 I = 2 R = 1 x 2 = 2 (**Low**)
9. Protection of Natural Habitats	Programme activities under Component 1 will be carried out on areas already under usage. As the programme aims to rehabilitate and protect natural habitats through ecosystem-based adaptation measures, the programme will teach practices to dispense traditional agriculture, therefore reducing pressures on ecosystems. Furthermore, the program will work with measures for water conservation (Output 1.3) to limit the runoff and soil erosion in the selected areas. As well, it will reduce the use demand of more water-demand products, agro-chemicals and other substance that's pollutes the soil and the water. Programme may cause negative impacts on the biophysical environment, if activities are not monitored consequently. The Law 64-00 and Law 22-04 protect any area identified as Protected Areas. So, the relevant protected areas of San Cristobal will be protected from further development.	P = 1 I = 2 R = 1 x 2 = 2 (**Low**) Monitoring on natural habitats will be undertaken throughout the programme

[8] Declaración de la Política Social y Ambiental (declaración de compromiso con el Fondo de Adaptación): http://iddi.org/file/repository/Declaracion_Politica_Ambiental_y_Social_del_IDDI.pdf

10. Conservation of Biological Diversity	The Programme will adopt agro-forestry practices that increase biodiversity compared to the baseline scenario, including conservation agriculture. Further, the programme will not introduce any exotic or invasive species in the targeted areas. However, as noted before, water storage facilities and irrigation may impact biodiversity particularly when areas need to be cleared to build new facilities. Programme may cause negative impacts on the biological diversity, if activities are not monitored consequently. Habitat and species protection and monitoring will be consistent with the Law 64-00 (environment and natural resources) and the Law 22-04 (protected areas).	P = 1 I = 2 R = 1 x 2 = 2 (**Low**) Monitoring on flora/fauna affectations will be undertaken.
11. Climate Change	The Programme is focused on climate change adaptation through sustainable water management which, from a climate perspective, incorporates resilience (adaptation) and reduction or removal of greenhouse gases (mitigation). All adaptation actions undertaken under the umbrella of this programme will need to be assessed constantly in order to understand whether they contribute to build resilience under increasingly variable climate. The final assessment of the Programme as well as the socio-climatic vulnerability assessment will support achieving this principle. Potential impacts on land use will also be registered, thus contributing to GHG emissions assessment (for mitigation and/or sinks). However, some minor GHGs emissions can occurs due to the fossil fuel and electricity consumption on building infrastructure, facilities and operations, which will be monitored during programme lifespan.	P = 1 I = 1 R = 1 x 1 = 1 (**Low**)
12. Pollution Prevention and Resource Efficiency	Water resources are currently exposed to various forms of pollution associated with the use of fertilizers and pesticides and manure. The programme activities will work to prevent these types of pollution (Output 1.1) and with the introduction of more resilient agriculture/forestry practices (Output 1.3). Under component 3, educational material that can be to include additional content for communities interested into care their own environment conditions. There may be further pollution linked to the construction of water storage facilities, including deterioration in water quality downstream, or detrimental effects through limiting access to water by downstream users. During the construction of water infrastructure other affectations can occur (noise, solid waste, wastewater, dust, accidents, etc.)	P = 2 I = 2 R = 1 x 2 = 4 (**Mid**) Potential impacts will be monitored to ensure environmental integrity
13. Public Health	By supplying more and better water and sanitation services it is expected a positive impact in public health of selected communities. Education and training in water management and planning at community level can be extended to prevent water-	P = 1 I = 1 R = 1 x 1 = 1 (**Low**)

	related diseases and/or vectors as mosquito, avoiding Zika, Dengue, Malaria, etc. Mosquito and vector borne diseases impact community members, particularly women, among childbearing age, children and elderly people. Programme workers (staff, personal, technicians, extension agents, labors and consultants) will be equipped with safety equipment to protect them, according the potential risk of their respective tasks.	
14. Physical and Cultural Heritage	No adverse impacts on the physical and cultural heritage of the people in the targeted areas is foreseen. As programme activities are designed through a participative approach and with support of key government institutions (i.e., Ministry of Environment and Natural Resources, INAPA and INDRI) The chances of to damage any physical assets are zero.	n/A
15. Lands and Soil Conservation	There are no particular fragile lands that would be lost nor degraded by the program activities. The Programme will have positive impacts on the landscape of the intervention areas through the establishment of agroforestry systems and conservation agriculture. Soil conservation and restoring fertility is a key practice in smart-agriculture and forestry. The capacity building and education material produced by programme (under Component 3) it will include manuals for repairing and maintenance infrastructure. The cleaning and maintenance of irrigation systems will also to reduce erosion (especially during floods or periods of heavy rain).	P = 1 I = 1 R = 1 x 3 = 3 (Low)

2.2 Programme Categorization

According to the AF standards, proposed projects/ programmes can be categorized as:

Category A Likely to have significant adverse Environmental & Social impacts that are diverse, widespread, or irreversible

Category B Potential adverse impacts that are fewer in number, smaller in scale, less widespread, reversible or easily mitigated

Category C No adverse Environmental & Social impacts

Based on the findings presented in Table 2 above, from an environmental and social risks perspective, the programme is ranked as a Category B (across all three components). The impacts and design of the program are not overall high risk when evaluated against the 15 ESP principles.

Risks identified at this stage have potential adverse impacts that are fewer in number, smaller in scale, less widespread, reversible or easily mitigated. However, the project design and budget allocations have been designed to focus on those areas with moderated or potentially low risks.

3. E&S + Gender Impacts

The programme carried out an Environmental and Social Impacts Assessment (ESIA) which describe strategies and actions to minimize or avoid any negative impact from programme activities, considering applicable local, national and international regulations, and to promote the minimization of resources usage. Within the study, all such these activities and strategies (and measures to reduce or avoid such impacts) are differenced by Programme's components and by programme phases (i.e., development, construction, operational and closure). A strong focus is done to cover potential impacts of infrastructure and facilities, and previsions to avoid, mitigate, reduce, or eliminate such impacts, and to agree mechanisms to involve the beneficiaries.

3.1 Consultations

The consultative process was designed to include an approach that included all members of the community but with special approaches to ensure that vulnerable and marginalized members of the communities could participate pate. Two of the consultation events were held during the ESIA process at San Cristobal (Institute Polytechnic Loyola) and Villa Altagracia (House of the Women) both at programme site, which are accessible by persons with disabilities and the public in general.

- 11 December 2017, 8:30 AM to 6:30 PM
  Casa de la Mujer Villa Altagraciana (CAMUVA), Villa Altagracia

- 11 December 2017, 8:30 AM to 6:30 PM
  Instituto Politécnico Loyola (IPL), San Cristóbal

Detailed minutes of the consultations are presented in Annex 5 to the programme document, titled, *Consultation Meeting with Community Representatives from San Cristobal*. In addition, a focalized consultation was carried the Community Technologic Centre (CT) of Villa Altagracia, to share comments and strategies with professionals and leaders interested in the programme design. The public consultations informed the risk identification and analysis captured in the ESIA.

3.2 Risks by Component

This section summarizes the risks posed by the programme activities regarding the environment, social and gender criteria.

Component 1: Community level implementation of climate resilient water resource management activities

- Environmental Impacts

- Clearing of vegetation during construction of infrastructure and facilities (i.e., stations, tanks, ponds, dams, reservoirs, etc.).

- The vegetation around the place shall contain rare or vulnerable species.

- Removed vegetation cab be dragged or dumped into water courses. Same applies for any other solid waste or organic matter.

- Re-vegetation and re-afforestation schemes may result in the introduction of plant species which may out compete native plants, require extensive tending including watering.

- Soil and water may be affected by inadequate disposal of solid waste. Construction may also generate solid and liquid waste such as oil from equipment and machinery.

Interventions may create additional issues as noise, pollutants and dust. All these impacts can to affect the flora and fauna, and even the nearby communities. This may occur if for example with excavations, operation of heavy machinery, and transit of trucks. Some GHG emissions can ocurr.

- Social Impacts

- Conflicts with residents, especially landowners who have developed their agricultural practices and no necessarily are open to change their current land use.

- Many communities use to dump solid waste to watercourses so, some degree of resistance is expected to change such these practices.

- Resistance of property owners to some mitigation measures (i.e. planting of trees, location of infrastructure, and clearing of vegetation).

- Insufficient buy-in from communities, which understand the programme is political in nature and no a comprehensive effort to achieve a more resilient water supply in the long term.

- The possibility that some community members may be discriminated based on their status as, or based on the conscious or unconscious prejudices of those in charge.

The major challenge is that all these groups do not have the provision of this type of public service as their primary focus and so training must address this as well as preparation for maintenance.

- Gender Impacts

- Since climate change is one of the most common hazards that affect the targeted communities so, the re-engineering of the water supply for consumption and agriculture will have a positive impact on the community. This is particularly important for women, which families will be less

exposed to water-related diseases, will have less expenses purchasing drinking water, and will have more access to water for agriculture and livestock under climate change conditions.

- Participation of women is highly limited and results in a lack of transparency, inequity in access and distribution of water resources in planning and decision-making processes.

- Better access to water resources will reduce domestic storage that can become the breeding for mosquitoes and other insects identified above which increase vector-borne diseases (such as dengue and zyka) that could impact women and children disproportionately. Pregnant women and women among childbearing age would be more vulnerable to the Zika virus[9].

Consistent with a gender-sensitive approach, job application forms request that applicants state their gender, jobs will be monitored for gender equity. If applicant women not be adequately, then the programme staff will target other women through partnering with local groups and women-oriented organizations to increase the ratio of applications from empowered women. It therefore means that the jobs created or offered by the programme, must have gender sensitive criteria for selection and must also strive to achieve gender equity and equality.

Component 2: Capacity building and capacity development in key institutions and communities to manage long-term climate change-related risks

- Environmental Impacts

There are no foreseeable impacts or risks to the environment associated with this component.

- Social Impacts

- Concern that even a good strategy for communication could not replicate the programme impacts beyond San Cristobal, due to unappropriated buy-in from targeted audiences.

- Different ways of dissemination (i.e., social media, infographics, papers and dissertations) should be women/youth-focused since its designing.

- Community training, regular visits, and field demonstrations shall be done, and also training of extension workers (giving them skills and hands-on experience).

- Universities and local NGOs can be befitted carrying activities as awareness raising, training and technical assistance for implementation of sub-projects.

[9] Since there are currently no vaccines to protect against the infection according to the World Health Organization, the improvement of the water infrastructure, will reduce any possible negative health impact.

Regarding the Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal, and is discuses above, programme can to establish a partnership with Plan Estrategico de San Cristóbal (PESC) to create the committee and for its long-term sustainability. In this case, PESC can be beneficed due to the inclusion of the climate change perspective into San Cristobal long-term vision and strategic lines towards development, sustainability, inclusion, and welfare.

- Gender Impacts

- Men and women need be fully involved in capacity building to manage long-term climate change-related risks.

- Women may not see themselves as equal partners in the knowledge management, capacity building and climate change adaptation measures.
- This Component provides an opportunity for community members and key institutions to sustain the adaptation efforts.

- Men does not consider women as their equal partners in the materials design, preparation, dissemination or outreach of programme produced materials.

Men and women from diverse groups should have the opportunity to participate actively in the planning, design, and implementation of the communication strategy. Together they can work on other aspects as early warning systems, disasters risk management, and protection of livelihoods.

4. E&S Management Plan

The programme will have a normal pre-inception phase (3 months). During this time most of the policy, legal and other steps will be reviewed in preparation for the formal programme launch (inception workshop, on January 2018). The ESMP has been designed to part of this three months pre-inception phase, in order to facilitate the following activities prior to project implementation:

- Appoint and train the Programme members.
- Appointed members sign the *IDDI's Code of Conduct and Ethics* and understand the *IDDI's Conflict of Interest Manual*.
- Training of key executing institutions on and relevant local organizations/ firms in the IDDI's procurement guidelines.
- Capacity building on the ESP *Screening Checklist* and ESMP of project partners (Ministry of Environment and Natural Resources, INAPA, INDRHI, PESC and Governorate).
- Training and capacity building of community groups in the ESP Screening Checklist.

The ESMP will undergo more detailed assessment during the pre-inception phase to produce a more detailed Plan for inclusion, participation and engagement within the overall M&E strategy.

During the programme development phase, there were several assessments conducted to provide for programme buy-in regarding the Ministry of Environment and Natural Resources and other institutions (meaning the EIAS). In the process to develop the full programme proposal, the EIAS was approved by the Ministry of Environment, especially regarding the programme activities must meet national environmental and other planning requirements. These criteria have resulted on further detailed information/criteria/requirements which were incorporated into the ESMP.

4.1 Relevant Criteria

Component 1: A distinct characteristic of this component is that it includes 7 sub-projects for water supply and sanitation and 5 sub-projects for re-afforestation, with clearly defined activities eligible for funding, and that are located within the project area, including the exact location for infrastructure and facilities. Although sub-projects' engineering and designs were prepared by specialist from INAPA and the Ministry of Environment and Natural Resources, at inception stage a complete set of detailed drawings and specific EIA previsions. This EIA and engineering drawings will be conducted by INAPA and the Ministry of Environment support from local consultant. The EIA may include further assessment of the ESP for the AF or the IDDI may commission a separate study (but it's not necessary due to INAPA is the entity defined by Law to carry these activities).

Water works are well known and standards for these have been developed and set by INAPA and implemented by a variety of projects across the country. The activities are therefore well known and have undergone significant pre-project elaboration technical/financial feasibility assessments.

Regardless of the approach the process will generate an EIA report and a separate report for ESP.

Component 2: the component does need further approval, but it shall be based on a specific communication strategy. As the production of knowledge resources and training materials will be based on programme performance and learnings, other ESMP previsions could be included in the future. Of course, the prevision of a specific budget line for this component secure its performance will be not affected by any further Component 1 constraints or limitations.

The environment and social impacts of each of the subprojects were assessed at the time of application using a check list developed during the full-proposal phase and developed by the IDDI and based on the EIAS approved by the Ministry of Environment and Natural Resources, which also include the ESP criteria. The same checklist will be used also as a training tool for the programme staff and executing entities and it will be used to assess each of the sub-projects.

The responsibility for EIAS approval and cost is already built within government processes.

In addition to the check list, for Component 1 an assessment of ESP impacts will be conducted annually (within M&E verification of programme progress on output and implementation) using a sample size. In the case of Component 2, the approach is to facilitate lessons learned exercises with some drivers to strengthen the programme M&E plan. All these works will be conducted by a local consultant.

4.2 EMSP Process

With the significant number sub-projects included within the programme (and after meeting permissions and decisions as well as potentially bureaucratic demands) the ESMP represents a process-oriented risk management strategy. This process incorporates the use of Government approval processes with its considerable technical resources, and where necessary provide additional project specific steps. This allow for risks assessments be built into project execution thus ensuring that ESP can be applied to each stage of decision making process without delays.

IDDI has harnessed the significant resources of existing technical expertise of the community organization and government entities, to ensure that the cost of Component 3 does not negatively impact on the viability of the programme (due it's more for enabling that for increase resilience).

To community members to participate in the project, there is a need for resources to be budgeted to develop local capacity in order to empower community members and stakeholders. So, under Component 1 (output 1.1.), within more resilient water resource manage under climate impacts, several financials mechanisms scheme will be drafted to support to communities regarding to:

(a) Disbursement through local financial institutions
(b) Revolving funds administered by local NGO grantees
(c) Revolving Credit
(d) Small grants model

In addition, capacity building and learning opportunities will be fostered throughout the lifetime of the project within the Dominican Republic and throughout learning platforms and systems for integrating climate change-related risks into community management of water resources and diversified livelihoods activities. Also, the programme outputs will also be shared locally and through international fora on climate change, including UNFCCC, FAO, OMS, and UN Women.

4.3 Implementation Arrangements

- National Implementation Entity

The Dominican Institute of Integral Development (IDDI) will serve as the National Implementing Agency (NIE) for the programme. IDDI will have the technical and administrative responsibility for achieving expected outcomes/outputs as defined in the programme. Also, IDDI is responsible for:

- the timely delivery of inputs and outputs and, in this context, for the coordination of all other third parties, including ministries, municipalities, decentralized agencies and other authorities.

- the recruitment and contracting of programme personnel, staff and consultants, including subcontracting.

- to monitor project implementation and the achievement of the project outcomes and outputs, and ensure that the funds provided are used efficiently

Strategic and operational oversight, and oversight to ensure compliance with Adaptation Fund's ESP will be the responsibility of the NIE, as it's presented in the monitoring and reporting section.

- Management Agreements

The programme will be implemented by IDDI with Ministry of Environment and INAPA being execution entities. Other private (Water Users Associations and Micro, Small and Medium-sized Enterprises), civil society organizations (PRONATURA, INTEC, UAFAM, Loyola, etc.) and selected community groups have been involved at full-proposal level. As the Dominican Republic has established a regulatory and institutional framework for climate change, Programme activities will be aligned with country's priorities described in National Development Strategy and its national commitments under the UNFCCC. Any implementation arrangement shall recognize clearly the separation between implementing and execution services. Regarding this matter, IDDI will comply with relevant AF guidelines and other criteria as efficiency, transparency and coordination.

The management arrangements of the proposed Programme have been designed to facilitate extensive linkages at all levels, from national-level policymakers to institutional-level operations down to communities and beneficiaries. Into designing such implementation arrangement, following key considerations are taken into account:

1. Consistency with governance structures and mandates of various agencies in order to foster mainstreaming and ownership;

2. Accountability and transparency in fund flows to ensure cost-effectiveness;

3. Disbursement of funds in a timely manner to ensure Programme delivery within the stipulated timeframe; and

4. Mainstreaming and sustainability.

- Programme Architecture

The architecture of the programme will be follows:

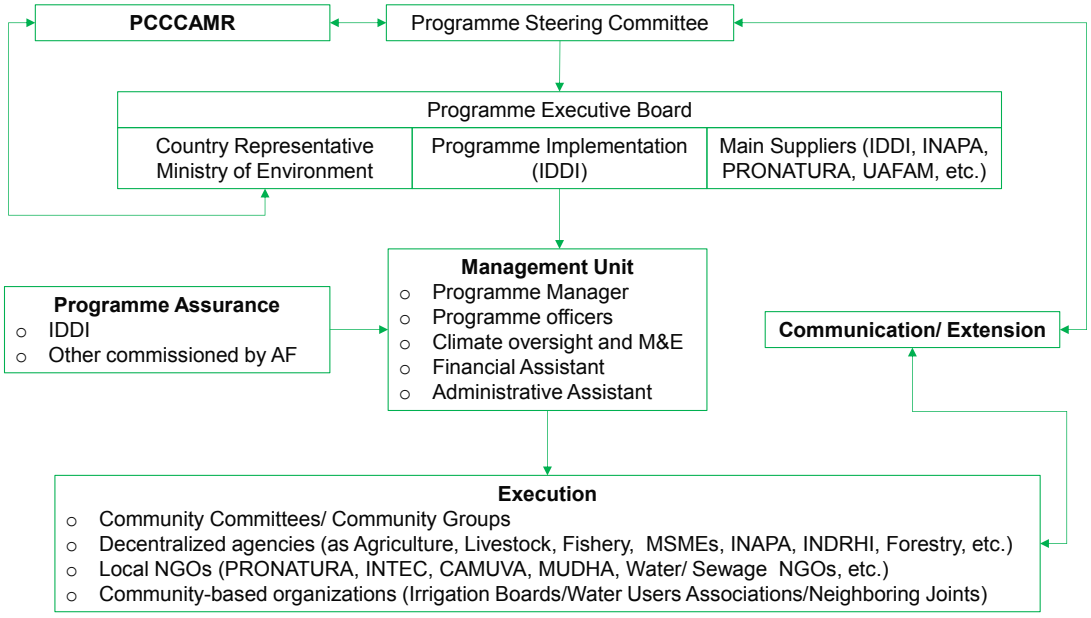


Figure 1: Architecture of the Proposed Programme

- Programme Partners

The Ministry of Environment and Natural Resources will be an executing entity. In addition, the Ministry will act as the main government institution to facilitate linkages between the national and local levels, and to coordinate the activities of the Program at the local level. The Ministry is in a good position to do this, as it has offices and staff at the provincial level. The deliverables of the Program at community level will follow the channels of the current structure of the government

of the Dominican Republic. Through the Vice Ministry of Forest Resources and the Vice Ministry of Soils and Waters, the activities of re-afforestation, conservation of the micro-basins, and / or restoration of the ecosystems will be coordinated.

The implementation of activities at community level will be the responsibility of the Community Committees / Community Groups (CC/CG), through the corresponding decentralized agencies, mainly INAPA (which will also be an executing entity). INAPA will also be in charge of the execution of the drinking water and sanitation projects, as well as the creation and formalization of the ASOCARES. In the places where the conditions exist, all the activities foreseen by the CC/CG will be closely related to associations of water users and the committees of irrigation users (for the management of water resources and irrigation systems, such as the supervision of infrastructure projects, identification of private contractors, etc.). In accordance with this approach, the CC/CG will be strengthened to work with several decentralized agencies regarding to the program.

Other governmental bodies such as INDRHI, the Ministry of Public Health, the Ministry of Public Works, etc., could be qualified as executing entities if necessary and / or depending on the nature of the activity carried out. This measure not only helps strengthen the capacities of these institutions, but also reduces delivery risks.

- Steering Committee

The Program will create a Steering Committee (PSC) composed of high-level representatives of IDDI, the Ministry of Environment and Natural Resources, INAPA, and key institutions such as the Government of San Cristóbal, INDRHI, MEPyD, local governments, universities and NGOs. This committee will be chaired by IDDI, and the Ministry of Environment and Natural Resources will be permanent secretary. In addition, the membership of the PSC could include the governing ministries of the decentralized agencies that will participate in the delivery of the project's products at the community level, such as the Ministries of Public Health, Public Works and Communications, of Industry and Commerce, of the Youth, of Women and others.

Table 3: Programme Steering Committee Membership

Regular (with key responsibilities)	Occasional (according agenda/ interest)
- Ministry of Environment and Natural Resources	- Local Goverments (according to agenda)
- IDDI	- Community based organizations
- INAPA	- Representatives of empowered women
- INDRHI	- Ministry of Public Health
- MEPyD	- Ministry for Women
- Governorate of San Cristobal	- Universities (UAFAM, INTEC, Loyola)
- PESC	- Local NGOS (ProNatura, Brightline)

PSC is constituted as a device to enforce decision-making process of the programme, especially to mitigate or avoid risk out of the IDDI control. PSC meet every 3 months and the minutes of the meetings will be recorded and shared with all PSC members. The PSC will be governed by a *Terms of Reference*[10] and the *IDDI's Code of Conduct and Ethics* and *IDDI's Conflict of Interest Manual*.

To secure gender inclusion and representation, 50% or more of the PSC members shall be women.

- Executive Board

The Programme Executive Board (PEB) will be responsible for approving the key management decisions of the Program and will play a key role in ensuring technical quality, financial transparency and overall impact on the Program's development, and will be established as soon as possible to approve the proposal presented. The Board will be composed of high-level designated representatives of agencies with direct participation in the implementation of the Program (i.e., IDDI, INAPA, MEPyD, Governor of San Cristóbal, Ministry of Environment and Natural Resources, etc.). Once the Program has been approved, the PEB will be formalized during the inception phase. At this point, a complete list of the PEB members designated by the institutions and their alternates will be provided. This will include the inception report.

To secure gender inclusion, 50% or more of the PEB appointed (regular) members shall be women.

- Management Unit

IDDI will establish a Program Management Unit (PMU), which will be responsible for the implementation of project activities. This Unit will prepare annual work plans, progress reports, and carry out the M&E plan of the Program. The PMU will be in charge of coordinating the activities under each component with the different government agencies / local organizations that will collaborate and participate in the execution of the project. This unit will also be responsible for guaranteeing the appropriate participation of the interested parties and the involvement, transparency and performance.

The PMU ensures that there is effective coordination and efficiency when there are programme activities that inter-dependent for execution. The PMU will have its own Project Manager. To secure gender inclusion, 50% or more of the PMU members (hired and staff) shall be women.

- Programme Manager

IDDI will appoint a Programme Manager (PM), who will be designated over the course of the Programme inception phase. The costs of the PM will be borne by the Programme. PM will be a dedicated professional designated for the duration of the programme. The prime responsibility

[10] The Terms of Reference for the Programme Sterring Committe are included in *Términos de Referencia: Comité de Dirección (Steering Committee)*, elaborated by Brightline Institute [Apendice D, just in Spanish].

of the PM is to ensure that the programme produces the results specified in the programme document to the required quality standard and within the specified constraints of time and cost.

As a way of ensuring the integration of the AF Programme into key Institutions' structures and process, the PM will be a senior official with at least 10 years of experience on climate change adaptation-related issues in the Dominican Republic, and relevant experience with gender, community-based adaptation, rural development, land planning, and local governments.

- Technical/ Support Staff

The PM will be supported by a core team of technical and support staff forming the Programme Management Unit (PMU) located at IDDI to execute Programme activities, including day-to-day operations of the programme, and the overall operational and financial management and reporting. Support staff can include accountant, consultant, engineers, drivers, secretary, etc. Technical/ support staff will be appointed by Programme Manager based on transparency and competitiveness criteria, and respecting aspects as equality, equity and gender (as it's said above, 50% or more of the PMU staff shall be women, based on correspondent competitiveness criteria).

- Local coordination/ implementation

At the local level, Community Committees and Community Groups (CC/CG) will be established in each site to be intervened and / or where the individual projects will be executed. This will ensure adequate coordination and participation at the local level of the key actors and representatives of the beneficiary groups. In the areas of intervention, the CC/CG will be responsible for the delivery of the project's products at the community level, through the appropriate government agencies, mainly INAPA, the Vice Ministry of Forest Resources, the Vice Ministry of Soils and Waters, and the Directorate of Climate Change.

To execute the activities and transfer the economic resources required to carry them out, IDDI will sign a Cooperation Agreement with the CC/CG, in line with its practices for the implementation of projects at community level. The PSC will have the responsibility to ratify the scope of said agreements. In case of not achieving with a particular CC/CG, IDDI may propose other projects.

The nature and extent of the Cooperation Agreements are defined based on IDDI's vast experience in implementing community-based initiatives in the Dominican Republic, which has been shown to encourage greater local ownership of initiatives, ensure accountability to purposes of the Programme, encourage local creativity and mobilize the local counterpart for the implementation of the Programme. It also ensures that the project is integrated into community work, instead of being seen as an additional responsibility that does not align with their own development plans.

Under the proposed program, the relevant government agencies will work in coordination with the CC/CG to deliver the Program's products, and to ensure that the institutional capacity for local adaptation action is built and survives beyond the life of the Program financed by the AF. At the

beginning of the program, the capacity of government agencies to determine the capacity gaps and the necessary support for the development of capacities to execute the program financed by the AF will be evaluated. Based on the findings, the Program, in coordination with the Ministry of Environment and Natural Resources and INAPA, will strengthen the areas that must be built to achieve the Program's objectives (i.e., technical capacity, financial management and M&E, etc.).

The processes for the CC/CG are robust and mature throughout the Dominican Republic, and also the processes to establish institutional arrangements with them. However, in some communities there are already community structures that can play - under a framework of appropriate dialogue- the role of the CC / CG. This is important because it avoids duplication of efforts.

- Extension Agents

For the implementation of the program, particularly in the management of water resources and forest resources in the intervention zones, it is essential the participation of community agents, who will provide technical assistance to the communities. Therefore, it is necessary to ensure that they have the necessary technical skills to implement the activities. Learning from the experiences of the Small Grants Program (UNDP-GEF-PPS), institutional arrangements can be used in the Program with respect to the use of the services of community agents.

The first option, and the preferred one, is to form a group of community agents, made up of interested members of the community, beneficiary groups and local NGO staff, through practical and concrete training in aspects that will focus -in principle- on the types of services that will be required by the interventions of the Program. The community agents will be empowered by the trainers (technicians of the Ministry of Environment and Natural Resources and of the INAPA, as appropriate, and consultants that will be hired through the Program) to offer their services to the beneficiary communities as it has been established for the program. Officials from government institutions and Program staff will periodically conduct field visits to ensure that the services provided by community agents conform to national standards and / or good practices. This approach is inclusive, profitable, innovative and sustainable, since it builds capacities, transfers technology and empowers people to diversify their livelihoods and helps them meet their needs.

The capacity of the community agents will be established through the evaluation of their skills, as well as an evaluation of the capacities of the target communities to assimilate the technical support they can provide. The Program will carry out an assessment of the functional, technical and other critical needs in support of the delivery of Component 1. It is expected that the capacity needs will vary significantly among the communities, but the common skills that will be developed under the Program would be appropriate practices in changing climatic conditions, community mobilization, climate risk management in the field (ie, water conservation techniques, etc.). The resources needed for the capacity development activities of the extension agents are budgeted within the components, as well as the budget for the local / external consultants who will carry out the training that will be provided. This is a basic measure of cost-efficiency.

The experience of consultations, meetings and field visits, indicates that there is a great interest on the part of local people to become community agents (at least based on their knowledge of the communities and their perception of the services that could provide these) due to the opportunity to acquire new skills and income. Some community agents even charge some fees for the services they perform for other members of the community (i.e., seedlings, fertilizers, etc.).

In cases in which the object community does not have the capacity to constitute community agents, an alternative option for the Program would be to include the extension service in the Cooperation Agreements to be signed between IDDI and the CC/CG. Under these agreements, the plans, activities and operations are developed specifying in detail the type of community service required, the frequency of visits, the types of services to be provided, and an estimate of the costs of these will be provided. The deliverables and monitoring mechanisms are detailed as an appendix to the Agreements. The Program will cover the additional cost involved in the provision of these services, in the form of transport / travel subsidy.

The CC/CG, in coordination with relevant government institutions, will submit regular reports to the PMU for monitoring, and to activate the release of funds to cover the incremental costs. The incremental emphasis is due to the fact that, as established for the projects implemented under the National Implementation Modality (NIM), the Program will not pay the professional services of the personnel paid by the government, nor will it dedicate or provide them with any asset, amount, sum or other values.

The Ministry of Environment and Natural Resources and INAPA, through their respective provincial offices in San Cristóbal, will be responsible for coordinating the CC/CG in the target communities to ensure that they learn from each other's experiences in the implementation of the Program. In addition, it is essential for the coordination function of these institutions, to ensure that the Program can take advantage of economies of scale as much as possible during implementation. This is particularly crucial in cases where the CC/CG could obtain a better price if they negotiate collectively (i.e., civil works, plant seeds, etc.). The provincial office of the Ministry of Environment and Natural Resources will collaborate with the Provincial Committee for Monitoring Adaptation to Climate Change (Output 2.2), giving opinion and information on the programme execution.

- Local NGOs

A Program of the size of this Proposal cannot rely solely on government systems. Fortunately, local NGOs are rapidly acquiring capacities to execute climate, forestry and environmental projects, in collaboration with communities and international agencies. The strategy of the Program will be to complement the government and NGOs with new and / or existing capacities (in other sectors) to create a group of community agents. This has been shown to work in the Dominican Republic based on the experiences of local NGOs (for example, the Disaster Risk Management Programs and the Small Grants Program). Regarding this aspect, it is expected that, according to their mission, experience and availability, organizations as PRONATURA, UAFAM, Fundación H+D, and the Loyola Institute, could achieve some leadership in support of water

management (Component 1) and capacity development (Component 3); while local organizations (as CAMUVA, MUDHA, and ASOCARES) can provide services and support at the field level.

- Provincial Committee

A Provincial Climate Change Adaptation Monitoring Committee (PCCAMC) will be created and empowered to provide overall guidance and supervision in order to lead the Programme to its long-term sustainability. The PCCAMC will act as "representative" of Programme beneficiaries and community-based organizations towards key government institutions. Its main activities will be related with the inclusion of the Programme achievements and further steps within both central and local government investment plans. This does include, but not limited to, National Budget and Public Spending Law, Participative Budget (a well-known/well established existing mechanism that promotes civil society participation into local governments investments to secure its plurality, efficiency, sustainability and transparency), and furthers Multi-Year Public Sector Plan.

As well the PCCAMC can work with other national and/or international relevant institutions (cooperation agencies and/or multilateral donors) into develop further climate and development related projects in benefit of communities and organizations of the San Cristobal Province.

The final design of the Provincial Committee, attributions and members will be defined after the inception phase. However, it's highly anticipated that it will include existing entities as the Governance, local governments, MEPyD, COE, Ministry of Public Health, Ministry of Environment and Natural Resources, INDRHI, INAPA, Ministry of Agriculture, Ministry of Energy and Mines, and Ministry of Industry and Commerce. Private sector representatives form industrial, services, banking, and agriculture, and civil society organizations, as universities, NGOs, women, youths and communities will be Included. *Plan Estratégico de San Cristobal* (PESC) has interest into host PCCAMC as they do with other strategic provincial committees.

The Programme will support the establishment of this committee initially, to serve the Programme objectives but with a wider view of supporting the identification of other climate change adaptation needs and the implementation of solutions in benefit of most vulnerable people and the long-term sustainable development of the San Cristóbal Province.

4.4 Safeguards for ESMP

The Ministry of Environment and Natural Resources is the authority responsible for overseeing and enforcing the national Environmental Impact Assessment (EIA), per mandate of General Law on Environment and Natural Resources. This Ministry of Environment, regulates the EIA process for both government and the private Sector initiatives (Law 64-00, chapter IV, art. 41, par. II).

The EIA process conducted by IDDI generates recommendations and alternatives within the EIAS. The assessment of the EIA and the recommendations included are reviewed by the Ministry of the Environment and Natural Resources, and a final decision is taken by the Board of that Entity.

As the IDDI is the programme proponent, the EIA follows the standard procedure, however the Ministry of Environment delegates, or shares, certain responsibilities of the EIA process that may be subject to bias (in this case, the IEAS has been submitted to secure the programme does not results in significant negative impacts and is being reviews by the Ministry). This is the case for the Adaptation Fund project, where the Ministry is serving as Executing Entity and key partner of NIE.

The arrangements and responsibilities for managing the EIA process are summarized below. These roles and responsibilities are supported by several budget lines which include *inter alia* followings:

- A budget line of USD 30,000 (AF's Project Formulation Grant) has been allocated to contract independent experts to conduct the preliminary EIAS and other studies required to draft the full programme proposal. Other resources from IDDI has been already invested in this item.

- Approximately USD 76,000 for Monitoring and Evaluation (M&E) including EIA provisions and USD 99,215 for hiring specialist on adaptation measures.

- Other lines can be identified for independent oversight EIAS within their respective physical interventions. All expenses shall be reported according M&E (and per any legal agreements).

The AF budget has allocated funding so that financial resources are used by IDDI to hire third-party's experts. These experts will provide technical reports to the Ministry of Environment and Natural Resources, to the Committees, and to programme partners if counts with IDDI approval.

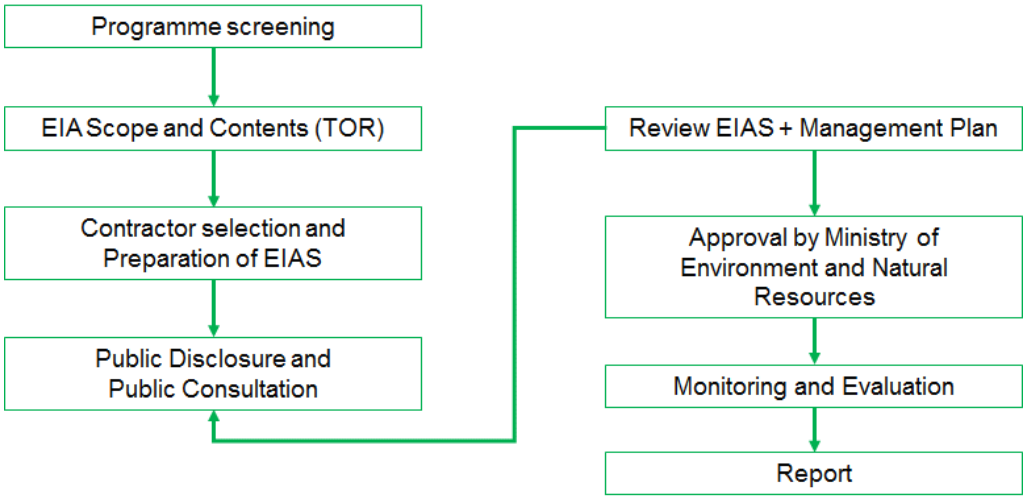


Figure 2: EIAS Process for the Programme

Final drafts of programme EIAS has been completed and was reviewed by IDDI and submitted to the Ministry of Environment and Natural Resources and INAPA for their approval (done in June)[11].

[11] The EIAS (which cover environmental and socioeconomic impacts of the Programme and the measures to avoid it) is included in *Apéndice C: Estudio de Impacto Ambiental*, elaborated by Brightline Institute.

4.5 Programme Assurance

IDDI will support Programme implementation by assisting in the monitoring of Programme budgets and expenditures, contracting Programme personnel and consultancy services, and subcontracting and procuring equipment at the request of the PMU. With respect to the technical side, IDDI will monitor progress of Programme implementation and achievement of Programme outcomes/outputs as per the approved proposal document. Several designated Programme officers will be assigned in the PMU to provide financial and technical monitoring and implementation support services. External consultants can be included if necessary.

Programme audits will follow international finance regulations, rules and applicable audit policies.

4.6 Risk Management

Component 1: Community level implementation of climate resilient water resource management

After complete Output 1.1. (Community plans), to implement of Output 1.2 (resilient water supply) and Output 1.3 (re-afforestation activities) a simplified EIA will be realized by INAPA and INDRHI respectively (with support of programme consultants), in order to be produce the intervention final technical drawings, budget and technical specifications. Both INDRHI and INAPA will approve the respective work plan before to start the physical interventions (as built new infrastructures). Along with the EIA, the programme ESMP and Monitoring Plan will be updated if necessary. Water conservation schemes, will be carried by the Ministry of Environment, NGOs and communities.

Figure below provides an overview of the planning and management process for Component 1.

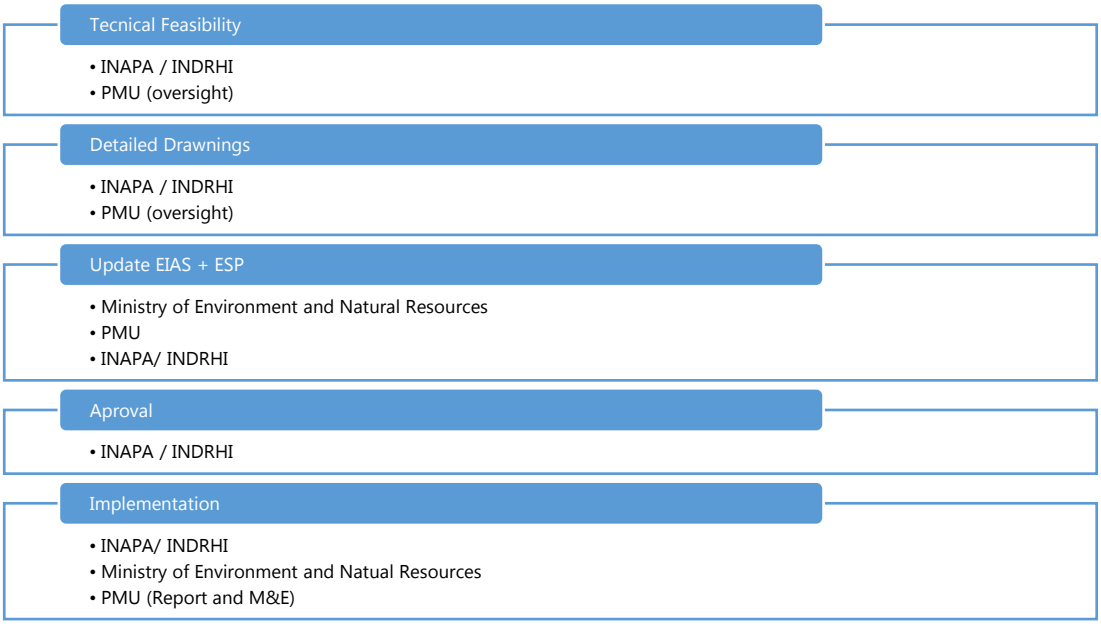


Figure 3: Process for Risk Management for Component 1

The above table defines the steps consistent with identified sub-projects approach. The EIA and ESMP will be implemented in accordance with the EIAS and ESMP and the ESP. The EIA and ESMP will screen for all 15 principles of the ESP using specific checklists (as is discussed later). All these precisions are reflected in the draft Terms of Reference for the EIAS.

The EIA will identify any potential risks, mainly for involuntary resettlement, whether physical or economic displacement, based on the final designs of the water works interventions. Involuntary resettlement shall be avoided as affected persons or communities have the right to refuse land acquisition or restrictions on land use. These rights shall be communicated through public notices, on the IDDI website, and by the staff and consultants of the programme. Affected community members will be notified of the grievance mechanism that is available to them (defined below).

The ESMP and Monitoring Plan will detail the monitoring requirements for pre-, during- and 2 years' post-implementation. This will include risk identification and recommendations to ensure the documented implementation of mitigation measures; long-term minimization of negative impacts; and maximization of positive impacts. Full costing of the Monitoring Plan implementation will be included, and indicators used for monitoring will be disaggregated by gender. The EIA and ESMP will include public disclosure, community consultations, and the outputs shall be appraised.

Component 2: Capacity building and capacity development in key institutions and communities to manage long-term climate change-related risks

After to develop the programme communication strategy, any potential community resistance to the Programme interventions, will be avoided through an adequate approach to aim an early and consistent stakeholder involvement and engagement, and permanent hearings and data sharing.

Regarding this matter, the EIAS and ESMP just will be updated to include indicators as people reached directly by the programme, visits to website (including material consulted or downloads), and dissemination activities related learning platforms, water management resources, climate change adaptation. Most of this work will be developed by third parties (as universities and local NGOs) under the PMU supervision and with the participation of communities and institutions.

In the case of PCCMAC, its development and performance will be monitored. However, the impact of this provincial committee will be promoted as it serve to mainstream ESP to other aspects of the live of San Cristobal and its linkages with greater levels of decision-making in the country.

Summarizing, the programme includes unidentified interventions in each component. These sub-projects mean interventions not defined at the Programme approval stage. For example, in the case of Component 1, community-based water management plans shall be in place before the design the adequate water infrastructure according to climate induced stress and the needs of the community. For Component 2, appropriate knowledge management and dissemination of learned lesson and best practices, will depend on the communication strategy adopted in the context of the program, the effectiveness of the relevant media, and the buy-in of target public.

4.7 Quick Tool

The following ESP screening checklist will be used to assess all programme components and sub-activities at the various steps above specified. This document attempts to apply the ESP Principles to a national context in a way that will be easily understood by project partners and beneficiaries alike so they can apply it easily on their day-to-day activities, understand what they are trying to achieve, and more importantly, how they can contribute with programme overall efficiency.

Table 4: Checklist for Compliance with ESP

ESP Principles	Activity Under Screening			
	Existing Risk	Activity With Positive Impact	Activity With Negative Impact	Explanation
Compliance with the Law				
Access and Equity				
Marginalized and Vulnerable Groups				
Human Rights				
Gender Equity and Women's Empowerment				
Core Labour Rights				
Indigenous Peoples				
Involuntary Resettlement				
Protection of Natural Habitats				
Conservation of Biological Diversity				
Climate Change				
Pollution Prevention and Resource Efficiency				
Public Health				
Physical and Cultural Heritage				
Lands and Soil Conservation				

Annex to this document a preliminary guideline for the ESP tool application is provided. It that has been prepared for training and capacity building purposes, but it will need more socialization.

4.8 Ineligible Activities

Programme funds provided by AF shall not be directly or indirectly used for:

- Operational or administrative costs of ministries, directors, departments or agencies of the Government of the Dominican Republic or the government of any other country;

- Salaries for executive officers and core staff of non-governmental organizations, except for such salaries related to services performed by such persons specifically for the purposes of achieving the objectives of the programme;

- Activities related to the extraction or depletion of non-renewable natural resources (including -inter alia- forests, trees, beach sand, and oil & gas)

- The resettlement of people, their livelihoods, or the removal or alteration of any physical cultural property under any circumstances; or

- Any other use that is deemed to be inconsistent with the Law and/or legal framework.

This list of exclusionary activities may be amended upon the recommendation of the Programme Steering Committee, or by resolution of the Ministry of Environment and Natural Resources.

4.9 Public Consultations

Any potential resistance of the communities to the Programme interventions will be avoided through a communication strategy to aim an early and consistent stakeholder involvement and engagement, and permanent hearings and information sharing. The following table provides for an indicate timeline and frequency of community consultations during project implementation.

Table 5: Timeline for Community Consultations

Frequency	Responsible	Purpose	Expected Outputs
3-month pre-inception phase	IDDI and Programme partners	Training Programme tailored to the needs of the community members and project partners	Network of validated project partners
Programme inception	IDDI	To gather baseline socioeconomic information	Baseline data
As needed and at least every 3 months (rotating communities)	IDDI	Discuss any impacts of interventions, challenges, schedule, review the 15 ESP principles; and notify the public about the grievance mechanism	Assessment of impacts of interventions and Programme activities.

The Programme Management Unit will ensure that marginalized and vulnerable groups in the targeted areas are included in public consultations, holding smaller focus groups as necessary, including: the disabled, single mothers who are heads of households, the elderly including those who on a fixed income (pension, if any), small children and migrants of questionable immigration status and their children.

The Programme stakeholders and community consultations should follow the Guidelines for Information and Public Participation of the Ministry of Environment and Natural Resources. This include the step-by-step guidance and for capture, analysis and reporting of feedback.

4.10 Grievance Mechanism

Ministry of Environment and Natural Resources has an established complaints procedure, which will be used as the Programme's Grievance Mechanism. This is covered in the Law 64-00 (General Law of Environment and Natural Resources). Complaints pertaining to the Programme activities implemented with AF resources will be addressed to executives of the Project Management Unit.

The public can submit complaints via the following channels:

- Ministry of Environment website: http://ambiente.gob.do/denuncias-ambientales/

- By email to: despacho@ambiente.gob.do

- In writing to: Ministry of Environment and Natural Resources
  Ave. Cayetano Germosén esq. Gregorio Luperón
  El Pedregal, Santo Domingo.

- By Phone: Monday to Friday: 8am to 4pm
  (+1) 809-539-6400; (+1) 809-200-6400 (free)

- By social networks:
  Whatsapp: (+1) 849-356-6400
  Twitter: AmbienteRD
  Instagran: AmbienteRD
  Facebook: AmbienteRD

Depending on the nature of the complaint, or if for any reason the complainant is unwilling to make a report to the Ministry of Environment and Natural Resources, they can submit a complaint trough the correspondent municipality.
When a complaint is communicated, the following information is recorded:

- The nature of the problem;

- The location of the problem;

- When the problem occurred (date and time);

- Who or what is the perceived source of the problem;

- Any information or evidence -particularly eyewitness, documents, photographs, videos, or a water or soil sample (the information or evidence must be credible and relate directly to the incident being reported) and

- Optionally, the contact information of the complainant: Name, Phone number, ID ("cédula"), Address and Email (optional).

Complaints will be handled by correspondent staff at the Ministry of Environment and Natural Resources, who will investigate the complaint. This process usually includes an on-site visit for investigation. Depending on the case, the Ministry may invite other relevant agencies (legal, coercive, technical, etc.) to participate in the investigation. During the investigation, individuals or agencies responsible for action to correct the issue will be identified. The Ministry will produce a report of its findings and recommendations and action if necessary. Complainants may request for a copy of the reports related to the complaint, as establishes the Freedom of Information Law.

5. MRV Arrangements

Under AF criteria, NIE is responsible for monitoring project implementation and the achievement of the programme outcomes and outputs, and ensuring that the funds provided by AF are used efficiently. While all staff members have a role in ensuring risk management, the Programme Manager will be responsible for implementation of the risk mitigation measures.

A monitoring, reporting and evaluation process model is illustrated below, and is the mechanism through which the programme and its unidentified sub-projects will promote compliance with the Adaptation Fund's ESP principles throughout implementation and in a comprehensive way. The process aligns M&E across components, and involves key institutional actors.

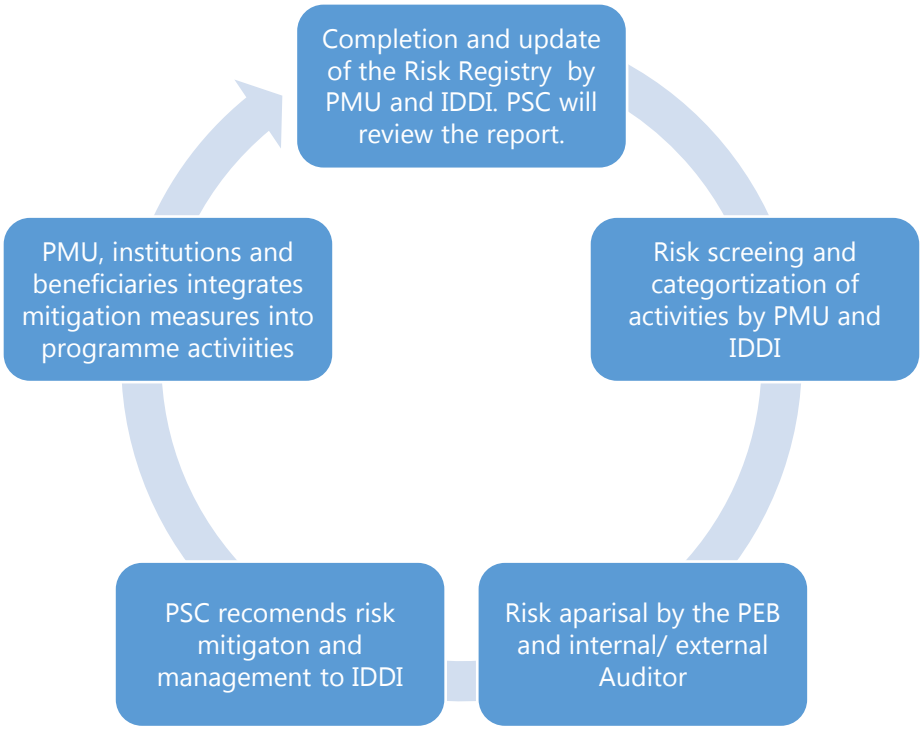


Figure 5: Risk screening, monitoring and management process

However, if a risk is handled the actions must be documented and included on programme file.

5.1 Roles and responsibilities

IDDI: it shall to promote the development of a culture that supports effective risk management and innovation, and that encourages effective risk taking in line with IDDI risk appetite; integrates risk management into projects, activities and functions with efficiency; ensures that risks are managed effectively, which includes identifying, analyzing, responding to, reviewing and reporting on risks; assigns accountability to staff for managing risks within their areas of responsibility, levels

of authority and competence; and allows for the systematic review of risk management to ensure its effectiveness and adherence to programme risk categorization.

Staff: All staff are required to familiarize themselves with *IDDI's directives for risk management*[12], comply with internal control measures, and escalate them to their managers when be appropriate.

PMU: The PMU is an internal custodian of Department's risk management with respect to projects and programs. It informs the IDDI on risk and performance management, develops and updates programme risk management tools, coordinates risk management activities, facilitates the identification and evaluation of risks, and maintains the risk management framework, ensuring that it is relevant and that it supports IDDI.

Audit: External audits independently assess the efficacy of risk management and risk identification and control processes, including mitigation actions. IDDI shall inform to all stakeholders about the auditing results and, also, the quality and effectiveness of policies, strategies and operations, and the efficiency of their implementation.

5.2 Risk Registry

The Risk Registry (or Risk Log) lists all identified risks that may undermine the programme ability to achieve its objective, and risks related to the ESP principles that may result from implementation of programme activities. The risks should be documented as much complete as possible to include all identifiable risks and generally includes estimated probability of the risk event to occur, and severity or possible impact of the risk.
The Risk Registry requires that the following be included and tracked:

- Description of the risk
- Potential consequence
- Mitigation measures
- PMC recommendation
- Risk category
- Probability and impact[13]

[12] Metodología de Evaluación de Riesgos del IDDI.
http://iddi.org/file/repository/METODOLOGIA_EVALUACION_DE_RIEGOS_PROYECTOS_26_02_2016.pdf

[13] As is defined before, the likelihood is the probability of the event arising within the programme, and the impact is the consequence of the event on the programme if it occurs.

The PMU and the IDDI shall established the project's Risk Registry, which is included in Annex 2 to this project document. The Risk Registry will be appraised and updated on a quarterly basis.

5.3 Screening + Categorization

Risk screening be conducted by the PMU and the IDDI for the 2 programme components of the using the ESP screening checklist (quick tool) for compliance with ESP principles (see Annex 1).

Under Component 1, the ESP risk screening will be conducted as part of the ESMP by INAPA and INDRHI with oversight of PMU and the Ministry of Environment and Natural Resources, before and throughout implementation of the water works that aims to increase the resilience of water resources. For Component 2, screening will take place during communication strategy drafting (by the professional as charge of this task), and it will subsequently update during implementation, monitoring and reporting by the PMU.

Above listed inputs will provide ESP risk screening data on activities being implemented in the relevant quarter (or every 4 months). The PMU and the NIE will compile the information for each component and categorize the sub-activities and sub-projects, using the following categories:

Category A Likely to have significant adverse Environmental & Social impacts that are diverse, widespread, or irreversible

Category B Potential adverse impacts that are fewer in number, smaller in scale, less widespread, reversible or easily mitigated

Category C No adverse Environmental & Social impacts

The PMU with assistance from the NIE will report the findings of the ESP screening and categorization process to the TAC, the Audit Committee and the Internal Auditor. It's precise to note that no Category A individual sub-activity or sub-project will be approved nor implemented.

5.4 Appraisal by PSC

The PMU will present the ESP risk report to IDDI and will shared electronically and through a verbal presentation to the PSC, on a quarterly basis. The PSC or any of its members can use the default baseline assessment provided below to evaluate the risks and identify mitigation measures where USPs are no consistent with the baseline.

Table 6: Default Baseline for Appraising ESP Compliance

ESP Principles	Default Baseline Assessment
Compliance with the Law *The project shall be in compliance with all applicable domestic and international law.*	All sub-projects and activities under this programme are compliant with the Dominican Republic laws and applicable international laws and regulations.

Access and Equity *The project shall provide fair and equitable access to benefits in a manner that is inclusive and does not exacerbate inequalities.*	All sub-projects and sub-activities are perceived as fair and equitable, where neither favouritism nor discrimination determine who benefits. A "bottom-up" and participatory design enable fair and equitable access, including to identified marginalized and vulnerable groups, who meet the eligibility criteria.
Marginalized and Vulnerable Groups *The project shall avoid designing activities that will disproportionately affect groups of marginalized or vulnerable people.*	All sub-projects and sub-activities will not disproportionately affect vulnerable and marginalized groups, who may be subject to discrimination, including children, women and girls, elderly, people living with disabilities, immigrants, and any other.
Human Rights *All project activities shall respect and promote international human rights.*	All sub-projects and activities are respecting and promoting international human rights. They are not discriminatory and reinforce the right of people to live safely with the access to basic rights, such as for example clean water or food security.
Gender Equity and Women's Empowerment *Projects shall be designed and implemented so that both men and women 1) have equal opportunities to participate, 2) have comparable benefits from the project, and 3) neither group are more likely to suffer as a result of the project.*	All sub-projects and sub-activities under this programme are considering gender equity as a priority, allowing women to have access to all the activities in the same way as men. The activities are thus empowering the women, offering them equal access to loans to improve their conditions and adapt to climate change. It also protects vulnerable women.
Core Labour Rights *Project activities shall meet the core labour standards per the International Labour Organization (ILO).*	All sub-projects and sub-activities are respecting the core labour standards per the International Labour Organization, for example prohibiting child labour, forced labour, or unfair compensation for services.
Involuntary Resettlement *Projects shall be designed and implemented to avoid or minimize the need for involuntary resettlement. When unavoidable, due process is required.*	Precisely, all sub-projects and sub-activities are made to avoid the need for involuntary resettlement, to reduce the vulnerability of the communities and generate adaptation and economic wellbeing. The project is based on participative approach, which monitors any risks of involuntary resettlement.
Protection of Natural Habitats *The Fund shall not support projects that involve unjustified conversion or degradation of critical natural habitats.*	All sub-projects and sub-activities are implemented with respect for nature, using ecosystem services where possible, and with an approach consistent with sustainable development and country priorities, taking care of the environment and the resources.
Conservation of Biological Diversity *Projects shall be designed and implemented to avoid any significant or unjustified impacts to biological diversity or the introduction of known invasive species.*	No biological material will be imported from other places to avoid the risk of introducing invasive species. For all sub-projects and sub-activities, invasive species are identified and measures to control their spread will be addressed in the design of the activities.
Climate Change *Projects shall not result in any significant or unjustified increase in greenhouse gas emissions or other drivers of climate change.*	All sub-projects and sub-activities are developed to reduce GHG emissions and the vulnerability of the communities to expected climate impacts. Community facilities and other structures are constructed or retrofitted to be resilient to climate change.
Pollution Prevention and Resource Efficiency *Projects shall meet international standards for maximizing energy efficiency and minimizing material resource use, waste material, and pollutants.*	All sub-projects and sub-activities are developed to avoid, reduce, mitigate or compensate any pollutant (wastewater, solid waste, dust, noise, emissions, etc.) and to use efficiently all used natural resources.

Public Health *Projects shall avoid potentially significant negative impacts on public health.*	All sub-projects and sub-activities are elaborated with the perspective of reducing health impacts on individuals and the community. All sub-projects and sub-activities must not result in trans-boundary harm such as flooding downstream, nor places where water can stagnate and cause mosquito-breeding habitat.
Physical and Cultural Heritage *Projects shall avoid the alteration, damage or removal of any physical cultural resources, sites, and those with unique natural values, include access to such sites.*	All sub-projects and sub-activities shall identify any physical cultural sites or places with unique natural values and notify the Ministry of Environment and/or the Ministry of Culture. If any physical and cultural heritage sites are identified, these shall be protected.
Lands and Soil Conservation *Activities shall promote soil conservation and avoid degradation or conversion of productive lands or lands that provide valuable ecosystem services.*	All sub-projects and sub-activities will conserve land and soil, including by promoting ecosystem-based adaptation and using ecosystem services to achieve the objectives of the programme. For non-ecosystem solutions, ecosystem solutions have been considered first and foremost.

After appraising the risks and identifying mitigation actions, the original PMU report and the outputs of the appraisal process will be submitted to the PSC.

5.5 Recommended Interventions

The Programme Steering Committee (PSC) is responsible for assess the risks and recommending risk mitigation & management actions to be implemented. The PSC may seek to bring in experts in ESP and Gender, or other disciplines as appropriate, and will draw on the expertise across the government and civil society, including the Ministry for Women, or the Ministry of Public Health, among others. The PSC recommendations will be documented and transmitted to the IDDI to oversee their implementation. The PSC and/or the IDDI will respond to risks in following four ways:

Acceptance Risk is accepted without the need for any mitigating measures

Example: *An event depends on staff working outside of their usual hours*

Action: None

Result: Event remains successful

Risk score: **Low**

Control Mitigation measures are implemented to reduce risks to acceptable levels

Example: *Failure of a bottling plant scheme due to the lack of buyers*

Action:

1. Designation of sales officers
2. Proper marketing/ commercial procedures
3. Provision of facilities as credit or discounts

4. Diversification of products/ target segment

5. Acquisition of vehicles to door-to-door deliver

Result: The mitigation measures led to the risk being brought down to acceptable levels

Risk score: **High** (before mitigation) to **Low** (after mitigation)

Avoidance

An activity may be terminated if it is deemed too risky

Example: *Failure to provide a safe working environment for staff*

Action: Termination of an employee who was deemed to pose a risk to the safety of other employees and to himself. The employee in question was displaying poor behavior. There were several altercations between him and other staff members which had the potential to turn violent. This employee was terminated according with previsions defined by the labour standars.

Results: The continued employment of this person was too risky to the safety of the other employees. Termination led to the avoidance of this risk.

Risk Score: **High** (before mitigation) to **Low** (after mitigation)

Transfer

The risk is transferred to a third party (i.e., insurance is taken out or work is sub-contracted to a third party that can do it at less risk or higher efficiency)

Example: *Risks associated to build an elevated tank (water storage facility)*:

1. Loss of life – faulty construction can cause serious injury or death

2. Reputational risk where if the infrastructure doesn't meet expectations

3. Financial risk associated to deliver off-time and/or additional cost for users

Action: To transfer the risk to an independent contractor

Result: No risk to the

Risk Score: **High** (before mitigation) to **Low** (after mitigation)

Whether a risk is accepted, controlled, avoided or transferred, the actions required to implement the risk response need to be documented and the responsibility assigned to the appropriate personnel for implementation. These such documents shall will be socialized with beneficiaries.

5.6 Feedback

Upon receiving the recommended actions from the PSC, the IDDI will work with PMU and beneficiaries to integrate mitigation measures into project design and activities. The IDDI (as NIE)

will oversee that the PMU update the Risk Registry and tracks mitigation actions. The Risk Registry will be inspected by PSC on a regular basis and briefings provided to the internal/external auditors.

5.7 Annual audits

Audits will be conducted by an independent evaluator on an annual basis for this programme. A suitably qualified person (or firm) will be hired through a competitive procurement process to examine and report on the IDDI governance arrangements, including arrangements in place for compliance with Adaptation Fund's ESP, programme performance, transparency and efficiency.

Annexes

Annex 1: Notes on ESP Principles

Annex 1. Explanatory note on the fifteen ESP Principles

Information below is provided to guide people applying for funding through the IDDI programme to comply with the 15 areas that cover the Adaptation Fund' Environmental and Social Policy Principles. This is not an exhaustive list and new ideas or thoughts are encouraged and can be added to the guidance information, is recommended that new ideas be shared with institutions and beneficiaries.

ESP Principles	Applicability to the Programme
Compliance with the Law *The project shall be in compliance with all applicable domestic and international law.*	All activities must follow national law and regulations. This includes: - Law 64-00 about Environment and Natural Resources - Law of Protected Areas (202-04) - Any permits for infrastructure and/or productive facility Some key questions are: - Will any of the activities proposed be breaking any national laws? - What permits or permissions will be needed in order to carry out these activities?
Access and Equity *The project shall provide fair and equitable access to benefits in a manner that is inclusive and does not exacerbate inequalities.*	The people who receive benefits from the programme must be fairly selected. This requires process without favouritism or discrimination, and an objective and impartial process where individual biases do not determine who gets access to benefits. Some key questions are: - Who will be the beneficiaries? - Will the beneficiaries be selected through a fair process that avoids abuse or any form of discrimination? - Is there any room for personal biases to become an issue? - Are there any people or groups of people who are not able or likely to be able to take their own initiative to access the benefits of the programme?
Marginalized and Vulnerable Groups *The project shall avoid designing activities that will disproportionately affect groups of marginalized or vulnerable people.*	Marginalized groups are, by definition, people excluded from normal economic and social activities, and they have a hard time accessing services such as water, electricity, or social assistance systems. They lack means such as motivation, social capital, skills and knowledge, to improve their own situations. Marginalized and vulnerable groups in the Dominican Republic include people living with disabilities, single mothers who are heads of households, people who are living with HIV/AIDS, the elderly, small children and migrants of questionable immigration status, LGTB. Some key questions are: - Who could be negatively impacts as a result of these activities? - Are there marginalized or vulnerable people who are more likely than everyone else to suffer as a result of these activities? - How can the activities be changed to address any impacts that are especially burdensome for marginalized people?

Annex 1. Explanatory note on the fifteen ESP Principles

	- If the situation can change over time, what special monitoring should be done to check that marginalized people are not disadvantaged?
Human Rights *All project activities shall respect and promote international human rights.*	International human rights promote the respect and dignity of each and every person. Human rights include the right to life, equality before the law, freedom of expression, the rights to work, social security and education, among others. Some key questions are: - Does the activity in any way affect a person's ability to enjoy their human rights? - Are there credible entities/people which can confirm a human right violation?
Gender Equity and Women's Empowerment *Projects shall be designed and implemented so that both men and women 1) have equal opportunities to participate, 2) have comparable benefits from the project, and 3) neither group are more likely to suffer as a result of the project.*	Gender equality is the equal rights, responsibilities, opportunities and access of both men and women, boys and girls, and the equal concern for their interests, needs and priorities. To ensure equality, the activities need to understand how different groups are positioned. Different genders can be affected as a result of laws, regulations or even cultural roles (i.e., children custody). so, often, activities need to be designed to compensate for any existing disadvantages. Some key questions are: - What are the existing gender roles that are relevant to the programme? - Are men/boys or women/girls more like to receive the benefits of the project?
Core Labour Rights *Project activities shall meet the core labour standards per the International Labour Organization (ILO).*	There are four core labour rights per the ILO: 1) the right to collective bargaining, where employers and workers discuss and negotiate their relations (unions, etc); 2) elimination of forced labour; 3) elimination of child labour; and 4) elimination of discrimination in employment. Some key questions are: - Are there any areas of potential labour risks that could result from activities? - How labours can secure their core rights will be respected?
Involuntary Resettlement *Projects shall be designed and implemented to avoid or minimize the need for involuntary resettlement. When unavoidable, due process is required.*	Involuntary resettlement applies to both physical (relocation) and economic (loss of assets that leads to loss of income resources). Resettlement is "involuntary" when people do not have the right to refuse acquisition or restrictions on land use that result in physical or economic displacement. Some key questions are: - Will the activities be restricting people's ability to use or access the land? - If so, could the restrictions result in potential physical/ economic displacement?
Protection of Natural Habitats *The Fund shall not support projects that involve unjustified conversion or degradation of critical natural habitats.*	Critical natural habitats include those that are legally protected; officially proposed for protection; or recognized by authoritative sources (such as IUCN, UNESCO or UNEP) for their high conservation value or traditional uses by local communities. There are several protected areas within San Cristobal (under Law of Protected Areas 202-04). Therefore, proposed activities must be consistent with its protection status under the Law. Some key questions are: - Could the activities lead to any negative impacts on the protected areas? - Are there any activities could increase positive impacts to the protected areas, such as improving water quality or avoiding of soil erosion?

Annex 1. Explanatory note on the fifteen ESP Principles

Conservation of Biological Diversity *Projects shall be designed and implemented to avoid any significant or unjustified impacts to biological diversity or the introduction of known invasive species.*	Biological diversity is the variability of living organisms and their ecosystems – both on land and in water. Invasive species can cause significant economic losses and are managed under the Law 64-00 about Environment and Natural Resources. Some key questions are: - Could the activities negatively impact any ecosystems, plants or animals in a significant way? - Will the activities require that any living organisms be imported from other countries?
Climate Change *Projects shall not result in any significant or unjustified increase in greenhouse gas emissions or other drivers of climate change.*	Activities that result in greenhouse gas emissions include burning of fossil fuels (for example, increasing energy consumption of the grid), as equipment, vehicles and machinery used during the construction of water resources facilities, and converting land from vegetation into other uses. Some key questions are: - Will activities lead to more fossil fuel (oil, GLP) energy use? - Will any new appliances or equipment be purchased? - Will major areas of land be converted from their natural state?
Pollution Prevention and Resource Efficiency *Projects shall meet international standards for maximizing energy efficiency and minimizing material resource use, waste material, and pollutants.*	This principle applies to the full life cycle of the programme and all the inputs required, whether important material or producing it locally. This applies to all sources and forms of energy, water and other resources and material inputs. It also applies to the production of solid waste, wastewater and pollutants release. Some key questions are: - Will activities result in greater use of inputs, such as water, energy, etc.? - Will activities result in solid waste, such as discarded items? If so, how can these be properly disposed? - Could activities cause any pollution to be emitted into the environment?
Public Health *Projects shall avoid potentially significant negative impacts on public health.*	Public health is determined by education for prevention and control of diseases, access to medical care and facilities, and lifestyle choices. It also applies to the broader set of social and economic conditions in which typically people live. Some key questions are: - Could activities lead to stagnant water bodies that lead to mosquito breeding? - Are there any possible health impacts as a result of activities?
Physical and Cultural Heritage *Projects shall avoid the alteration, damage or removal of any physical cultural resources, sites, and those with unique natural values, include access to such sites.*	The Dominican Republic cultural and physical heritage sites include archaeological sites (*as Cueva de las Maravillas or Corral de los Indios*), colonial points of interests such as the colonial city and certain buildings, and other areas that are recognized for their value at the community, national or international levels. Some key questions are: - Are there any cultural heritage sites of interest in or near to the proposed programme activities? - Could the proposed activities potentially impact the sites, or people's access to the sites?

Annex 1. Explanatory note on the fifteen ESP Principles

Lands and Soil Conservation *Activities shall promote soil conservation and avoid degradation or conversion of productive lands or lands that provide valuable ecosystem services.*	Major soil disturbances can cause erosion and sedimentation on water stream. Conventional agricultural practices utilizes ago-chemicals which can affect the soil. DUrin construction of water facilities and/or productive facilities, it can occur soil contamination from oil and/or hydrocarbons linkages (vehicles and equipment) Some key questions are: - Are there any activities that could lead to soil being washed downstream? - If so, what is the potential scale of the impact? - What areas could be affected

N.A.: The Indigenous Persons principle has been excluded from the Checklist as this principle is not applicable to the Dominican Republic, having no Indigenous Persons in the country.

Annex 2: Format for Risk Registry

ANNEX 2: FORMAT FOR OFFLINE RISK LOG

Project Title:	Award ID:	Date:

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Mngt response	Owner	Submitted, updated by	Last Update	Status
1	Enter a brief description of the risk *(In Atlas, use the Description field. **Note: This field cannot be modified after first data entry)***	When was the risk first identified *(In Atlas, select date. Note: date cannot be modified after initial entry)*	Environmental Financial Operational Organizational Political Regulatory Strategic Other Subcategories for each risk type should be consulted to understand each risk type (see Deliverable Description for more information) *(In Atlas, select from list)*	Describe the potential effect on the project if this risk were to occur Enter probability on a scale from 1 (low) to 5 (high) P = Enter impact on a scale from 1 (low) to 5 (high) I = *(in Atlas, use the Management Response box. Check "critical" if the impact and probability are high)*	What actions have been taken/will be taken to counter this risk *(in Atlas, use the Management Response box. This field can be modified at any time. Create separate boxes as necessary using "+", for instance to record updates at different times)*	Who has been appointed to keep an eye on this risk *(in Atlas, use the Management Response box)*	Who submitted the risk *(In Atlas, automatically recorded)*	When was the status of the risk last checked *(In Atlas, automatically recorded)*	e.g. dead, reducing, increasing, no change *(in Atlas, use the Management Response box)*
2			Environmental Financial Operational Organizational Political Regulatory Strategic Other	Text P = I =					
3			Environmental Financial Operational Organizational Political Regulatory Strategic Other	Text P = I =					
4									

@AdaptationFund
Project Proposal Development

Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme

#ClimaSanCristobal

Informe 1:
pre-Identificación de comunidades beneficiarias

Este documento contiene información relevante a un conjunto de comunidades de la Provincia de San Cristóbal, pre-identificadas como potenciales beneficiarios del programa propuesto, las cuales han sido caracterizadas en base a su índice de pobreza y a su vulnerabilidad climática. En adición, se indican una serie de potenciales medidas de adaptación para cada comunidad, y se aporta información sobre organizaciones comunitarias de base que trabajan en dichos sitios.

Elaborado por:

Brightline Institute, Inc.
proyectos@brins.org

Encargado por:

Instituto Dominicano de Desarrollo Integral (IDDI)

Fecha: 10 de abril del 2018

Contenido

1. Objetivos, metodología y resultados esperados

1.1 Objetivos

- Identificar comunidades potenciales beneficiarias de las intervenciones previstas en el marco del programa.
- Disponer de un mapa de potenciales sitios de intervención, con información de necesidades y prioridades de adaptación.
- Definir un conjunto de indicadores climáticos y de gestión de riesgos que faciliten la información sobre las comunidades.
- Recomendar estrategias de adaptación para cada comunidad, y listar actores que puedan apoyar el programa.

1.2 Metodología

La metodología utilizada, se basa en un análisis multicriterio que combina los siguientes aspectos:

- Criterios establecidos [en el contexto de la Nota Conceptual] para maximizar los impactos del programa (i.e., Población, Pobreza, Razonabilidad, Inclusión, etc.).
- Vulnerabilidad de grupos clave, como productores, mujeres, regantes, jóvenes, etc.
- Indicadores de vulnerabilidad climática y de gestión de riesgos, según data disponibles.
- Recomendaciones de expertos, funcionarios, profesionales, académicos y empresarios.

Los aspectos anteriormente citados se incluirán en una matriz, en la cual se dará una ponderación específica a cada uno. Las 30 comunidades con el puntaje más alto serán las inicialmente incluidas.

1.3 Resultados Esperados

- Un conjunto de comunidades ha sido identificado y caracterizado en base a su nivel de pobreza y vulnerabilidad.
- Una serie de potenciales medidas de adaptación climática son sugeridas para las comunidades pre-identificadas.
- Un conjunto de organizaciones comunitarias de base (de San Cristóbal) ha sido debidamente identificada.

2. Listado preliminar de comunidades

El listado de municipios que pueden ser incluidas preliminarmente, se indican a continuación.

Cuadro 1: Listado de Municipios/ Distritos Municipales Incluidos en el Programa

Satage 1: Municipalities	Population		Households in Poverty		Area	Basin	Included?	
			%	Number	km2		Yes	No
San Cristóbal	232,769				212.6			
San Cristóbal		216,875	31.4%	18,122				
Hato Damas (D.M.)		15,894	55.8%	2,198			Yes	
Hatillo (D.M)								
Sabana Grande de Palenque	15,466	15,466	25.3%	1,035	30.0			
Bajos de Haina	124,193				39.7			
Bajos de Haina		83,582	31.5%	7,238				
El Caril (D.M.)		40,611	20.1%	2,239				
Cambita Garabitos	31,057				172.8			
Cambita Garabitos		20,655	55.4%	3,013			Yes	
Cambita El Pueblecito (D.M.)		10,402	51.9%	1,301			Yes	
Villa Altagracia	84,312				426.2			
Villa Altagracia		53,576	46.6%	6,697			Yes	
San José del Puerto (D.M.)		14,493	38.4%	1,485			Yes	
Medina (D.M.)		7,066	58.9%	1,084			Yes	
La Cuchilla (D.M.)		9,177	53.4%	1,350			Yes	
Yaguate	42,325				122.3			
Yaguate		42,325	38.5%	4,175				
Doña Ana (D.M.)								
San Gregorio de Nigua	30,268	30,268	40.6%	3,373	51.1			
Los Cacaos	9,540	9,540	78.4%	1,586	185.9		Yes	
TOTAL	**569,930**	**569,930**			**1,240.6**			

Datos de población obtenidos del *Censo Nacional de Población y Vivienda 2010* (ONE, 2014).
Datos sobre pobreza obtenidos del *Mapa de la Pobreza en la República Dominicana 2014* (MEPYD, 2014).
Datos sobre cuencas obtenidos del *Programa Manejo Integrado y Uso Sostenible de Cuencas Prioritarias y sus Franjas Costeras en República Dominicana* (Ministerio de Medio Ambiente y Recursos Naturales, 2015).

Como indica en la Nota Conceptual del Programa, los criterios de inclusión de comunidades son:

a) Comunidades con 50% o más de sus hogares considerados como pobres (basados en el ingreso doméstico u otras medidas de privación).

b) Comunidades con una población de, al menos, 500 personas (basados en los informes estadísticos oficiales o en censos de población).

c) Otros criterios como compromiso, razonabilidad o inclusividad. Los cuales se analizarán tras concluir inspecciones y/o las consultas.

Tras realizar un primer filtrado de potenciales comunidades, se ha obtenido la siguiente lista:

Cuadro 2: Listado de Comunidades Potenciales de Incluir en el Programa

Satage 2: Communities	Households in Poverty
Los Cacaos	**1,586**
Los Cacaos (urban area)	
El Guineo	
Los Naranjos	
Calderón	
Medina (D.M.)	**1,084**
Medina (urban area)	
Loma Verde	
El Pedrero	
Castaño	
Medina	
Cambita Garabitos	**3,013**
Cambita Grabitos (urban area)	
Cambita Garabitos	
Humachón	
La Colonia	
Los Manantiales	
El Tablazo	
La Cuchilla (D.M.)	**1,350**
La Cuchilla (urban area)	
La Cuchilla	
El Aguacero	
El Caobal	
El Cidral	
El Cidral (La Represa)	
Cambita El Pueblecito (D. M.)	**1,301**
Cambita El Pueblecito (urban area)	
Llanada Grande	
Pueblo Nuevo	
El Toro	
Hato Damas (D.M.)	**2,198**
Hatos Damas (urban area)	
Los Montones	
Dasa	
San Francisco	
Jamey	
Villa Altagracia	**6,697**
Villa Altagracia	
Catarey	
Maná de Haina	
San José del Puerto	**1,485**
San José del Puerto (urban area)	
Básima	
Los Mogotes	
Pino Herrado	
Households in Poverty	**18,714**
Included communities	**37**
Municipalities/ Districts	**8**

Del total de los 8 municipios y/o distritos municipales inicialmente incluidos, se han identificado unas 37 comunidades. Como el programa propuesto tiene como meta incluir al menos 30 comunidades, identificar comunidades adicionales asegura un mayor alcance del programa.

Figura 1: Condiciones de Vulnerabilidad y Pobreza de Comunidades de San Cristóbal

Crecida del Río Haina arriesga el puente y sus usuarios
Ago.2017

Municipios de Los Cacaos incomunicado
Sep..2017

Comunidades de Cambita (El Pueblecito)
Nov.2017

Comunitarios de Villa Altagracia protestan por un acueducto
Oct.2017

ONGs tienen programas para cuidar las fuentes de agua.
Oct.2017

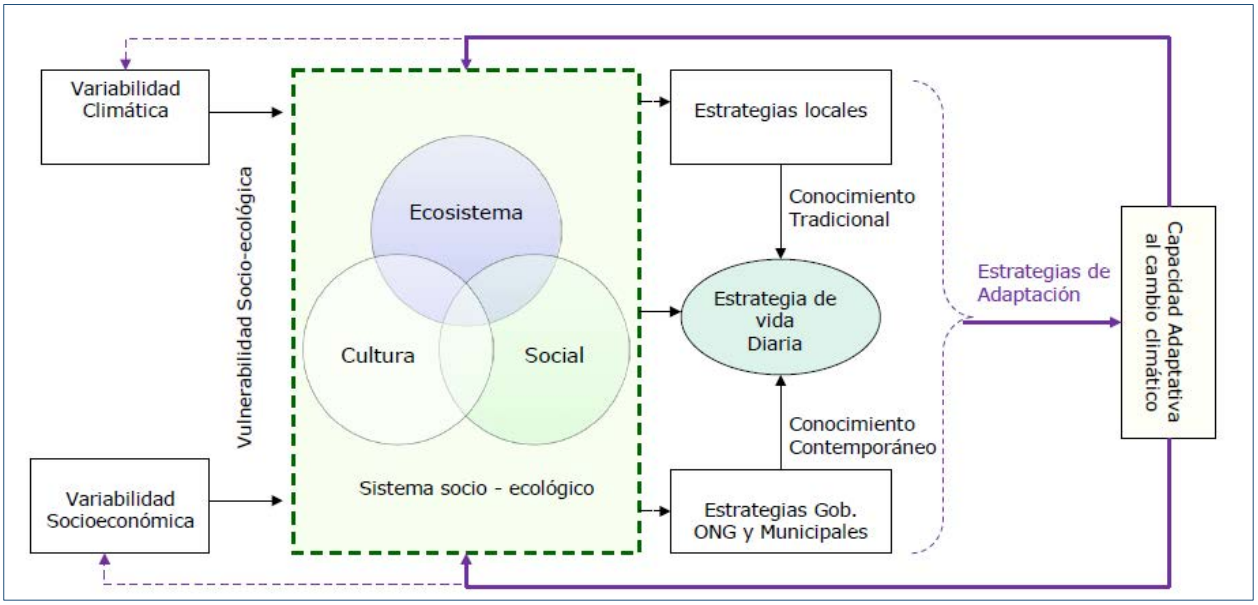
Casas anegas en Hato Damas
Sep..2017

3. Análisis de vulnerabilidad de las comunidades

Para las comunidades identificadas, se ha realizado un análisis de vulnerabilidad. El objetivo de dicho análisis es conocer la vulnerabilidad climática del sistema socio-ecológico de las zonas bajo estudio, basado en el estudio de la capacidad de adaptación que tienen las distintas comunidades rurales incluidas inicialmente en el programa, según los recursos y capacidades de que disponen.

El análisis de vulnerabilidad realizado, se basa en la teoría de co-evolución de los sistemas socio-ecológicos, según se ilustra a continuación. Esta, ofrece un marco para establecer estrategias de disminución de la vulnerabilidad, y de aumentar la capacidad adaptativa de las comunidades.

Figura 2: Marco General para Crear Estrategias para la Adaptación a Nivel Comunitario



Adaptado de: Adger, 2006; Füssel et al., 2007; Engle, 2011,; Kallis et al 2010.

Bajo este enfoque, la evaluación plantea tres elementos básicos:

1. Evaluar la variabilidad climática su influencia en los medios de vida de las comunidades.
2. Evaluar la vulnerabilidad de los medios de vida y su influencia en las estrategias de vida.
3. Evaluar estrategias de adaptación y su articulación con las necesidades locales.

Según el análisis de estos elementos, se han considerado los impactos según las siguientes variables:

Cuadro 3: Impactos Climáticos Observados y sus Efectos sobre la Vulnerabilidad de las Comunidades

Factor	Elementos	Impactos Actuales	Impactos Futuros
Agua	Consumo Humano	- Muchos ríos y manantiales han reducido su capacidad y otros se están secando. - El tratamiento que recibe el agua no asegura que su consumo sea seguro. - En muchos casos no se cuida la cadena origen-destino del agua, contaminándola.	- Se sentirá más calor, y se necesitará más agua para consumo, aseo, y refrescarse. - Aumentará la necesidad de tratar una mayor cantidad de agua a tratar o de comprarla ya tratada. - Aumentarán los conflictos por el uso, en especial con el riego, la agricultura y la hidroelectricidad.
	Riego	- Se ha reducido el riego por la falta de agua, esto también deteriora algunas estructuras por la falta de uso. - Se requiere tecnología para riego porque el riego por gravedad no siempre es posible. - Baja productividad de los cultivos por la falta de agua suficiente para sustentarlos. - Los turnos de agua ya no son suficientes para los cultivos con mayor demanda de riego.	- Escaseará el agua para riego, siendo necesaria más infraestructura de captación y de almacenamiento. - El agua podría ser racionada y/o su distribución podría ser más controlada para todos los usuarios. - Aparecerán regulaciones y leyes tendentes a privatizar el acceso al agua, o a pagar altas tarifas por recibirla.
	Ecosistema	- Por efecto del calor y la disminución de la lluvia, muchos ríos se han secado ya. - Las lluvias caen en un tiempo más corto, causando avenidas y deslizamientos. - La tala de árboles y los incendios forestales reducen la capacidad de retener agua.	- Muchos ríos, manantiales y lagunas podrían secarse totalmente, o llegar a ser ecosistémicamente inútiles. - Por falta de agua habrá más migración de personas hacia otras zonas donde pueda contar con el recurso.
Sistemas Productivos	Agricultura	- Se han incrementado el número y tipo de plagas que afectan los cultivos. - Se utilizan más agroquímicos para controlar las plagas, reduciendo la productividad.	- Los productos disminuirán, así como la crianza de animales, reduciendo la seguridad alimentaria. - Las prácticas de cultivo basadas en los ciclos habituales de las lluvias tenderán a desaparecer.

		- Llueve menos de lo que se necesita y cuando lo hace es demasiado fuerte. - Muchos agricultores emigran a otros lugares donde pueden gestionar el agua. - Se observan alteraciones en el tiempo de maduración de muchos cultivos.	- Podrían aparecer nuevas enfermedades por falta de una buena alimentación, o por basarse en comida importada. - Las enfermedades y las plagas en los cultivos se agravarán, afectando la comida y el ingreso. - Los descendientes de los agricultores emigrarán a otros sitios donde existan medios de vida que sean viables.
	Ganadería	- Por efecto del calor, los animales necesitan más agua para consumo y refrescarse. - Hay mayor incidencia de enfermedades parasitarias que obligan a más medicación. - El pasto se reduce en las sequias, lo que hace que el ganado enflaquezca. - Enfermedades que antes se curaban en la misma finca, ahora necesitan antibióticos.	- Aparecerán más enfermedades parasitarias e infecciosas que atacan al ganado y a los animales menores. - El ganado desaparecerá por las enfermedades o por el bajo precio que se ofrecería para comprarlos. - Una baja productividad afectaría la economía familiar y por lo tanto la educación y la salud de los hijos. - Las enfermedades que ataquen a los animales, con más incidencia y más agresivas, podrían afectar al hombre.
	Forestería	- Los frutales y maderables son atacados por un mayor número de enfermedades. - La floración está ocurriendo antes de tiempo, y las flores se caen más rápido. - Los incendios forestales son ahora más comunes, afectando muchas plantaciones.	- El ingreso por venta de frutos y madera podría reducirse de forma drástica, causando migración de las personas. - La edad productiva de los frutales podría disminuirse, lo que reduciría la producción y el ingreso asociado. - Los incendios forestales serían más y más frecuentes, provocando migración a otras prácticas no sostenibles.
	Otras Actividades	- La escasez de agua afecta la producción de peces. Así también la producción apícola. - Las plantas que antes tenían propiedades medicinales ahora no son tan efectivas. - El comercio se altera con los caminos y puentes que son dañados con las lluvias. - Se consumen más productos de otros lugares, lo que disminuye el ingreso. - El turismo en lugares como balnearios se ha reducido por la falta de agua.	- El ingreso económico asociado a la producción será cada vez menos para todos. - Será necesario demandar más programas sociales del gobierno y del sector privado. - Productos culturales y artesanales con valor económico podrían no ser viables por el alto costo de los insumos. - Actividades como la apicultura, pesca artesanal, o venta de productos naturales podría desaparecer.

Flora	Bosques Primarios	- Los bosques se reducen por acción humana y por plagas que antes no les afectabas. - Hay nuevas plagas y enfermedades que afectan los bosques y su productividad. - Hay más incendios forestales, y cuando estos ocurren son más devastadores	- Los árboles se envejecerán y si no hay regeneración, el bosque podrían pasar a ser bosques secundarios. - Los bosques pueden reducirse mucho o desparecer, dando paso a la actividad agrícola no sostenible. - La reducción/ desaparición de boques daría paso a suelos áridos, agravando el deslave y los deslizamientos.
	Bosques Secundarios	- Los arbustos son afectados por nuevas plagas y otras vejas que son más fuertes. - La productividad de frutos de arbustos está bajando en muchos lugares. - Hay más incendios forestales, y cuando estos ocurren son más devastadores	- Si la vegetación de arbustos se reduce, los suelos se empobrecerán y se convertirán en suelos áridos. - Por falta de terrenos se realizarán más cultivos en forma más seguida y los suelos podrían degradarse.
	Pastizales Naturales	- Se ha observado una reducción del tamaño de los pastos (altura que antes llegaban). - Se están secando más rápidamente, esto hace que se quemen con más facilidad.	- EL crecimiento de los pastizales estaría comprometido por la falta de agua, encareciendo la ganadería. - Muchos pastizales podrían no regenerarse y por ello desaparecerían completamente. - Se agravarían los incendios forestales, dejando espacio para que se hagan otras prácticas no sostenibles.
Fauna	Fauna	- Muchas especies han reducido de número, o al menos la frecuencia con que se veían. - Muchos insectos, lagartos y aves son visto en zonas donde antes no se les veía.	- Algunas especies podrían reducirse drásticamente o llegar a extinguirse. - Otras especies podrían pasar a ser más agresivas con otros animales y/o con el hombre.
Población	Salud	- Aumentan las enfermedades gastrointestinales, las respiratorias, y las alergias producidas por comidas. - Aumenta la incidencia de enfermedades por vectores como dengue, chikungunya, leptospirosis y mayaro. - Hay miedo al daño a la salud asociado al consumo de alimentos producidos con más químicos.	- Los niños, las embarazadas y las personas de edad avanzada serían los más afectados. - Las enfermedades se harán más frecuentes por la baja calidad de los alimentos o el agua. - El calor se hará más intenso, y con ello aumentarán las afectaciones a la salud y por la exposición al sol.
	Seguridad Alimentaria	- La baja en la producción hace necesario comprar alimentos de otros lugares, afectando el ingreso.	- No habrá suficiente producción para todas las personas, aumentando la importación de comida de otros lugares.

		- Muchos alimentos no tienen igual sabor, lo que los hace menos apropiados para el consumo. - Los conocimientos culturales de riego, planificación, almacenaje y cuidado de productos, ya no funcionan. - La calidad de la alimentación se reduce porque se consume menos leche, huevos y carne. - Se ha reducido la calidad de los alimentos por ser tratados con químicos. No se usan abonos naturales.	- Muchos niños sufrirían por la baja calidad de los alimentos o por la menor disponibilidad de agua. - La economía de las familias que se dedican a la actividad agrícola se verá afectada. - La seguridad alimentaria descansaría en el uso de más alimentos enlatados y en agua embotellada.
	Organización	- Las comunidades no siempre están organizadas, y las estructuras actuales no siempre son las mejores. - No existe una distribución equitativa de la tierra, de los recursos, del ingreso, ni del apoyo que llega. - Mucha gente que no trabaja la agricultura o ganadería, no va a las reuniones ni a las consultas. - Muchos hombres van a trabajar a otros lugares, lo que les impide integrarse a la comunidad. - Las mujeres deben hacerse cargo de labores que antes hacían los hombres, más la que ya hacían. - No se sabe cómo el cambio climático afectará a la comunidad, ni como la asociatividad lo enfrentaría.	- La organización a nivel de comunidad se podría debilitar mucho e incluso desaparecer. - Las personas dedicarán más tiempo a las actividades que generen ingreso y no a las de bien social.
	Riesgos	- Muchas comunidades son altamente vulnerables a las inundaciones y deslizamiento de tierras. - Los ciclones, huracanes y tormentas hacen muchos daños a las casas, los cultivos y a la infraestructura. - La baja en la disponibilidad de agua ha generado conflictos de uso y entre las personas. - En épocas de sequía, muchos animales mueren por la falta de alimento, ya que comprarlo es muy costoso. - Muchas personas han muerto al cruzar ríos durante crecidas, o al caerle encima paredes, techos o cables.	- El incremento de los caudales, en épocas de avenidas, afectará comunidades y predios en las orillas de los ríos. - Aparición de nuevas enfermedades para las plantas, los animales, los cultivos y el hombre. - Los riesgos aumentarán por la mayor ocurrencia de huracanes, tormentas, deslizamientos y sequias.

Nota: en el proceso de realización de la evaluación, se han identificado otros impactos importantes relativos al cambio climático, no obstante, sólo se han incluido aquellos que tienen influencia en las comunidades y que pueden ser superados mediante la implementación del programa propuesto.

Tras analizar estos impactos, muchos de los cuales ya son visibles (y se han manifestado en mayor o menor medida) en todas las comunidades bajo estudio. Se han identificado algunas acciones ya tomadas por personas de la comunidad (con y sin apoyo externo), que de algún modo reflejan su capacidad actual de adaptación. Un resumen de los hallazgos se indica en la siguiente tabla.

Cuadro 4: Capacidad de Adaptación de las Comunidades de Interés

Factor	Elementos	Medidas de Adaptación Observadas
Agua	Consumo Humano	- Actualmente muchas personas compran agua en botellones. Esto les asegura más calidad, pero a un alto costo para las familias.
	Riego	- Se ha pedido al gobierno que intervenga para construir algunos sistemas de riego, y rehabilitar otros que no funcionan.
	Naturaleza	- No observado.
Sistemas Productivos	Agricultura	- Los productores han incrementado el uso de herbicidas, plaguicidas y pesticidas, así como el de fertilizantes químicos. - Se cultivan rubros como el café y el cacao a cotas más altas, provocando nuevos conflictos con los bosques.
	Ganadería	- Los dueños de animales ha incrementado la medicación y vacunaciones, pero no siempre con ayuda de veterinarios.
	Forestería	- Se aplican insecticidas y otros productos para control de plagas, pero la efectividad de los mismos no es absoluta. - Algunas personas están usando residuos orgánicos como abono para sus plantaciones. Se trabaja en mejorar la dosificación.
	Otros	- En muchos casos, los agricultores están probando variedades de semillas que sean más resistentes a las plagas. - Las mujeres han tomado sitios de trabajo abandonados por los hombres como la venta en la calle, dulces, artesanía, etc.
Flora	Bosques Primarios	- En muchas zonas se ha controlado el corte de árboles, pero en otras zonas se hace indiscriminadamente para producir carbón. - No se establecen responsabilidades por los incendios forestales causados por el hombre. No se conoce de ninguna sanción.
	Bosques Secundarios	- Se han realizado jornadas de reforestación para aumentar la capacidad de captar agua y preservar los suelos.
	Pastizales Naturales	- No observado.
Fauna	Fauna	- El Ministerio de Medio Ambiente y Recursos Naturales impone vedas estacionales, y hace prohibiciones.
Población	Salud	- Las mujeres embarazadas, los niños y los envejecientes reciben atenciones en las clínicas rurales, la cuales son aún deficientes. - Se realizan campañas ocasionales de prevención de enfermedades gastrointestinales y también provocadas por vectores.

		- Se hace crianza de gallinas, patos y pavos, para aumentar el consumo familiar de carne y huevos.
	Seguridad Alimentaria	- La alimentación de muchos niños descansa en los programas de alimentación escolar que impulsa el gobierno. - Los hijos de los agricultores, en muchas localidades, abandonan los campos para trabajar donde reciban más ingreso (i.e., motocicletas). - Se imparten charlas y talleres ocasionales sobre seguridad alimentaria y se promueve la asociatividad entre los productores.
	Organización	- No observado
	Riesgos	- Muchos de los que viven a orillas de ríos y cañadas son evacuados de forma preventiva ante tormentas y huracanes. - La defensa civil tiene que trabajar más en muchos lugares, porque las personas se oponen a abandonar sus casas.

Del cuadro anterior se deduce que, a pesar de que muchas comunidades han emprendido algunas acciones para disminuir su vulnerabilidad climática, estas acciones no han sido sistemáticas ni han permitido crear un marco general de aumento de la resiliencia en todos los sitios. Los resultados de la evaluación realizada a nivel de comunidades, se resume a continuación.

Cuadro 5: Indicador de Vulnerabilidad de las Municipalidades bajo Estudio

Comunidad	Agua			Medios de Subsistencia				Flora y Fauna		Factor Humano				Vulnerabilidad Global
	Consumo	Riego	Ecosistemas	Agricultura	Ganadería	Forestería	Otros	Flora	Fauna	Salud	Seguridad Alimentaria	Organización Comunitaria	Gestión de Riesgos	
Los Cacaos	4.25	4.00	2.75	5.00	4.75	4.00	5.00	3.00	3.00	4.00	5.00	4.50	4.50	**3.73**
Medina	4.20	4.00	3.60	4.60	4.00	4.40	4.00	3.00	3.00	4.20	4.20	4.40	3.80	**3.56**
Cambita Garabitos	4.33	3.83	3.50	4.00	4.00	4.00	4.17	3.00	3.00	4.50	4.50	4.17	3.83	**3.51**
La Cuchilla	4.17	3.50	2.33	4.33	4.17	3.83	3.83	3.00	8.00	4.00	4.50	4.00	3.50	**3.44**
El Pueblecito	4.25	3.00	2.50	5.00	4.25	4.25	3.75	3.00	3.00	4.00	4.25	3.75	4.25	**3.39**
Hato Damas	3.40	2.00	2.40	4.20	4.20	4.00	4.60	3.00	3.00	4.20	4.80	4.60	3.40	**3.29**
Villa Altagracia	3.00	2.67	2.67	4.00	4.00	4.00	4.00	3.00	3.00	4.33	5.00	3.67	4.00	**3.25**
San José del Puerto	3.00	2.50	3.50	4.00	4.00	3.75	4.00	3.00	3.00	4.00	4.00	4.25	3.50	**3.19**

4. Estresores sobre los medios de subsistencia

Comprender la vulnerabilidad de los medios de vida y su relación con el cambio climático es muy importante para cualquier sociedad. Eventos como tormentas, huracanes, inundaciones, sequias y deslizamientos, están siendo exacerbados por este fenómeno, ocasionando grandes pérdidas económicas y sociales en muchos lugres, así como transformaciones ecosistémicas y culturales.

Como en las comunidades objeto aún persisten grandes desafíos respecto a la pobreza y la exclusión, mucho del apoyo externo (especialmente las intervenciones del gobierno) se enfoca en mejorar la infraestructura de servicios, pero no necesariamente en fortalecer los medios de vida. Del análisis realizado en las comunidades bajo estudio, se han identificado un conjunto de estresores sobre los medios de vida. A continuación, se resumen los más notorios identificados:

a) **Estresores Naturales**: En la generalidad de los casos, las personas no tienen la propiedad legal de las tierras en que viven o producen. Aunque hay varios programas de titulación en marcha, en muchos lugares persisten los conflictos de uso del suelo. Algo similar ocurre con el agua, cuyos usos están siendo conflictivos en algunos lugares. En el caso de los bosques, hay un conflicto de mayor nivel (que ocurre a nivel nacional) derivado que en muchas áreas protegidas por ley existen asentamientos humanos y actividades que riñen con el bosque.

b) **Estresores Físicos**: Muchas comunidades no tienen caminos o carreteras en buen estado que faciliten el transporte de los insumos y/o de los productos hacia los mercados de consumo. En adición, los tipos y condiciones de las viviendas, edificaciones e infraestructura, no garantiza la protección de las familias ante eventos extremos, ni la planificación del uso del agua.

c) **Estresores Económicos**: la economía de muchas familias está altamente influenciada por el apoyo que estas reciben de los programas sociales del gobierno (Solidaridad, Bono-Gas, Bono-Luz, SENASA, etc.), y por las remesas que reciben desde Estados Unidos y España. Además, la agricultura no es remunerada como otras actividades (i.e., turismo, transporte, etc.)

d) **Estresores Humanos**: poca o ninguna oportunidad de acceso a programas de capacitación para mejorar las prácticas agrícolas, o para el trabajo en general. La capacitación en salud preventiva es escasa y la infraestructura para proveer servicios de salud es muy deficitaria.

e) **Estresores Sociales**: Aunque en muchas comunidades existen organizaciones comunitarias y de base que ayudan a las familias y a los productores, muchas veces estas organizaciones no tienen acceso a recursos y oportunidades para fortalecer o expandir sus programas y servicios.

5. Estrategias para reducir la vulnerabilidad

En el contexto del programa propuesto, la estrategia para reducir la vulnerabilidad climática de las comunidades objeto, se basará en realizar acciones precisas, destinadas a que las personas tomen conciencia de su situación frente a los impactos del cambio climático y se sientan motivadas a asumir procesos que les permitan disminuir su nivel de vulnerabilidad. Paralelamente, se prevé que todas las comunidades recibirán el acompañamiento técnico que les facilite concluir con éxito los procesos que emprendan, los que a su vez serán monitoreados de forma sistemática.

La estrategia general del programa, se ha resumido en la siguiente matriz.

Cuadro 6: Resumen de la Estrategia del Programa para Reducir la Vulnerabilidad

Nivel de la Acción	Acciones Concretas	Grupos Destinatarios	Resultados Esperados
1	Generación de información climática a nivel de cada comunidad. Socialización de los análisis de vulnerabilidad entre beneficiarios clave.	Al menos 8 municipalidades (y/o distritos municipales) que serán incluidas. Líderes comunitarios, funcionarios y representantes de ONGs locales.	Disponer de información adecuada para decidir las acciones que deben hacerse para lograr más resiliencia. Lograr una visión conjunta hasta dónde puede llegar la comunidad y cómo el programa podría apoyarla. Realización de acuerdos para ejecución.
2	Desarrollo y ejecución de proyectos locales de agua y saneamiento. Desarrollo y ejecución de proyectos de infraestructura de irrigación.	30 comunidades con sistemas deficientes de suministro y almacenamiento de agua para consumo humano. 30 comunidades con sistemas deficientes de suministro y almacenamiento de agua para irrigación y ganadería.	Una mejora significativa en la salud de las personas. Una mejora en la economía de las familias beneficiarias. Una mejora significativa en la economía de los productores. Fortalecimiento de estructuras para gestionar el agua.
3	Medidas para conservación del agua.	Comunidades en las zonas altas de las cuencas, con meta de alcanzar 400 hectáreas.	Asegurar la disponibilidad del agua, para sustentar las acciones tomadas a Nivel 2. Mejorar el ingreso de las familias beneficiarias.
4	Mejora y rehabilitación de sistemas de distribución de agua.	Al menos 8 municipalidades (y/o distritos municipales) que serán incluidas.	Disponer de sistemas adecuados para distribuir el agua a múltiples usuarios.

5	Creación de fuentes de empleo que sean sostenibles y de largo plazo.	Creación de esquemas comunitarios de jardinería y procesamiento agrícola en unas 20 comunidades (que los gestionarán). Creación de esquemas comunitarios de viveros y lotes forestales en unas 20 comunidades (que los gestionarán). Creación y establecimiento de fincas de peces en unas 20 comunidades.	Las personas, en especial las mujeres tienen fuentes de trabajo alternativas o complementarias a la agricultura. Las personas, en especial las mujeres tienen fuentes de trabajo alternativas o complementarias a la agricultura. Las personas, en especial las mujeres tienen fuentes de trabajo alternativas o complementarias a la agricultura.
6	Establecimiento de plataformas para la gestión a largo plazo del programa y extenderlo a otros lugares.	Creación de comités comunitarios y provincial para la gestión de la adaptación del cambio climático. Producir y diseminar materiales sobre lecciones aprendidas y las mejores prácticas.	Las comunidades adquieren competencias para sostener los resultados del programa a largo plazo. La comunidad nacional e internacional conoce en detalle los éxitos del programa y tienen herramientas para replicarlo.
7	Monitoreo continuo.	Todas las comunidades incluidas en el programa.	Los resultados logrados son los esperados. Los recursos económicos y humanos son invertidos adecuadamente. Se logra una adaptación real y costo-efectiva.

La reducción efectiva de la vulnerabilidad debe basarse la combinación de acciones, individuales, colectivas e institucionales, a fin de que los habitantes mejoren su capacidad de respuesta frente a los efectos del cambio climático y lideren la toma de decisiones sobre el empleo de sus recursos. Este aspecto del programa será fortalecido durante la etapa de consultas a los interesados.

6. Conclusiones y Recomendaciones

Conclusiones

1. Se han identificado 30 comunidades elegibles para ser incluidas como beneficiarias. Dichas comunidades se localizan en los Municipios *Los Cacaos*, *Villa Altagracia*, y *Cambita Garabitos*, y los Distrito Municipales *Medina*, *El Pueblecito*, *La Cuchilla*, *Hato Damas*, y *San José del Puerto*.
2. Basado en la información disponible, se han definido un conjunto de indicadores de gestión de riesgos y para la adaptación al cambio climático. Dichos indicadores se basan en: agua potable, agricultura ante sequía y ante inundaciones, y áreas protegidas y biodiversidad.
3. Las estrategias de adaptación definidas para el programa, se basan en reducir los estresores sobre los medios de subsistencia de las comunidades: conflictos en el uso del suelo y el agua, falta de acceso a crédito, infraestructura precaria, subsidios deformados, falta de asociatividad.

Recomendaciones

1. Aprovechar la cercanía geográfica de las comunidades identificadas, y priorizar acciones que maximicen los beneficios del programa. Esto puede incluir, actividades conjuntas entre comunidades, gestionar recursos de manera compartida, y con la creación de otras sinergias.
2. Se debe sistematizar la información necesaria para monitorear los indicadores de riesgos y de adaptación definidos. Para esto, en la fase de incepción se debe establecer una línea base para cada comunidad, y medir cómo estas aumentan su resiliencia según se ejecuta el programa.
3. Dado que el programa pretende aumentar la resiliencia de los medios de subsistencia en las comunidades, deben priorizarse las acciones que permitan aumentar el capital económico, la riqueza y el ingreso. Esto motivará a los actores a continuar con el programa en el largo plazo.

7. Anexos

Anexo A: Lista de Municipalidades Incluidas

Annex A. Municipalities Potentially Included in the Programme

Municipalities	Population		Households in Poverty		Area	Basin	Included?	
			%	Number	km2		Yes	No
San Cristóbal	232,769				212.6			
San Cristóbal		216,875	31.4%	18,122				
Hato Damas (D.M.)		15,894	55.8%	2,198			Yes	
Hatillo (D.M)								
Sabana Grande de Palenque	15,466	15,466	25.3%	1,035	30.0			
Bajos de Haina	124,193				39.7			
Bajos de Haina		83,582	31.5%	7,238				
El Caril (D.M.)		40,611	20.1%	2,239				
Cambita Garabitos	31,057				172.8			
Cambita Garabitos		20,655	55.4%	3,013			Yes	
Cambita El Pueblecito (D.M.)		10,402	51.9%	1,301			Yes	
Villa Altagracia	84,312				426.2			
Villa Altagracia		53,576	46.6%	6,697			Yes	
San José del Puerto (D.M.)		14,493	38.4%	1,485			Yes	
Medina (D.M.)		7,066	58.9%	1,084			Yes	
La Cuchilla (D.M.)		9,177	53.4%	1,350			Yes	
Yaguate	42,325				122.3			
Yaguate		42,325	38.5%	4,175				
Doña Ana (D.M.)								
San Gregorio de Nigua	30,268	30,268	40.6%	3,373	51.1			
Los Cacaos	9,540	9,540	78.4%	1,586	185.9		Yes	
TOTAL	**569,930**	**569,930**			**1,240.6**			

Anexo B: Matriz de Vulnerabilidad de las Comunidades

Annex B. Communities Potentially Included in the Programme

Communities	Households in Poverty	Water			Livelihoods				Flora and Fauna		Human Health	Food Security	Community Organization	Risks Management	Global Vulnerability
		Consumption	Irrigation	Ecosystem	Agriculture	Livestock	Forestry	Others	Flora	Fauna					
Los Cacaos	**1,586**	**4.25**	**4.00**	**2.75**	**5.00**	**4.75**	**4.00**	**5.00**	**3.00**	**3.00**	**4.00**	**5.00**	**4.50**	**4.50**	**3.73**
Los Cacaos (urban area)		4	2	2	5	5	4	5	3	3	4	5	4	4	
El Guineo		4	5	3	5	5	4	5	3	3	4	5	5	5	
Los Naranjos		5	4	3	5	5	5	5	3	3	4	5	4	5	
Calderón		4	5	3	5	4	3	5	3	3	4	5	5	4	
Medina (D.M.)	**1,084**	**4.20**	**4.00**	**3.60**	**4.60**	**4.00**	**4.40**	**4.00**	**3.00**	**3.00**	**4.20**	**4.20**	**4.40**	**3.80**	**3.56**
Medina (urban area)		4	2	2	4	4	4	4	3	3	3	3	4	3	
Loma Verde		4	5	4	5	4	5	5	3	3	4	4	5	4	
El Pedrero		5	5	4	5	5	5	4	3	3	5	4	4	5	
Castaño		4	4	5	4	4	5	4	3	3	5	5	4	3	
Medina		4	4	3	5	3	3	3	3	3	4	5	5	4	
Cambita Garabitos	**3,013**	**4.33**	**3.83**	**3.50**	**4.00**	**4.00**	**4.00**	**4.17**	**3.00**	**3.00**	**4.50**	**4.50**	**4.17**	**3.83**	**3.51**
Cambita Grabitos (urban area)		4	1	2	3	4	4	5	3	3	4	5	4	4	
Cambita Garabitos		4	4	5	4	4	5	4	3	3	5	5	4	3	
Humachón		5	5	3	4	4	3	4	3	3	4	4	5	4	
La Colonia		4	4	5	4	4	5	4	3	3	5	4	4	3	
Los Manantiales		5	4	3	5	4	3	4	3	3	4	4	4	5	
El Tablazo		4	5	3	4	4	4	4	3	3	5	5	4	4	
La Cuchilla (D.M.)	**1,350**	**4.17**	**3.50**	**2.33**	**4.33**	**4.17**	**3.83**	**3.83**	**3.00**	**8.00**	**4.00**	**4.50**	**4.00**	**3.50**	**3.44**
La Cuchilla (urban area)		4	2	2	3	3	2	4	3	33	3	4	4	4	
La Cuchilla		4	1	2	5	5	4	5	3	3	4	5	4	4	
El Aguacero		5	4	3	5	5	5	4	3	3	4	5	4	4	
El Caobal		4	5	3	5	4	3	4	3	3	4	4	5	4	
El Cidral		4	4	2	4	3	5	3	3	3	5	5	4	2	
El Cidral (La Represa)		4	5	2	4	5	4	3	3	3	4	4	3	3	
Cambita El Pueblecito (D. M.)	**1,301**	**4.25**	**3.00**	**2.50**	**5.00**	**4.25**	**4.25**	**3.75**	**3.00**	**3.00**	**4.00**	**4.25**	**3.75**	**4.25**	**3.39**
Cambita El Pueblecito (urban area)		4	3	2	5	4	4	4			3	3	3	4	
Llanada Grande		4	1	2	5	5	4	3	3	3	4	5	4	4	
Pueblo Nuevo		5	4	3	5	4	5	3	3	3	4	5	4	4	
El Toro		4	4	3	5	4	4	5			5	4	4	5	
Hato Damas (D.M.)	**2,198**	**3.40**	**2.00**	**2.40**	**4.20**	**4.20**	**4.00**	**4.60**	**3.00**	**3.00**	**4.20**	**4.80**	**4.60**	**3.40**	**3.29**
Hatos Damas (urban area)		3	1	2	4	4	4	4	3	3	4	5	5	3	
Los Montones		4	2	2	5	4	4	5	3	3	4	5	4	4	
Dasa		4	3	3	4	4	5	5	3	3	4	5	4	3	
San Francisco		3	2	3	4	5	3	5	3	3	4	4	5	4	
Jamey		3	2	2	4	4	4	4	3	3	5	5	5	3	
Villa Altagracia	**6,697**	**3.00**	**2.67**	**2.67**	**4.00**	**4.00**	**4.00**	**4.00**	**3.00**	**3.00**	**4.33**	**5.00**	**3.67**	**4.00**	**3.25**
Villa Altagracia		3	2	3	4	4	3	4	3	3	4	5	4	4	
Catarey		3	3	2	4	5	5	4	3	3	4	5	4	4	
Maná de Haina		3	3	3	4	3	4	4	3	3	5	5	3	4	
San José del Puerto	**1,485**	**3.00**	**2.50**	**3.50**	**4.00**	**4.00**	**3.75**	**4.00**	**3.00**	**3.00**	**4.00**	**4.00**	**4.25**	**3.50**	**3.19**
San José del Puerto (urban area)		3	1	3	3	3	3	3	3	3	5	4	5	4	
Básima		2	2	4	4	5	4	4	3	3	4	5	4	3	
Los Mogotes		4	3	4	5	4	3	5	3	3	3	4	5	4	
Pino Herrado		3	4	3	4	4	5	4	3	3	4	3	3	3	
Households in Poverty	**18,714**														
Included communities	**37**														
Municipalities/ Districts	**8**														

Note: 1 = Less vulnerable
5 = More vulnerable

Anexo C: Lista de Actores Relevantes

Annex C. Community-based Organizations acting on San Cristóbal

	Organization	Acronism	Contacts		
01	Consejo de Desarrollo Provincial-Plan Estratégico, San Cristóbal		Melvin Brioso Director Ejecutivo	809-528-4010	melvinbrioso@gmail.com
02	Instituto Politécnico Loyola	IPL	Omar de Leon Cordinador de Proyectos Felix Rondon Director de Investigaciones	809-528-4010 809-528-4010	omontas@ipl.edu.do frondon@ipl.edu.do
03	Asociación de Mujeres Unidas para el Progreso de San Cristóbal	AMUPROSANC	Marcia Matos Presidenta	809-707-4707	amuprosanc@gmail.com mmatosmontas@yahoo.com
04	Fundación para el Desarrollo y Bienestar de la Mujer y la Niñez	FUNDEBMUNI		809-288 1075 809-528 0955	contactofundebmuni@gmail.com rosannagerman@hotmail.com
05	Fundación Pro-Desarrollo de la Salud Comunitaria, Inc.	ECOSALUD	Luis Alberto Concepcion	809-957-3662 809-697-3455	descosalud@gmail.com
06	Fundacion Fe y Vida de San Cristóbal	FUNFEVISA		809-528-4128	fundacionfeyvida@hotmail.com
07	Cámara de Comercio de San Cristóbal		Enmanuel D. Ramirez Presidente	809-528-3344	emdionicio73@hotmail.com
08	Fundacion de Ayuda a Niños y Envejecientes Necesitados de San Cristóbal, Inc.		Ramon Peña Presidente	809-528-9293 809-729-9291	tonypenacpa@gmail.com
09	Instituto de Estudios del Medio Ambiente, Inc., San Cristóbal		Carlos Franco Presidente	809-534-5818	institutoambienteysociedad@gmail.com
10	Centro de Gestion Ambiental del INTEC	INTEC	José Contreras Director	809-567-9271	jose.contreras@intec.edu.do
11	Junta Agroempresarial Dominicana	JAD	Osmar Benitez Presidente	809-563-6178	o.benitez@jad.org.do
12	Fondo Pro-Naturaleza	PRONATURA	Frank Arnemann Director Ejecutivo	***	farnemann@pronatura.org.do
13	Fondo Especial para el Desarrollo Agropecuario	FEDA			
14	Asociacion de Caficultores de Villa Altagracia, Inc.	ASOCAFIVA		809-559-2287	asocaficultores@hotmail.com
15	Asociacion de Caficultores La Esperanza, Inc.	ASOCAES	Marino Soto	809-481-6117 829-719-0072	asocaes@gmail.com
16	Asociación para el Desarrollo de San Cristóbal, Inc.			809-537-8447	
17	Casa de la Mujer Villaltagraciana, Inc.		Mayra Minaya	809-482-4851	minaya_mayra@hotmail.com
18	Centro de Estudios Economicos y Sociales de la Region Sur, Inc.	CEDEESSUR	Cristian Beltré	809-816-9434 809-467-7470	cristianbeltre@hotmail.com
19	Conjunta de Vecinos de Cambita Garabitos,inc	CONJUVECA		809-528-8282	
20	Consejo para el Plan Estratégico de Desarrollo Provincia San Cristóbal, Inc.		Jose Fco Martich Presidente	809-288-3800	pe.sancristobal@verizon.net.do planstrategicofc@gmail.com
21	Federacion de Caficultores de la Region Sur, Inc.	FEDECARES	Israel Cuevas	809-528-7552	y.dominguez@hotmail.com

Annex C. Community-based Organizations acting on San Cristóbal

			Secertario General		
22	Federacion de Mujeres Campesinas de Cambita, San Cristobal, Inc.	FEMUCAC		809-528-8485	
23	Fundacion Ecología y Habitat, Inc.	FUEHA		809-528-4222	
24	Fundacion Esperanza Comunitaria Siempre, Inc.	ESPCOMS		829-872-3074 849-356-0002	
25	Fundacion Gestion Fundamental RACADO, inc.			829-458-4107 809-449-7308	
26	Fundacion Nacional Casa de la Familia, Inc.		Rina Suero Presidenta	809-669-1983 809-857-9266	rhinacelest@hotmail.com
27	Fundacion para el Desarrollo de Villa Altagracia, Inc.	FUDEVA		809-559-2606 809-559-2894	fudeva2@codetel.net.do
28	Fundacion para la Accion y Desarrollo Ambiental Comunitario, Inc.	FADAC		809-288-2420	julio01ruiz@hotmail.com
29	Fundacion por el Bienestar de la Niñez, Inc.	FUNDABINI		829-972-2057 809-843-3212	fundabin@hotmail.com
30	Fundacion por el Bienestar y el Desarrollo de San Cristóbal, Inc.	FUNDESANCRIS		809-528-4302 809-729-1299	fundesancris@gmail.com
31	Fundacion Pro-Desarrollo Forestal Plan Mucha Agua, Inc.	FUNDEFOPMA		809-528-8854 809-288-2104	
32	Fundacion Pro-Desarrollo Social de la Provincia de San Cristóbal, Inc.			809-528-4177	
33	Fundacion Social Comunitaria Cambita Garabito, Inc.	FSCCG		809-528-8508	
34	Patronato Pro-Desarrollo de los Cacaos, Inc.	APRODECA		809-909-1017	
35	Patronato Pro-Desarrollo de Villa Altagracia, Inc.	PAPRODEVA		809-559-2576	
36	Asociacion de Juntas de Vecinos de San Cristóbal, Inc.	AJUVSANCRI		809-528-3423	asocjuntasdevecinos@hotmail.com
37	Brightline Institute, Inc.	Brightline	Elizabeth Paniagua Gerente	829-943-3466	admin@brins.org
TOTAL	**37**				

Anexo D: Indicadores Climáticos y de Gestión de Riesgos

Annex D. Climate Vulnerability and Risks Management Indicators

1. AGRICULTURA ANTE SEQUIA

AGR-S01	
Indicador	Porcentaje de ocupados en el sector agropecuario
Sector	Agricultura
Dimensión	Exposición
Componente	Población
Unidad	%
Fuente	Oficina Nacional de Estadística (ONE)
Año de referencia	2015
Tipo de dato	Estimación
Instrumento	Encuesta
Periodicidad	Anual
Desagregación	Municipal
Comentario	Municipios con altos porcentajes de población que dependen para su subsistencia del sector agropecuario son potencialmente más expuestas a recibir efectos de cambios climáticos.
Referencias	Encuesta Nacional de Hogares

Los Cacaos	78.2
Medina (D.M.)	74.3
Cambita Garabitos	69.7
La Cuchilla (D.M.)	58.2
Cambita El Pueblecito	52.9
Hato Damas (D.M)	51.4
Villa Altagracia	49.4
San José del Puerto	48.1

Los Cacaos	3.9
Medina (D.M.)	3.6
Cambita Garabitos	3.5
La Cuchilla (D.M.)	3.5
Cambita El Pueblecito	3.1
Hato Damas (D.M)	3.9
Villa Altagracia	3.7
San José del Puerto	3.7

AGR-S02	
Indicador	Clase climática
Sector	Agricultura
Dimensión	Exposición
Componente	Clima
Unidad	Clase climática de Thornthwaite
Fuente	Oficina Nacional de Meteorología (ONAMET)
Año de referencia	1970-2000
Tipo de dato	Estudio
Instrumento	Extracción del mapa climático provincial a partir del mapa climático nacional, mediante clipping.
Periodicidad	n/A
Desagregación	Raster 1 km x 1 km, cobertura municipal
Comentario	El tipo de clima es un factor que condiciona la vulnerabilidad de una zona frente al cambio climático, siendo las zonas con clima seco en general más expuestas a fenómenos de sequía.
Referencias	Shape file de los límites provinciales

AGR-S03	
Indicador	Sequía agrícola
Sector	Agricultura
Dimensión	Exposición
Componente	Clima
Unidad	%
Fuente	Oficina Nacional de Meteorología (ONAMET)
Año de referencia	1970-2000
Tipo de dato	Estudio
Instrumento	Datos municipales incluidos en el estudio.
Periodicidad	n/A
Desagregación	Municipal
Comentario	El porcentaje de territorio que en promedio experimenta condiciones de sequía proporciona una medida de la exposición

Los Cacaos	66
Medina (D.M.)	64
Cambita Garabitos	62
La Cuchilla (D.M.)	58
Cambita El Pueblecito	64
Hato Damas (D.M)	69
Villa Altagracia	64
San José del Puerto	66

Annex D. Climate Vulnerability and Risks Management Indicators

	territorial a dicho fenómeno y de la vulnerabilidad a recibir sus efectos.
Referencias	Estudio de la climatología de la sequía agrícola en la República Dominicana, 2006.

Los Cacaos	52.5
Medina (D.M.)	56.6
Cambita Garabitos	53.2
La Cuchilla (D.M.)	53.5
Cambita El Pueblecito	49.1
Hato Damas (D.M)	58.5
Villa Altagracia	50.3
San José del Puerto	56.9

AGR-S04	
Indicador	Áreas agrícolas con pendiente superior al 10%
Sector	Agricultura
Dimensión	Sensibilidad
Componente	Uso de suelo
Unidad	%
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
Año de referencia	2015
Tipo de dato	Datos oficiales
Instrumento	Cálculo de la relación porcentual entre el área del territorio municipal con pendiente superior al 10% (a partir del DEM nacional) y la superficie del territorio municipal con uso agrícola.
Periodicidad	Variable
Desagregación	Modelos Digital del Terreno: Raster 50 m x 50 m, cobertura nacional; Mapa de Uso de Suelo: Datos vectoriales, cobertura municipal.
Comentario	Pendientes superiores al 10% se considera que tengan un creciente potencial de erosión sin importar el tipo de suelo.
Referencias	Atlas de Recursos Naturales de RD, 2015. Shape file de los límites provinciales. Modelo Digital del Terreno (50 m).

AGR-S05	
Indicador	Índice de Sensibilidad a la Desertificación
Sector	Agricultura
Dimensión	Sensibilidad
Componente	Cultivos
Unidad	ESAI (Índice de Sensibilidad a la Desertificación)
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
Año de referencia	Variable
Tipo de dato	Estudio
Instrumento	Extracción del mapa de sensibilidad a la desertificación a partir del mapa nacional, mediante clipping. Cálculo del promedio del ESAI del territorio municipal.
Periodicidad	n/A
Desagregación	Raster 50m x 50m, cobertura provincial.
Comentario	Las áreas con ESAI más alto son las más sensibles a la desertificación. El valor del índice depende de cuatro componentes principales: el clima, la vegetación, el suelo y el manejo del territorio.
Referencias	Land sensitivity to desertification in the Dominican Republic: an adaptation of the ESA methodology. Land Degradation and Development, 2011.

Los Cacaos	1.326
Medina (D.M.)	1.312
Cambita Garabitos	1.391
La Cuchilla (D.M.)	1.308
Cambita El Pueblecito	1.376
Hato Damas (D.M)	1.322
Villa Altagracia	1.127
San José del Puerto	1.382

Annex D. Climate Vulnerability and Risks Management Indicators

Los Cacaos	4.4
Medina (D.M.)	4.9
Cambita Garabitos	4.1
La Cuchilla (D.M.)	4.6
Cambita El Pueblecito	4.7
Hato Damas (D.M)	4.3
Villa Altagracia	4.6
San José del Puerto	4.4

AGR-S06	
Indicador	Porcentaje de superficie cubierta por cultivos intensivos
Sector	Agricultura
Dimensión	Sensibilidad
Componente	Cultivos
Unidad	%
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
	Ministerio de Agricultura
Año de referencia	2015
Tipo de dato	Datos oficiales
Instrumento	Cálculo de la relación porcentual entre el área del territorio municipal ocupada por cultivos intensivos y la superficie total del territorio del municipio.
Periodicidad	Variable
Desagregación	Datos vectoriales, cobertura provincial.
Comentario	Sistemas de agricultura intensiva demandan de muchos recursos naturales para poder funcionar y serían muy sensibles frente a condiciones de reducción de la disponibilidad hídrica.
Referencias	Atlas de Recursos Naturales de RD, 2015. Shape file de los límites provinciales.

AGR-S07	
Indicador	Índice de Empoderamiento Individual
Sector	Agricultura
Dimensión	Capacidad de Adaptación
Componente	Población
Unidad	IEI (Índice de Empoderamiento Individual)
Fuente	Oficina de Desarrollo Humano (ODH) del Programa de las Naciones Unidas para el Desarrollo (PNUD)
Año de referencia	2015
Tipo de dato	Medición
Instrumento	Combinación de 31 indicadores estandarizados aferentes a cuatro áreas principales: economía, salud, educación y TIC (Tecnología de la Información y Comunicación).
Periodicidad	Variable
Desagregación	Municipal
Comentario	Un municipio con más altos valores del índice cuenta con una población que goza de mejores condiciones en cada una de las cuatro áreas señaladas arriba y por ende resulta menos sensibles frente a posibles cambios climáticos.
Referencias	Informe sobre Desarrollo Humano, República Dominicana 2015.

Los Cacaos	0.451
Medina (D.M.)	0.442
Cambita Garabitos	0.446
La Cuchilla (D.M.)	0.423
Cambita El Pueblecito	0.417
Hato Damas (D.M)	0.474
Villa Altagracia	0.422
San José del Puerto	0.424

Los Cacaos	1.7
Medina (D.M.)	2.1
Cambita Garabitos	1.9
La Cuchilla (D.M.)	2.2
Cambita El Pueblecito	1.8
Hato Damas (D.M)	1.7

AGR-S08	
Indicador	Porcentaje de áreas bajo riego
Sector	Agricultura
Dimensión	Capacidad de Adaptación
Componente	Riego
Unidad	%
Fuente	Instituto Nacional De Recursos Hidráulicos (INDRHI)

Annex D. Climate Vulnerability and Risks Management Indicators

Villa Altagracia	1.1
San José del Puerto	1.9

Año de referencia	2015
Tipo de dato	Informes oficiales
Instrumento	Cálculo de la relación porcentual entre el área del territorio municipal bajo riego y la superficie total del territorio del municipio.
Periodicidad	Variable
Desagregación	Datos vectoriales, cobertura provincial.
Comentario	Las áreas del territorio que cuentan con sistemas de riego tienen una mayor capacidad de responder a condiciones de sequía.
Referencias	Base de datos de sistemas de riego de RD: shape file de las áreas bajo riego. Shape file de los límites municipales.

AGR-S09	
Indicador	Disponibilidad de agua almacenada
Sector	Agricultura
Dimensión	Capacidad de Adaptación
Componente	Riego
Unidad	km3
Fuente	Instituto Nacional De Recursos Hidráulicos (INDRHI)
Año de referencia	2015
Tipo de dato	Informes oficiales
Instrumento	Cálculo de la relación porcentual entre el área del territorio ocupada por reservorios de agua y la superficie total del territorio municipal.
Periodicidad	Variable
Desagregación	Datos vectoriales, cobertura provincial.
Comentario	Las áreas del territorio que cuentan con sistemas de riego tienen una mayor capacidad de responder a condiciones de sequía.
Referencias	Base de datos de sistemas de riego de RD: shape file de las áreas bajo riego. Shape file de los límites municipales.

Los Cacaos	0.25
Medina (D.M.)	0.12
Cambita Garabitos	0.15
La Cuchilla (D.M.)	0.24
Cambita El Pueblecito	0.11
Hato Damas (D.M)	0.19
Villa Altagracia	0.14
San José del Puerto	0.07

2. AGRICULTURA ANTE INUNDACIONES

Los Cacaos	78.2
Medina (D.M.)	74.3
Cambita Garabitos	69.7
La Cuchilla (D.M.)	58.2
Cambita El Pueblecito	52.9
Hato Damas (D.M)	51.4
Villa Altagracia	49.4
San José del Puerto	48.1

AGR-I01	
Indicador	Porcentaje de ocupados en el sector agropecuario
Sector	Agricultura
Dimensión	Exposición
Componente	Población
Unidad	%
Fuente	Oficina Nacional de Estadística (ONE)
Año de referencia	2015
Tipo de dato	Estimación
Instrumento	Encuesta
Periodicidad	Anual
Desagregación	Municipal
Comentario	Municipios con altos porcentajes de población que dependen para su subsistencia del sector agropecuario son potencialmente más expuestas a recibir efectos de cambios climáticos.

Annex D. Climate Vulnerability and Risks Management Indicators

Referencias	Encuesta Nacional de Hogares

AGR-I02	
Indicador	Número de trazas de ciclones tropicales y tormentas que han impactado el territorio
Sector	Agricultura
Dimensión	Energía
Componente	Exposición
Unidad	Clima
Fuente	Número de trazas
Año de referencia	1860-2015
Tipo de dato	Registros oficiales
Instrumento	Recopilación de datos puntuales relativos al paso de los ciclones tropicales.
Periodicidad	Anual
Desagregación	Shape files, cobertura global
Comentario	El número de tormentas y huracanes que históricamente han impactado el territorio municipal es una medida de cuán expuesto está el territorio a estos fenómenos.
Referencias	https://oceanservice.noaa.gov/news/historical-hurricanes/

Los Cacaos	16
Medina (D.M.)	16
Cambita Garabitos	16
La Cuchilla (D.M.)	16
Cambita El Pueblecito	16
Hato Damas (D.M)	16
Villa Altagracia	16
San José del Puerto	16

Los Cacaos	11.7
Medina (D.M.)	11.4
Cambita Garabitos	11.1
La Cuchilla (D.M.)	11.8
Cambita El Pueblecito	11.7
Hato Damas (D.M)	11.8
Villa Altagracia	11.2
San José del Puerto	11.3

AGR-I03	
Indicador	Porcentaje de áreas cultivadas en zona inundables
Sector	Agricultura
Dimensión	Exposición
Componente	Cultivos
Unidad	%
Fuente	Ministerio de Medio Ambiente y Recursos Naturales Instituto Nacional De Recursos Hidráulicos (INDRHI)
Año de referencia	2010
Tipo de dato	Datos oficiales
Instrumento	Cálculo de la relación porcentual entre el área del territorio municipal potencialmente inundable y la superficie del territorio municipal bajo uso agrícola.
Periodicidad	Variable
Desagregación	Datos vectoriales, cobertura provincial.
Comentario	Provincias con un mayor porcentaje de áreas agrícolas en terrenos sujetos a ser inundados son más expuestas a recibir daños ligados a la ocurrencia de inundaciones.
Referencias	Atlas de Recursos Naturales de RD, 2015. Shape file de los límites provinciales. Sahpe file de las áreas potencialmente inundables.

AGR-I04	
Indicador	Número de desastres ligados a inundaciones
Sector	Agricultura
Dimensión	Exposición
Componente	Territorio
Unidad	Número
Fuente	Datos oficiales recopilados de diversas fuentes

Los Cacaos	14
Medina (D.M.)	16
Cambita Garabitos	13
La Cuchilla (D.M.)	11
Cambita El Pueblecito	15
Hato Damas (D.M)	15

Annex D. Climate Vulnerability and Risks Management Indicators

Año de referencia	1970-2015
Tipo de dato	Registros oficiales
Instrumento	Aplicar el filtro "inundaciones" a todos los informes relacionados con eventos desastrosos ocurridos en el país durante el periodo de estudio.
Periodicidad	n/A
Desagregación	Municipal
Comentario	El número de inundaciones ocurridas históricamente es un indicador de cuán expuesto es el territorio de una provincia frente a estos fenómenos ligados a eventos meteorológicos.
Referencias	Inventarios de efectos de desastres naturales en RD.

Villa Altagracia	16
San José del Puerto	16

Los Cacaos	0.451
Medina (D.M.)	0.442
Cambita Garabitos	0.446
La Cuchilla (D.M.)	0.423
Cambita El Pueblecito	0.417
Hato Damas (D.M)	0.474
Villa Altagracia	0.422
San José del Puerto	0.424

AGR-I05	
Indicador	Índice de Empoderamiento Individual
Sector	Agricultura
Dimensión	Capacidad de Adaptación
Componente	Población
Unidad	IEI (Índice de Empoderamiento Individual)
Fuente	Oficina de Desarrollo Humano (ODH) del Programa de las Naciones Unidas para el Desarrollo (PNUD)
Año de referencia	2015
Tipo de dato	Medición
Instrumento	Combinación de 31 indicadores estandarizados aferentes a cuatro áreas principales: economía, salud, educación y TIC (Tecnología de la Información y Comunicación).
Periodicidad	Variable
Desagregación	Municipal
Comentario	Un municipio con más altos valores del índice cuenta con una población que goza de mejores condiciones en cada una de las cuatro áreas señaladas arriba y por ende resulta menos sensibles frente a posibles cambios climáticos.
Referencias	Informe sobre Desarrollo Humano, República Dominicana 2015.

AGR-I06	
Indicador	Número de préstamos agropecuarios
Sector	Agricultura
Dimensión	Capacidad de Adaptación
Componente	Planificación y Financiación
Unidad	Número
Fuente	Banco Agrícola
	Programa de Visitas Sorpresa del Presidente
Año de referencia	2016
Tipo de dato	Cifras oficiales
Instrumento	Conteo de los préstamos realizados por las instituciones que proveen créditos agropecuarios.
Periodicidad	Mensual
Desagregación	Municipal
Comentario	El acceso a crédito representa un respaldo para la actividad agropecuaria, y por ende un componente importante en tema de

Los Cacaos	42
Medina (D.M.)	72
Cambita Garabitos	80
La Cuchilla (D.M.)	61
Cambita El Pueblecito	42
Hato Damas (D.M)	50
Villa Altagracia	90
San José del Puerto	32

Annex D. Climate Vulnerability and Risks Management Indicators

	adaptación al cambio climático.
Referencias	Estadísticas del Banco Agrícola, 2016. Estadísticas del FEDA, 2016.

3. AGUA PARA CONSUMO HUMANO

Los Cacaos	3.9
Medina (D.M.)	3.6
Cambita Garabitos	3.5
La Cuchilla (D.M.)	3.5
Cambita El Pueblecito	3.1
Hato Damas (D.M)	3.9
Villa Altagracia	3.7
San José del Puerto	3.7

ACH-01	
Indicador	Clase climática
Sector	Agua potable
Dimensión	Exposición
Componente	Clima
Unidad	Clase climática de Thornthwaite
Fuente	Oficina Nacional de Meteorología (ONAMET)
Año de referencia	1970-2000
Tipo de dato	Estudio
Instrumento	Extracción del mapa climático provincial a partir del mapa climático nacional, mediante clipping.
Periodicidad	n/A
Desagregación	Raster 1 km x 1 km, cobertura municipal
Comentario	El tipo de clima es un factor que condiciona la vulnerabilidad de una zona frente al cambio climático, siendo las zonas con clima seco en general más expuestas a fenómenos de sequía.
Referencias	Shape file de los límites provinciales

ACH-02	
Indicador	Densidad poblacional
Sector	Agua potable
Dimensión	Sensibilidad
Componente	Población
Unidad	hab/km2
Fuente	Oficina Nacional de Estadística (ONE)
Año de referencia	2010
Tipo de dato	Cifras oficiales
Instrumento	Estimaciones y proyecciones
Periodicidad	Anual
Desagregación	Municipal
Comentario	Densidades de población más altas hacen un territorio más sensibles a recibir los efectos adversos del cambio climático, puesto que implican mayores necesidades de recursos y mayor producción de desechos, lo que se traduce en mayores presiones sobre el medio.
Referencias	Censo Nacional de Población y Vivienda, 2010.

Los Cacaos	51
Medina (D.M.)	
Cambita Garabitos	180
La Cuchilla (D.M.)	
Cambita El Pueblecito	
Hato Damas (D.M)	
Villa Altagracia	426
San José del Puerto	

Los Cacaos	66
Medina (D.M.)	64
Cambita Garabitos	62
La Cuchilla (D.M.)	58
Cambita El Pueblecito	64
Hato Damas (D.M)	69

ACH-03	
Indicador	Sequía agrícola
Sector	Agua potable
Dimensión	Exposición
Componente	Clima
Unidad	%
Fuente	Oficina Nacional de Meteorología (ONAMET)

Annex D. Climate Vulnerability and Risks Management Indicators

Villa Altagracia	64
San José del Puerto	66

Año de referencia	1970-2000
Tipo de dato	Estudio
Instrumento	Uso del dato municipal presentado en los estudios de referencia.
Periodicidad	n/A
Desagregación	Municipal
Comentario	El porcentaje de territorio que en promedio experimenta condiciones de sequía proporciona una medida de la exposición territorial a dicho fenómeno y de la vulnerabilidad a recibir sus efectos.
Referencias	Estudio de la climatología de la sequía agrícola en la República Dominicana, 2006.

ACH-04	
Indicador	Número de trazas de ciclones tropicales y tormentas que han impactado el territorio
Sector	Agricultura
Dimensión	Energía
Componente	Exposición
Unidad	Clima
Fuente	Número de trazas
Año de referencia	1860-2015
Tipo de dato	Registros oficiales
Instrumento	Recopilación de datos puntuales relativos al paso de los ciclones tropicales.
Periodicidad	Anual
Desagregación	Shape files, cobertura global
Comentario	El número de tormentas y huracanes que históricamente han impactado el territorio municipal es una medida de cuán expuesto está el territorio a estos fenómenos.
Referencias	https://oceanservice.noaa.gov/news/historical-hurricanes/

Los Cacaos	16
Medina (D.M.)	16
Cambita Garabitos	16
La Cuchilla (D.M.)	16
Cambita El Pueblecito	16
Hato Damas (D.M)	16
Villa Altagracia	16
San José del Puerto	16

Los Cacaos	51
Medina (D.M.)	
Cambita Garabitos	180
La Cuchilla (D.M.)	
Cambita El Pueblecito	
Hato Damas (D.M)	
Villa Altagracia	426
San José del Puerto	

ACH-05	
Indicador	Densidad poblacional
Sector	Asentamientos humanos
Dimensión	Sensibilidad
Componente	Población
Unidad	hab/km2
Fuente	Oficina Nacional de Estadística (ONE)
Año de referencia	2010
Tipo de dato	Cifras oficiales
Instrumento	Estimaciones y proyecciones
Periodicidad	Anual
Desagregación	Municipal
Comentario	Densidades de población más altas hacen un territorio más sensibles a recibir los efectos adversos del cambio climático, puesto que implican mayores necesidades de recursos y mayor producción de desechos, lo que se traduce en mayores presiones sobre el medio.
Referencias	Censo Nacional de Población y Vivienda, 2010.

Annex D. Climate Vulnerability and Risks Management Indicators

ACH-06	
Indicador	Tasa de letalidad del dengue hemorrágico por 100,000 habitantes
Sector	Asentamientos humanos
Dimensión	Sensibilidad
Componente	Salud
Unidad	Número por cada 100,000 habitantes
Fuente	Oficina Nacional de Estadísticas (ONE)
Año de referencia	2015
Tipo de dato	Cifras oficiales
Instrumento	Cálculo de la relación entre el número de casos confirmados de muerte por dengue hemorrágico y la población provincial, multiplicado por 100,000.
Periodicidad	Anual
Desagregación	Municipal
Comentario	La mortalidad ligada a dengue hemorrágico es una medida de cuánto un territorio es sensible a recibir los efectos de la exposición a enfermedades cuyas incidencia tiene relación con factores climáticos.
Referencias	Anuario de salud, 2015.

Los Cacaos	0.81
Medina (D.M.)	0.79
Cambita Garabitos	0.81
La Cuchilla (D.M.)	0.78
Cambita El Pueblecito	0.78
Hato Damas (D.M)	0.81
Villa Altagracia	0.79
San José del Puerto	0.74

Los Cacaos	72.4
Medina (D.M.)	70.9
Cambita Garabitos	68.4
La Cuchilla (D.M.)	68.1
Cambita El Pueblecito	70.1
Hato Damas (D.M)	69.9
Villa Altagracia	70.2
San José del Puerto	70.3

ACH-07	
Indicador	Porcentaje de hogares sin suministro de agua para uso humano dentro de la vivienda
Sector	Asentamientos humanos
Dimensión	Sensibilidad
Componente	Suministro de agua potable
Unidad	%
Fuente	Oficina Nacional de Estadística (ONE)
Año de referencia	2010
Tipo de dato	Cifras oficiales
Instrumento	Cálculo de la relación porcentual entre el número de hogares con suministro de agua para uso humano dentro de la vivienda y el total de hogares encuestados.
Periodicidad	Anual
Desagregación	Municipal
Comentario	Un porcentaje más alto de casas que cuentan con abastecimiento de agua dentro de la vivienda es un elemento que reduce la sensibilidad frente a potenciales cambios del clima.
Referencias	Censo Nacional de Población y Vivienda, 2010.

ACH-08	
Indicador	Índice de Empoderamiento Individual
Sector	Asentamientos humanos
Dimensión	Capacidad de Adaptación
Componente	Población
Unidad	IEI (Índice de Empoderamiento Individual)
Fuente	Oficina de Desarrollo Humano (ODH) del Programa de las Naciones Unidas para el Desarrollo (PNUD)
Año de referencia	2015
Tipo de dato	Medición

Los Cacaos	0.451
Medina (D.M.)	0.442
Cambita Garabitos	0.446
La Cuchilla (D.M.)	0.423
Cambita El Pueblecito	0.417
Hato Damas (D.M)	0.474
Villa Altagracia	0.422
San José del Puerto	0.424

Annex D. Climate Vulnerability and Risks Management Indicators

Instrumento	Combinación de 31 indicadores estandarizados aferentes a cuatro áreas principales: economía, salud, educación y TIC (Tecnología de la Información y Comunicación).
Periodicidad	Variable
Desagregación	Municipal
Comentario	Un municipio con más altos valores del índice cuenta con una población que goza de mejores condiciones en cada una de las cuatro áreas señaladas arriba y por ende resulta menos sensibles frente a posibles cambios climáticos.
Referencias	Informe sobre Desarrollo Humano, República Dominicana 2015.

Los Cacaos	9.1.
Medina (D.M.)	8.4
Cambita Garabitos	8.9
La Cuchilla (D.M.)	9.2
Cambita El Pueblecito	9.1
Hato Damas (D.M)	8.4
Villa Altagracia	8.9
San José del Puerto	8.2

ACH-09	
Indicador	Razón de médicos por 10,000 habitantes
Sector	Asentamientos humanos
Dimensión	Capacidad de Adaptación
Componente	Salud
Unidad	Número por cada 10,000 habitantes
Fuente	Ministerio de Salud Pública
Año de referencia	2015
Tipo de dato	Cifras oficiales
Instrumento	Cálculo de la relación entre el número de médicos y la población municipal, multiplicado por 10,000.
Periodicidad	Anual
Desagregación	Municipal
Comentario	La razón de médicos es un indicador que contribuyen a definir la calidad del servicio de salud. Una más alta razón de médicos da a la provincia una capacidad mayor de responder a situaciones problemáticas ligadas a posibles cambios climáticos.
Referencias	Indicadores básicos de salud 2015 - OMS/OPS

ACH-10	
Indicador	Razón de hospitales por 10,000 habitantes
Sector	Asentamientos humanos
Dimensión	Capacidad de Adaptación
Componente	Salud
Unidad	Número por cada 10,000 habitantes
Fuente	Ministerio de Salud Pública
Año de referencia	2015
Tipo de dato	Cifras oficiales
Instrumento	Cálculo de la relación entre el número de hospitales y clínicas respecto a la población municipal, multiplicado por 10,000.
Periodicidad	Anual
Desagregación	Municipal
Comentario	El número de hospitales es un indicador que contribuye a definir la calidad del servicio de salud. Una mayor disponibilidad de centros de salud da a la provincia una capacidad mayor de responder a situaciones problemáticas ligadas a posibles cambios climáticos.

Los Cacaos	0.19
Medina (D.M.)	0.22
Cambita Garabitos	0.21
La Cuchilla (D.M.)	0.23
Cambita El Pueblecito	0.22
Hato Damas (D.M)	0.21
Villa Altagracia	0.26
San José del Puerto	0.24

Annex D. Climate Vulnerability and Risks Management Indicators

Referencias	Indicadores básicos de salud 2015 - OMS/OPS

4. ÁREAS PROTEGIDAS Y BIODIVERSIDAD

Los Cacaos	22.4
Medina (D.M.)	14.7
Cambita Garabitos	17.9
La Cuchilla (D.M.)	21.1
Cambita El Pueblecito	21.6
Hato Damas (D.M)	23.1
Villa Altagracia	22.6
San José del Puerto	23.4

SAP-01	
Indicador	Porcentaje de superficie del SINAP por municipio
Sector	Áreas protegidas
Dimensión	Exposición
Componente	Áreas protegidas
Unidad	%
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
Año de referencia	2015
Tipo de dato	Datos oficiales
Instrumento	Cálculo de la relación porcentual entre la superficie de áreas protegidas en el territorio municipal y el área total del municipio.
Periodicidad	Variable
Desagregación	Datos vectoriales, cobertura nacional
Comentario	La extensión del territorio protegido es tomado como medida de la superficie expuesta.
Referencias	Shape file del SINAP Shape file de los límites municipales/ provinciales.

SAP-02	
Indicador	Superficie del SINAP por municipio
Sector	Áreas protegidas
Dimensión	Exposición
Componente	Áreas protegidas
Unidad	km2
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
Año de referencia	2015
Tipo de dato	Datos oficiales
Instrumento	Medición de la superficie de áreas protegidas en el territorio municipal.
Periodicidad	Variable
Desagregación	Datos vectoriales, cobertura nacional
Comentario	La extensión del territorio protegido es tomado como medida de la superficie expuesta.
Referencias	Shape file del SINAP Shape file de los límites municipales/ provinciales.

Los Cacaos	#Error
Medina (D.M.)	#Error
Cambita Garabitos	#Error
La Cuchilla (D.M.)	#Error
Cambita El Pueblecito	#Error
Hato Damas (D.M)	#Error
Villa Altagracia	#Error
San José del Puerto	#Error

Los Cacaos	1
Medina (D.M.)	1
Cambita Garabitos	1
La Cuchilla (D.M.)	1
Cambita El Pueblecito	1
Hato Damas (D.M)	1
Villa Altagracia	1
San José del Puerto	1

SAP-03	
Indicador	Porcentaje de áreas protegida con avistamiento de especies amenzadas o en peligro
Sector	Áreas protegidas
Dimensión	Exposición
Componente	Biodiversidad
Unidad	%
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
Año de referencia	2015
Tipo de dato	Datos oficiales

Annex D. Climate Vulnerability and Risks Management Indicators

Instrumento	Cálculo del número de especies de flora y fauna cuya presencia es registrada en el territorio del municipio.
Periodicidad	Variable
Desagregación	Datos puntuales y por área, cobertura nacional
Comentario	El porcentaje de territorio protegido ocupado por especies amenazadas o en peligro es un indicador de la exposición de la biodiversidad a los efectos del cambio climático.
Referencias	Shape file con ubicación de las especies de fauna amenazada o en peligro en el territorio nacional. Shape file del SINAP. Shape file de los límites municipales/ provinciales. Atlas de Recursos Naturales de RD, 2015.

SAP-04	
Indicador	Porcentaje de áreas con actividades humanas dentro del área protegida
Sector	Áreas protegidas
Dimensión	Sensibilidad
Componente	Uso del suelo
Unidad	%
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
Año de referencia	2015
Tipo de dato	Datos oficiales
Instrumento	Filtro de la capa de uso de suelo en función del parámetro “actividades antrópicas”. Clipping de la capa de uso de suelo con actividades antrópicas mediante la capa de SINAP. Clipping de la capa de actividades antrópicas dentro del territorio protegido mediante la capa de los límites municipales. Cálculo de la relación porcentual entre el área del territorio municipal protegido ocupada por actividades antrópicas y la superficie total del territorio del municipio.
Periodicidad	Variable
Desagregación	Datos vectoriales, cobertura nacional
Comentario	Las áreas protegidas que presentanporcentajes más altos de territorio ocupado por actividades antrópicas son más sensibles a recibir los efectos adversos asociados al cambio climático.
Referencias	Shape file del SINAP Mapa de Uso de Suelo Shape file de los límites municipales/ provinciales.

Los Cacaos	36.4
Medina (D.M.)	34.9
Cambita Garabitos	33.5
La Cuchilla (D.M.)	33.7
Cambita El Pueblecito	36.8
Hato Damas (D.M)	35.4
Villa Altagracia	37.7
San José del Puerto	36.8

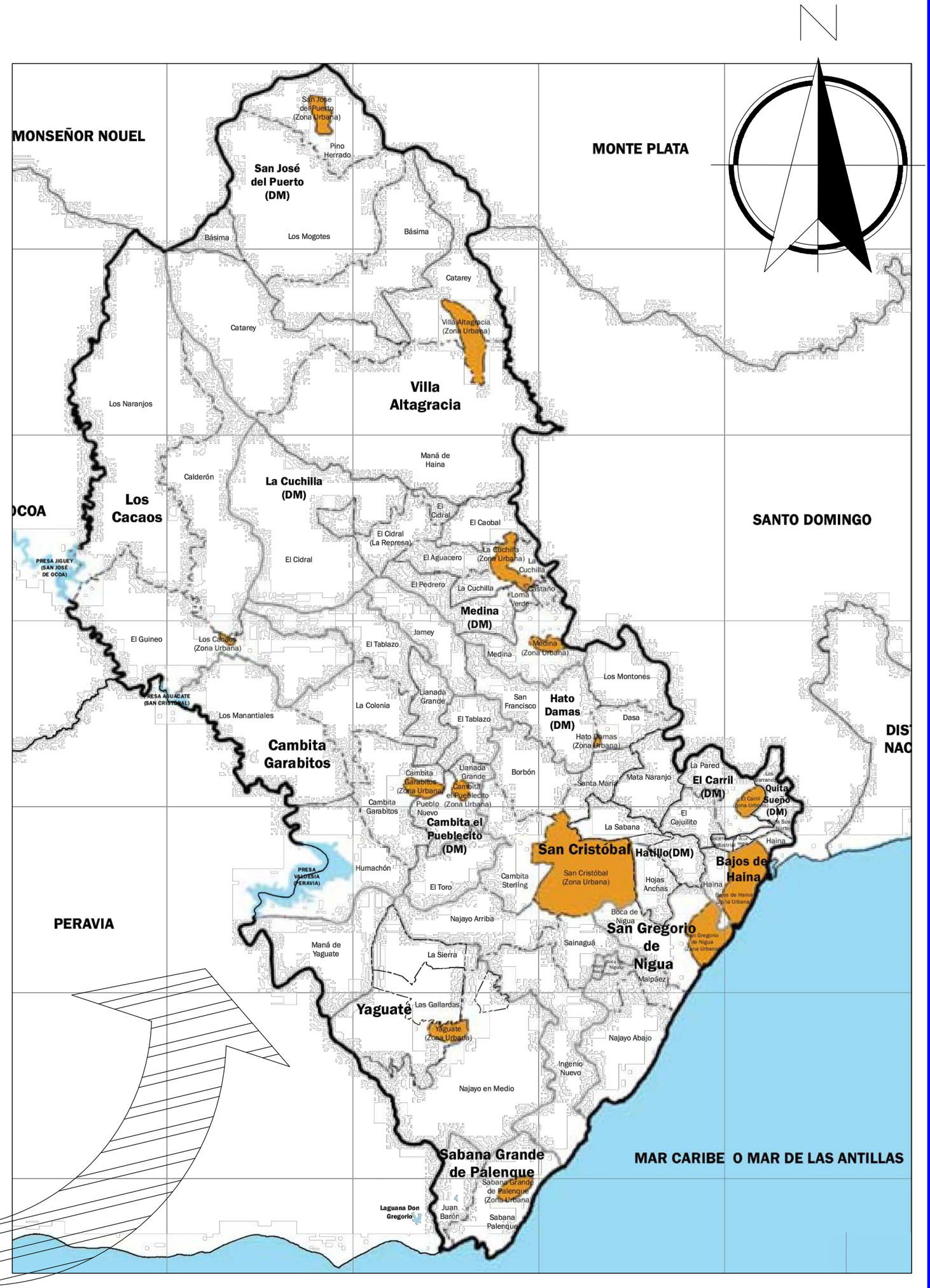
Los Cacaos	1.326
Medina (D.M.)	1.312
Cambita Garabitos	1.391
La Cuchilla (D.M.)	1.308
Cambita El Pueblecito	1.376
Hato Damas (D.M)	1.322
Villa Altagracia	1.127
San José del Puerto	1.382

SAP-05	
Indicador	Índice de Sensibilidad a la Desertificación
Sector	Agricultura
Dimensión	Sensibilidad
Componente	Cultivos
Unidad	ESAI (Índice de Sensibilidad a la Desertificación)
Fuente	Ministerio de Medio Ambiente y Recursos Naturales
Año de referencia	Variable (datos disponibles para distintos años)
Tipo de dato	Estudio
Instrumento	Extracción del mapa de sensibilidad a la desertificación a partir del

Annex D. Climate Vulnerability and Risks Management Indicators

	mapa nacional, mediante clipping. Cálculo del promedio del ESAI del territorio municipal.
Periodicidad	n/A
Desagregación	Raster 50m x 50m, cobertura provincial.
Comentario	Las áreas con ESAI más alto son las más sensibles a la desertificación. El valor del índice depende de cuatro componentes principales: el clima, la vegetación, el suelo y el manejo del territorio.
Referencias	Land sensitivity to desertification in the Dominican Republic: an adaptation of the ESA methodology. Land Degradation and Development, 2011.

Anexo E: Mapa de Comunidades Potenciales



PROYECTISTA:

Brightline Institute, Inc.

PROYECTO:

Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural

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PROMOTOR:

Instituto Dominicano de Desarrollo Integral (IDDI)

DISEÑO:
ARQ. BETANIA BERIGUETE
CODIA # 28201
FIRMA

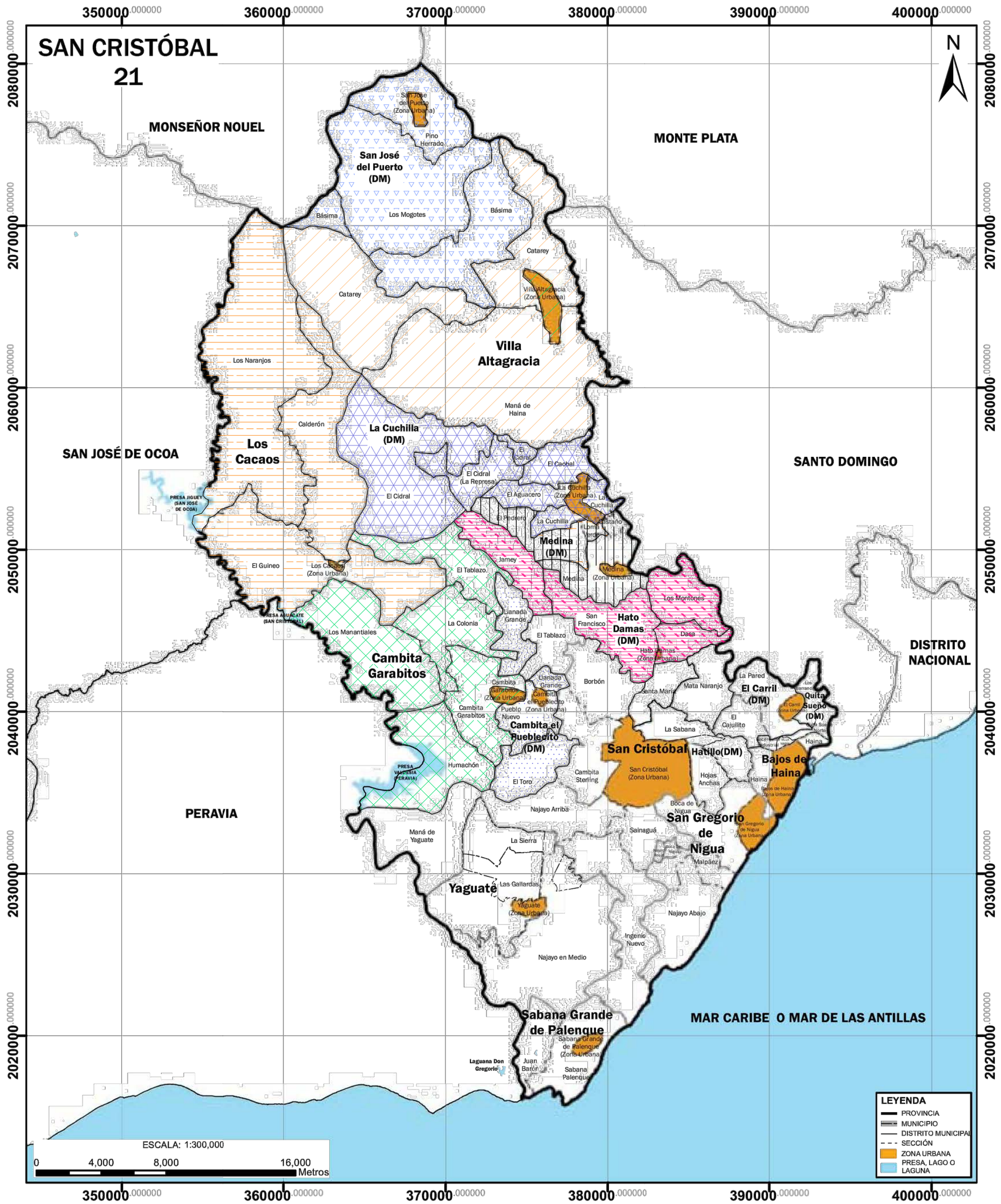
CONSULTORES

DIRECTOR:	FORESTAL:	HIDRAULICO:	SANITARIO:
FIRMA	FIRMA	FIRMA	FIRMA
ING. RAFAEL BERIGUETE	ING. JOSE A. NUÑEZ	ING. ELIZABETH PANIAGUA	ING. RAFAEL MIESES
CODIA # 21870	CODIA #2	CODIA # 20901	CODIA #2

TÍTULO DE LA HOJA:

UBICACION Y LOZALIZACION DEL PROYECTO

ESCALA	CODIGO	FECHA	SERIE	
1:150	MC: BL-#ClimaComunidad_001	OCTUBRE/2017	A	1 / 6



LEYENDA

- LOS CACAOS
- MEDINA (D.M.)
- CAMBITA GARABITOS
- LA CUCHILLA (D.M.)
- CAMBITA EL PUEBLECITO (D. M.)
- HATO DAMAS (D.M.)
- VILLA ALTAGRACIA
- SAN JOSÉ DEL PUERTO

PROYECTISTA:

Brightline Institute, Inc.

PROYECTO:

Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural

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PROMOTOR:

Instituto Dominicano de Desarrollo Integral (IDDI)

DISEÑO:
ARQ. BETANIA BERIGUETE
CODIA # 28201
FIRMA

CONSULTORES

DIRECTOR:	FORESTAL:	HIDRAULICO:	SANITARIO:
FIRMA	FIRMA	FIRMA	FIRMA
ING. RAFAEL BERIGUETE	ING. JOSE A. NUÑEZ	ING. ELIZABETH PANIAGUA	ING. RAFAEL MIESES
CODIA # 21870	CODIA #	CODIA # 20901	CODIA #

TÍTULO DE LA HOJA:

COMUNIDADES BENEFICIARIAS DEL PROGRAMA

ESCALA	CODIGO	FECHA	SERIE	
1:150	MC: BL-#ClimaComunidad_002	OCTUBRE/2017	A	2 / 6

@AdaptationFund
Project Proposal Development

Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme

#ClimaSanCristobal

Informe 2:
Definición de las intervenciones de adaptación

Este documento contiene información relativa al diseño conceptual y técnico de las intervenciones propuestas para el programa propuesto, incluyendo especificaciones técnicas, inversiones, costos, presupuestos, cronograma de ejecución, impactos preliminares y riesgos asociados a la etapa de implementación. Esta información, complementa la incluida en el Producto 1, y permitirá realizar la evaluación de impactos socioeconómicos y medioambientales del programa.

Elaborado por:

Brightline Institute, Inc.
proyectos@brins.org

Encargado por:

Instituto Dominicano de Desarrollo Integral (IDDI)

Fecha: 25 de abril del 2018

Contenido

1. Objetivos-Metodología-Resultados Esperados

1.1 Objetivos

- Elaborar el diseño conceptual y definir las especificaciones técnicas de los proyectos de adaptación en las comunidades priorizadas.
- Preparar el presupuesto y cronograma de actividades para la implementación del programa, que incluyan notas a nivel de producto.
- Identificar los riesgos e impactos socioeconómicos y medioambientales de la implementación del programa y de las estrategias de adaptación.
- Recomendar acciones para la movilización de los recursos humanos, técnicos y financieros para la implementación del programa.

1.2 Metodología

La metodología utilizada se basa en la combinación de informaciones y análisis relevantes a:

- Alcance de las intervenciones considerada en el contexto del programa.
- Análisis y revisión de las especificaciones técnicas, normativa y buenas prácticas aplicables.
- Elaboración del presupuesto y cronograma para las intervenciones y el programa.
- Plan de desembolsos y plan de movilización para la implementación del programa.

Los aspectos anteriormente citados se reúnen en distintas matrices, de forma que se pueda evaluar como el programa se ajusta a los criterios y directrices del Fondo de Adaptación.

1.3 Resultados Esperados

- Un listado de especificaciones técnicas, normas y reglamentos aplicables a las intervenciones de programa.
- Cronograma de ejecución y presupuesto del programa, con información y notas a nivel de output (producto).
- Matriz de riesgos asociados al programa, incluyendo medidas para la mitigación y/o reducción de los mismos.

2. Intervenciones Consideradas

Según se establece en la Nota Conceptual, para lograr aumentar la resiliencia y la capacidad de adaptación de las comunidades objeto, el programa contempla las siguientes intervenciones:

Cuadro 1: Intervenciones Consideradas en el Diseño del Programa

Componente (a)	Resultados (output) (a)	Intervención	Cantidad	Alcance (b)
1. Implementación a nivel comunitario de actividades de gestión de recursos hídricos resilientes al clima.	1.1	○ Planes comunitarios de abastecimiento y gestión del agua que incorporen los riesgos relacionados con el cambio climático.	30	Comunidades Rurales
	1.2	○ Incremento en el suministro de agua para múltiples usos y usuarios durante períodos de escasez bajo impactos del cambio climático.	30	Comunidades Rurales
	1.3	○ Medidas para la conservación del agua bajo impactos climáticos (cuenca/ ribera, esquemas de re-aforestación).	2,722	Comunidades Rurales
2. Creación de capacidades y desarrollo de capacidades en instituciones clave y en comunidades para gestionar los riesgos relacionados con el cambio climático a largo plazo	2.1	○ Desarrolla de un conjunto de manuales y otros materiales sobre las mejores prácticas para la gestión del agua y los medios de subsistencia resilientes, incluido un sitio web plenamente operativo.	¿?	Comunidades Instituciones Organizaciones Cooperación Empresas
	2.2	○ Establecimiento del Comité Provincial de Adaptación al Cambio Climático.	1	San Cristóbal
	2.3	○ Institucionalización de plataformas de aprendizaje y sistemas para integrar los riesgos relacionados con el cambio climático en la gestión comunitaria de recursos hídricos y actividades de medios de subsistencia.	8	Comunidades y/o Municipalidades

El alcance propuesto se incluye sólo por fines de orientación. Si los recursos del programa y los plazos de ejecución del mismo lo permiten, en el futuro se podrían incluir otras comunidades y/o municipalidades. Las comunidades inicialmente incluidas, son las indicadas en el Producto 1[1]. El cuadro siguiente resume las principales características de los proyectos técnicos incluidos.

[1] Informe 1: pre-Identificación de comunidades beneficiarias.

Cuadro 2: Proyectos Individuales Identificados para el Programa

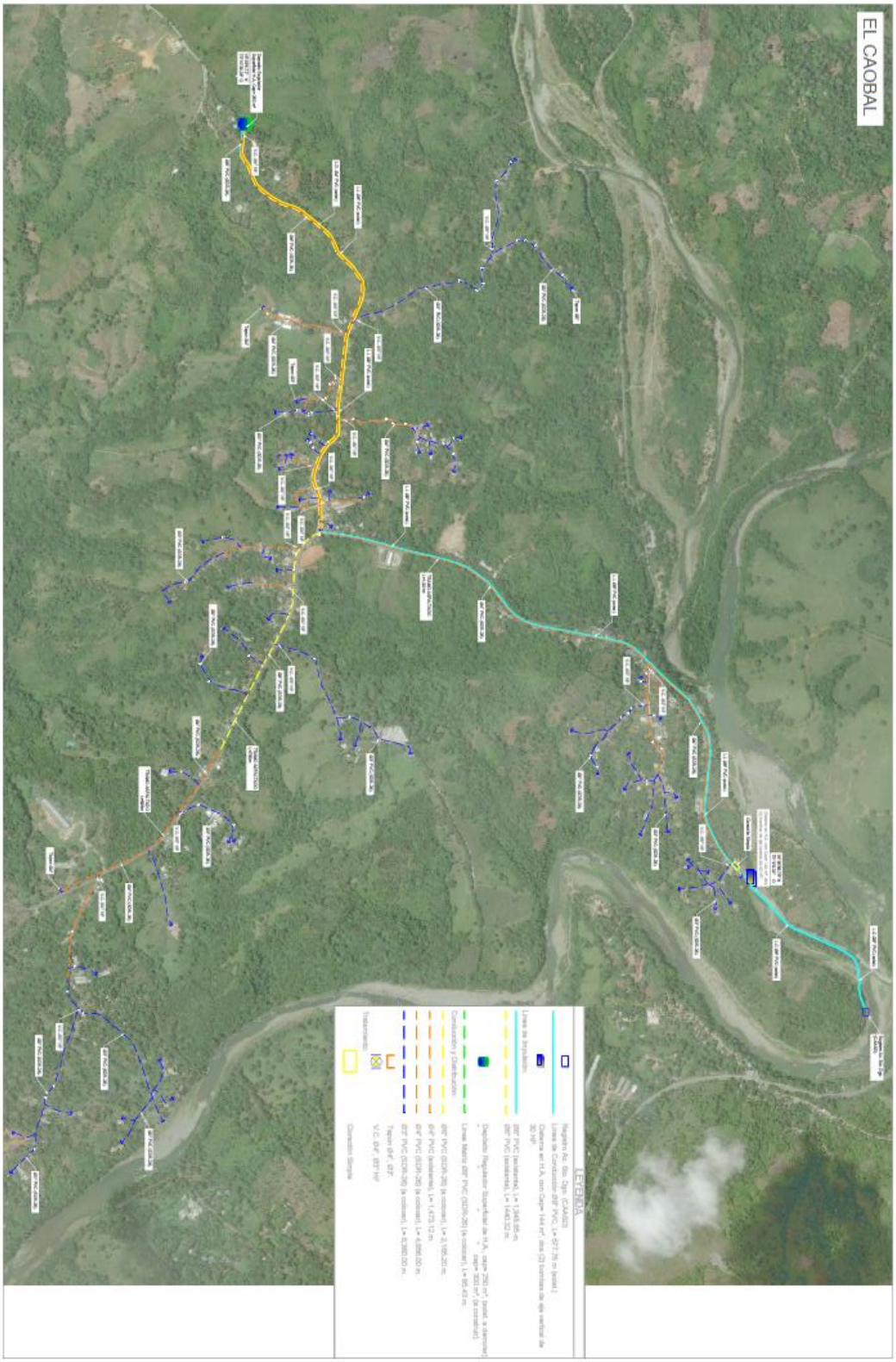
Proyecto	Descripción
El Caobal	- Fuente: Río *El Duey* - Obra de Toma: Empalme desde línea de aducción Ø30" L.J. (existente), Acueducto Sto. Dgo. - Línea de Conducción: Ø8" PVC (existente) - Estación de Bombeo: Cisterna en Hormigón Armado – Capacidad: 144 m³ - Dos (2) bombas de eje vertical de 30 HP - Verja de malla ciclónica (existente) - Línea de Impulsión: Ø8" PVC (existente), L= 1,945.84 m Ø6" PVC (existente), L= 1,455.60 m - Tratamiento: Cloración Simple - Almacenamiento: Depósito Regulador Superficial en Hormigón Armado – Capacidad: 300 m³ - Línea Matriz: Ø8" PVC (SDR-26), L=32.18 m (a colocar). - Red de Distribución: Ø4" PVC (existente), L= 1,473.12 m Ø6" PVC (SDR-26), L= 2,165.20 m Ø4" PVC (SDR-26), L= 4,856.00 m Ø3" PVC (SDR-26), L= 8,360.00 m - Tipo de Sistema: Gravedad – Bombeo - Acometidas Totales: 796 unidades urbanas, 417 unidades existentes y 379 unidades a instalar
Loma Verde	- Fuente: Aguas Subterránea (ubicada en el sector de *Los Jesús*) - Campo de Pozos: dos (2) unidades: una existente a rehabilitar y una nueva por construir. - Línea de Impulsión: Ø6" PVC (SDR-21), L= 956.08 m - Tratamiento: Cloración Simple - Almacenamiento: Depósito Regulador Superficial en Hormigón Armado - Capacidad 150 m³ - Línea Matriz: Ø6" PVC (SDR-26), L= 30.60 m - Red de Distribución: Ø4" PVC (existente), L= 734.36 m Ø3" PVC (existente), L= 736.00 m Ø6" PVC (SDR-26), L= 392.63 m Ø4" PVC (SDR-26), L= 873.78 m Ø3" PVC (SDR-26), L= 2,579.19 m Ø2" PVC (SDR-26), L= 51.30 m - Tipo de Sistema: Bombeo - Acometidas Totales: 300 unidades rurales
Castaño	- Fuente: Aguas Subterránea - Obra de Toma: Campo de pozos con estación de bombeo Nicho para paneles de control Equipos de bombeo Verja de malla ciclónica - Línea de Impulsión: Ø6" PVC (SDR-21), L=1,116.61m - Tratamiento: Cloración Simple - Almacenamiento: Depósito Regulador Elevado 12m en Hormigón Armado – Capacidad: 150m^3 - Línea Matriz: Ø6" PVC (SDR-26), L=60.00m - Red de Distribución: Ø4" PVC (SDR-26), L= 1,422.55 m Ø3" PVC (SDR-26), L= 3,932.21 m - Tipo de Sistema: Bombeo - Acometidas Totales: 347 unidades rurales
Los Algarrobos	- Fuente: Aguas Subterráneas - Obra de Toma: Campo de pozos con estación de bombeo Nicho para paneles de control Equipos de bombeo Verja de malla ciclónica - Línea de Impulsión: Ø4" PVC(SDR-21), L= 1,628.00 m - Tratamiento: Cloración Simple - Almacenamiento: Depósito Regulador Elevado 10m en Hormigón Armado – Capacidad: 65 m^3 - Línea Matriz: Ø4" PVC (SDR-26), L= 59.44 m - Red de Distribución: Ø4" PVC (SDR-26), L= 313.65 m

	Ø3" PVC (SDR-26), L= 4,430.00 m Ø2" PVC (SDR-26), L= 100.00 m - Tipo de Sistema: Bombeo - Acometidas Totales: 160 unidades rurales
San Francisco	- Fuente: Noria *San Francisco* - Obra de Toma: Cajuela en el cauce (a rehabilitar) - Línea de Aducción: Ø3" PVC (SDR-21), L= 196.15 m Ø3" Acero, L= 52.00 (para los cruces) - Tratamiento: Cloración Simple - Almacenamiento: Depósito Regulador Superficial de Bloques de Concreto – Capacidad: 45 m³ - Línea Matriz: Ø3" PVC (SDR-26), L= 140.53 m - Red de Distribución: Ø3" PVC (SDR-26), L= 1,402.91 m - Tipo de Sistema: Gravedad - Acometidas Totales: 40 unidades rurales
Arroyo Higüero	- Fuente: Arroyo *María* - Obra de Toma: Cajuela en el cauce (a construir) - Línea de Aducción: Ø4" PVC (SDR-21), L= 635.00 m Ø3" Acero, L= 652.00 m Ø3" PVC (SDR-21), L= 1,167.27 m - Tratamiento: Cloración Simple. - Almacenamiento: Depósito Regulador Elevado 10m en Hormigón Armado – Capacidad: 45 m³ - Línea Matriz: Ø4" PVC (SDR-26), L= 308.00 m. - Red de Distribución: Ø3" PVC (SDR-26), L= 820.00 m Ø2" PVC (SDR-21), L= 60.00 m - Tipo de Sistema: Gravedad - Acometidas Totales: 85 unidades rurales
El Fundo	- Fuente: Aguas Subterráneas - Obra de Toma: Cajuela en el cauce (a construir) - Línea de Aducción: Ø4" PVC (SDR-21), L= 635.00 m Ø3" Acero, L= 652.00 m Ø3" PVC (SDR-21), L= 1,167.27 m - Tratamiento: Cloración Simple. - Almacenamiento: Depósito Regulador Elevado 10m en Hormigón Armado – Capacidad: 45 m³ - Línea Matriz: Ø4" PVC (SDR-26), L= 308.00 m. - Red de Distribución: Ø3" PVC (SDR-26), L= 820.00 m Ø2" PVC (SDR-21), L= 60.00 m - Tipo de Sistema: Gravedad - Acometidas Totales: 200 unidades rurales
TOTAL	**7 PROYECTOS**

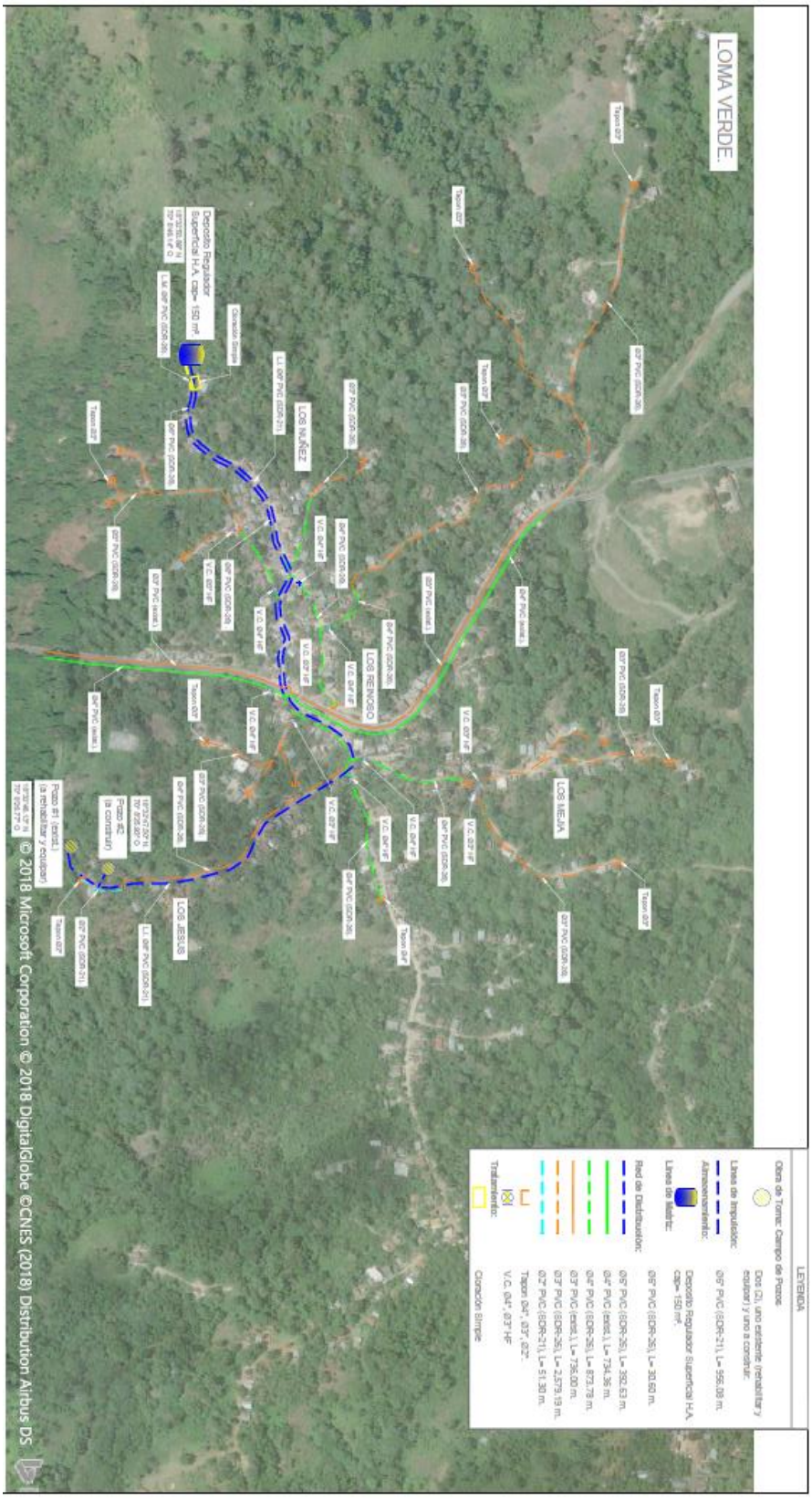
Ø = diámetro de la tubería; L = longitud de la tubería; PVC = Policloruro de Vinilo;
SDR = Standar Dimension Ratio (relación existente entre el diámetro nominal de la tubería y su espesor)

Estos proyectos son los incluidos en el presupuesto general del proyecto, que se complementan con los proyectos de re-forestación de sus respectivas cuencas hidrográficas. En adición, se han identificado otros 5 proyectos similares, los cuales podrían ser realizados, si se tiene acceso a otras fuentes adicionales de recursos. El diseño de estos proyectos se anexará a la propuesta completa.

Proyecto 01: El Caobal

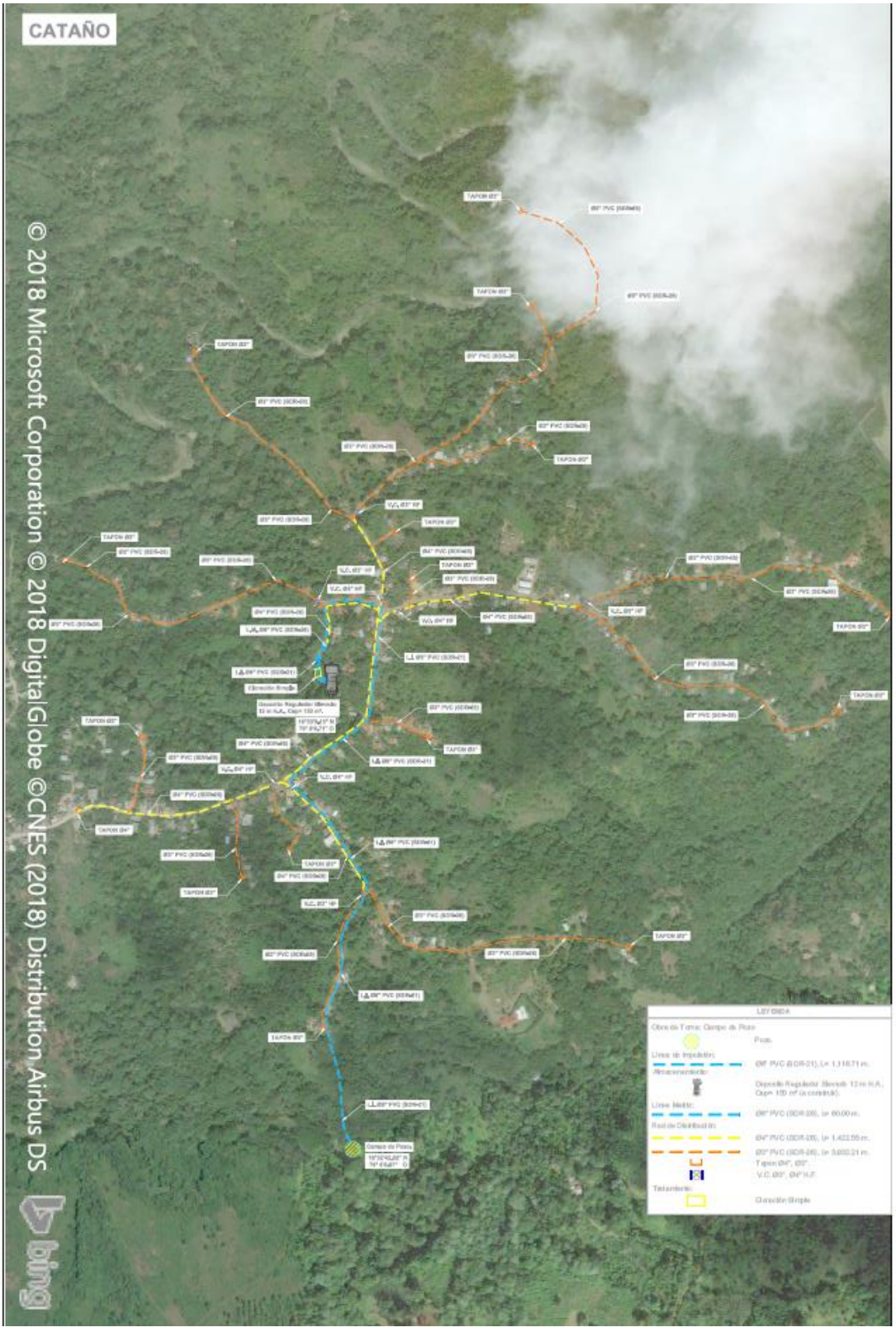


Proyecto 02: Loma Verde

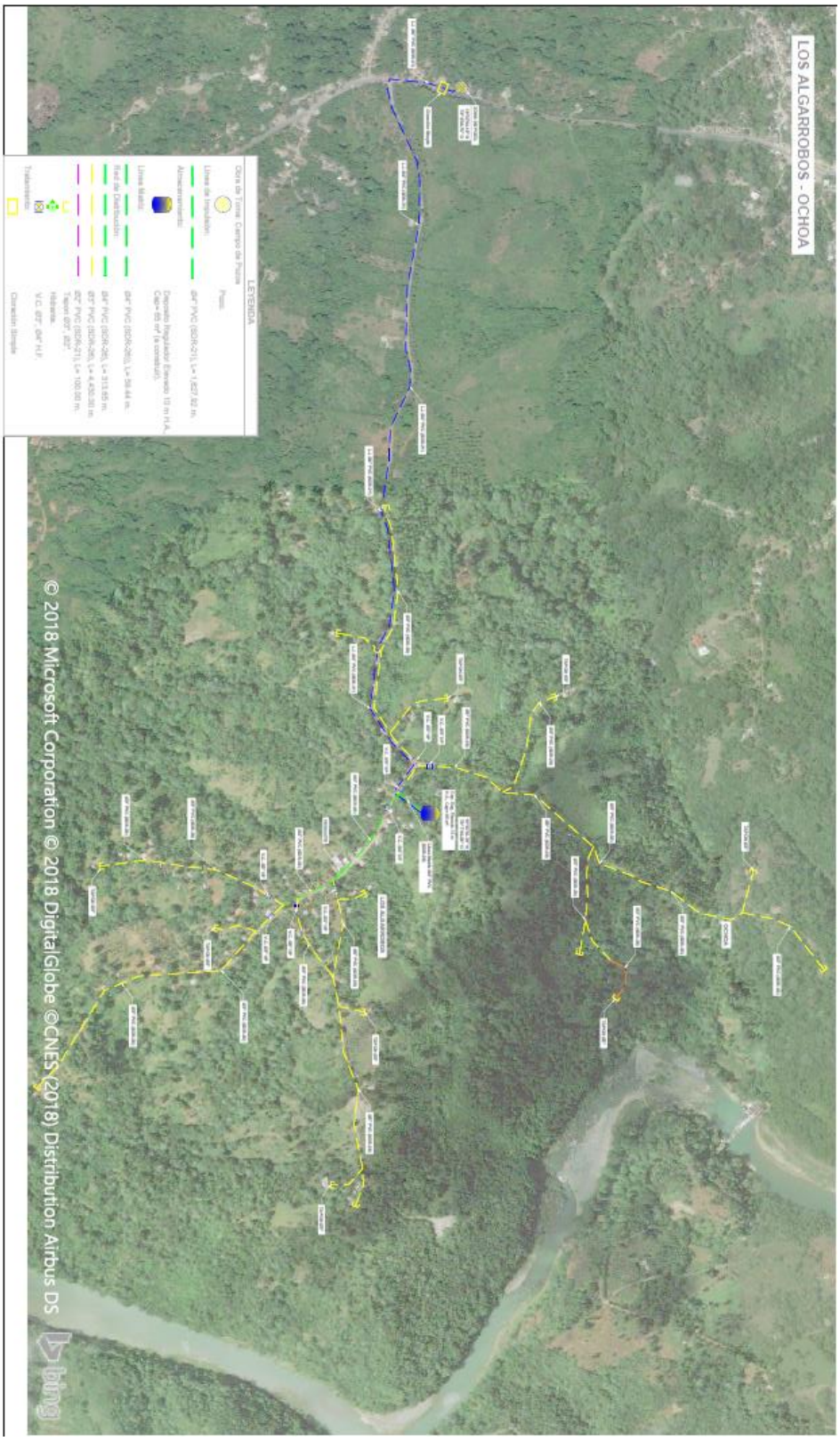


Informe No. 2: Definición de las intervenciones de adaptación

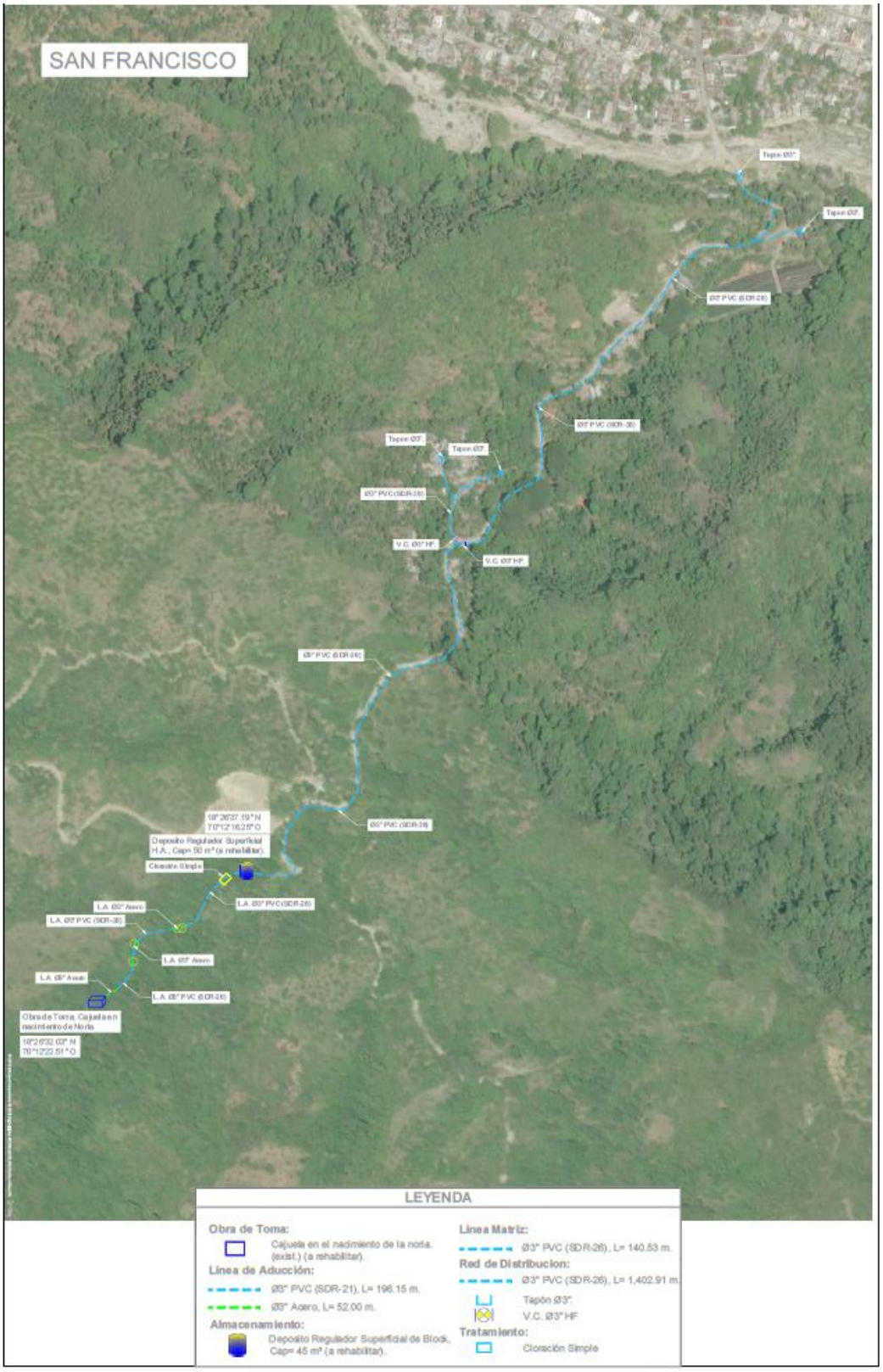
Proyecto 03: Castaño



Proyecto 04: Los Algarrobos-Ochoa

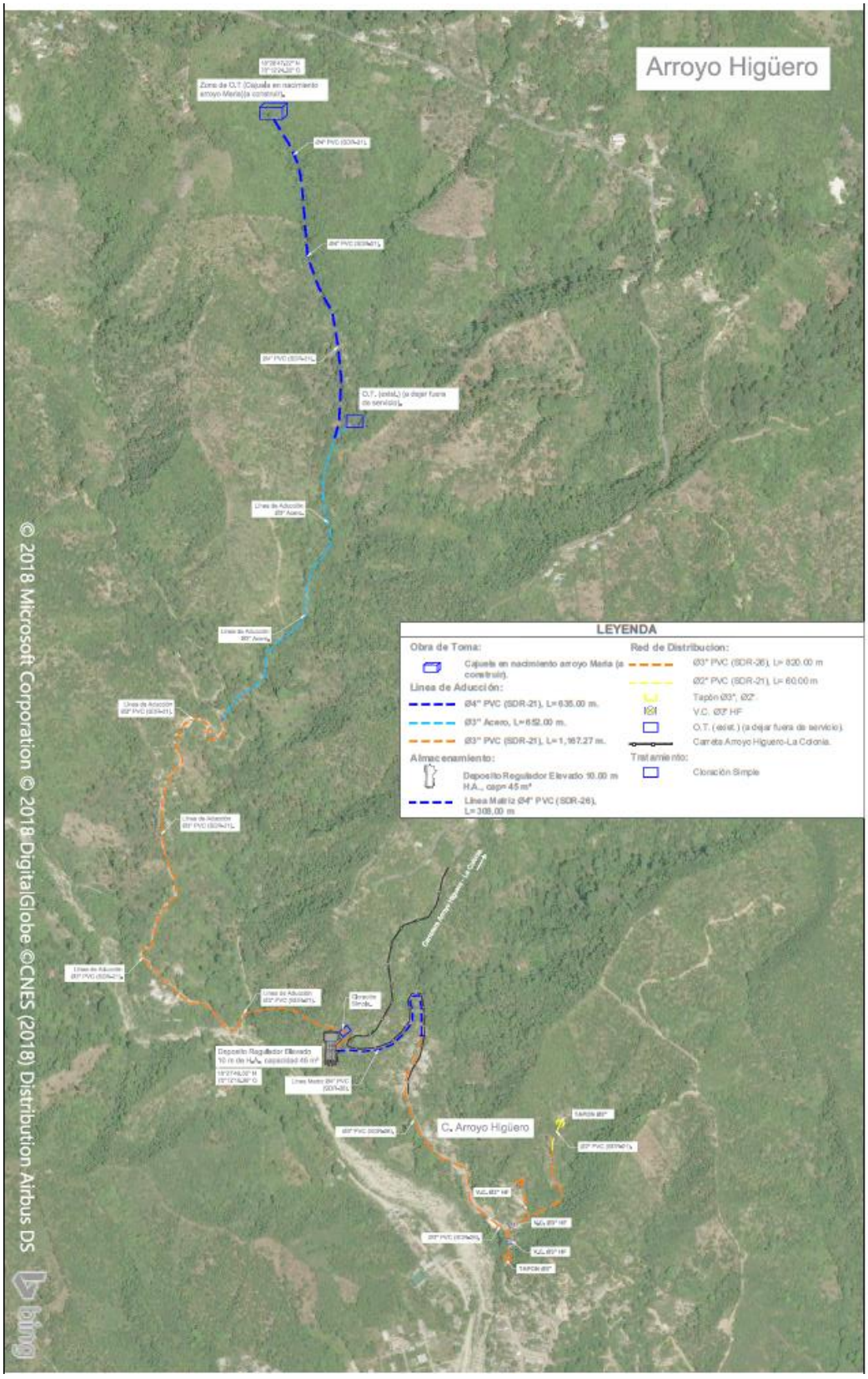


Proyecto 05: San Francisco



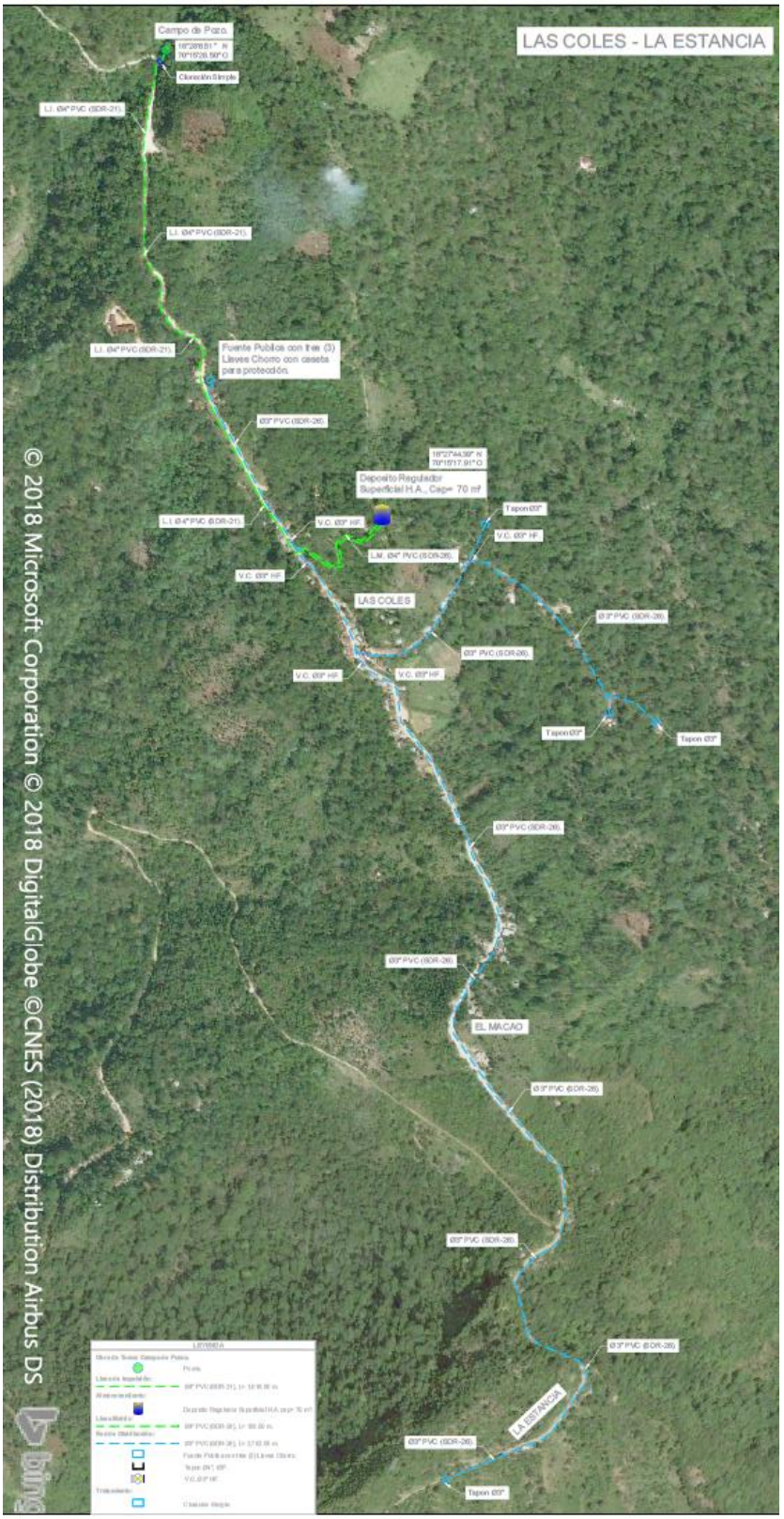
Informe No. 2: Definición de las intervenciones de adaptación

Proyecto 06: Arroyo Higüero

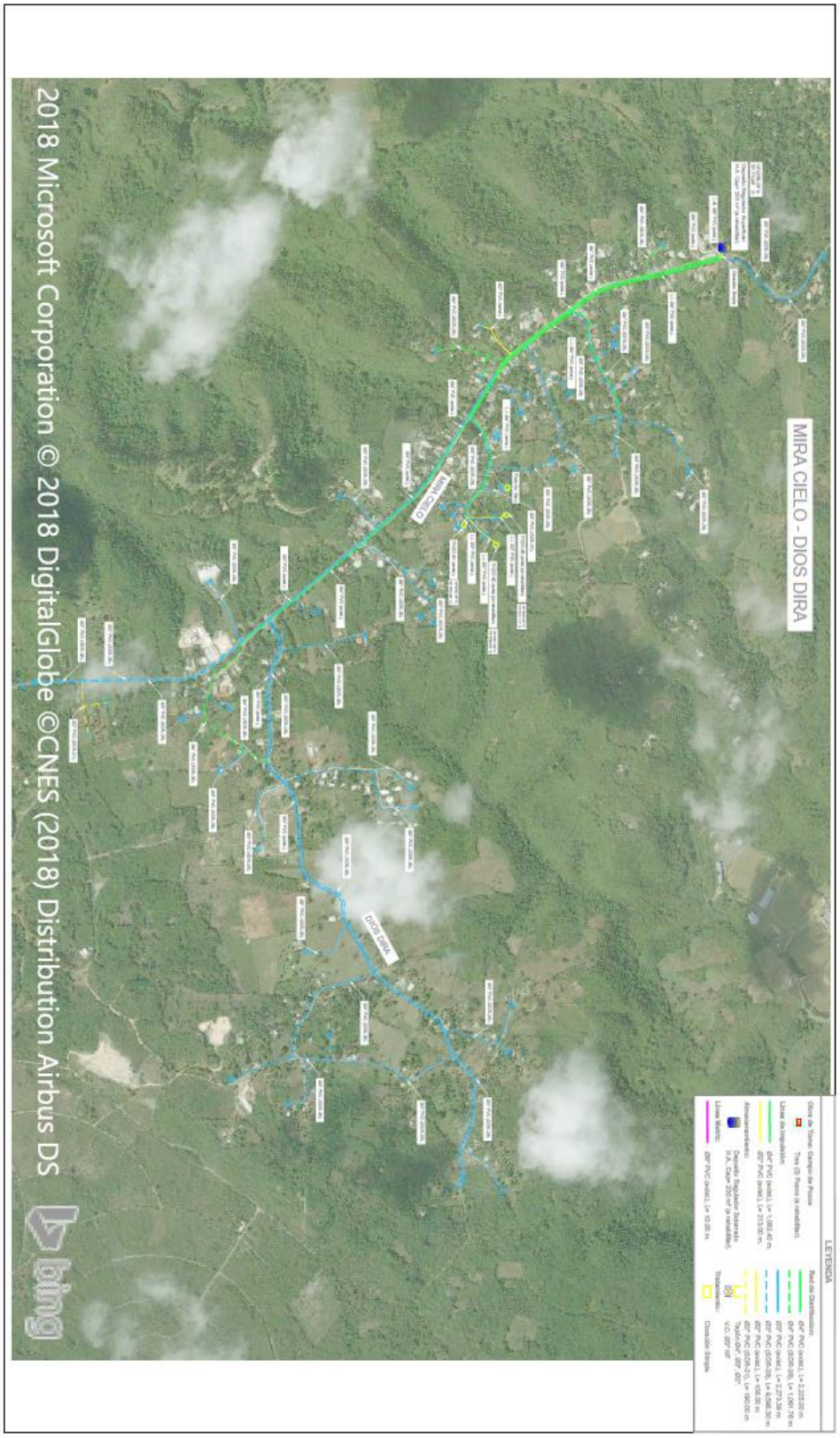


Informe No. 2: Definición de las intervenciones de adaptación

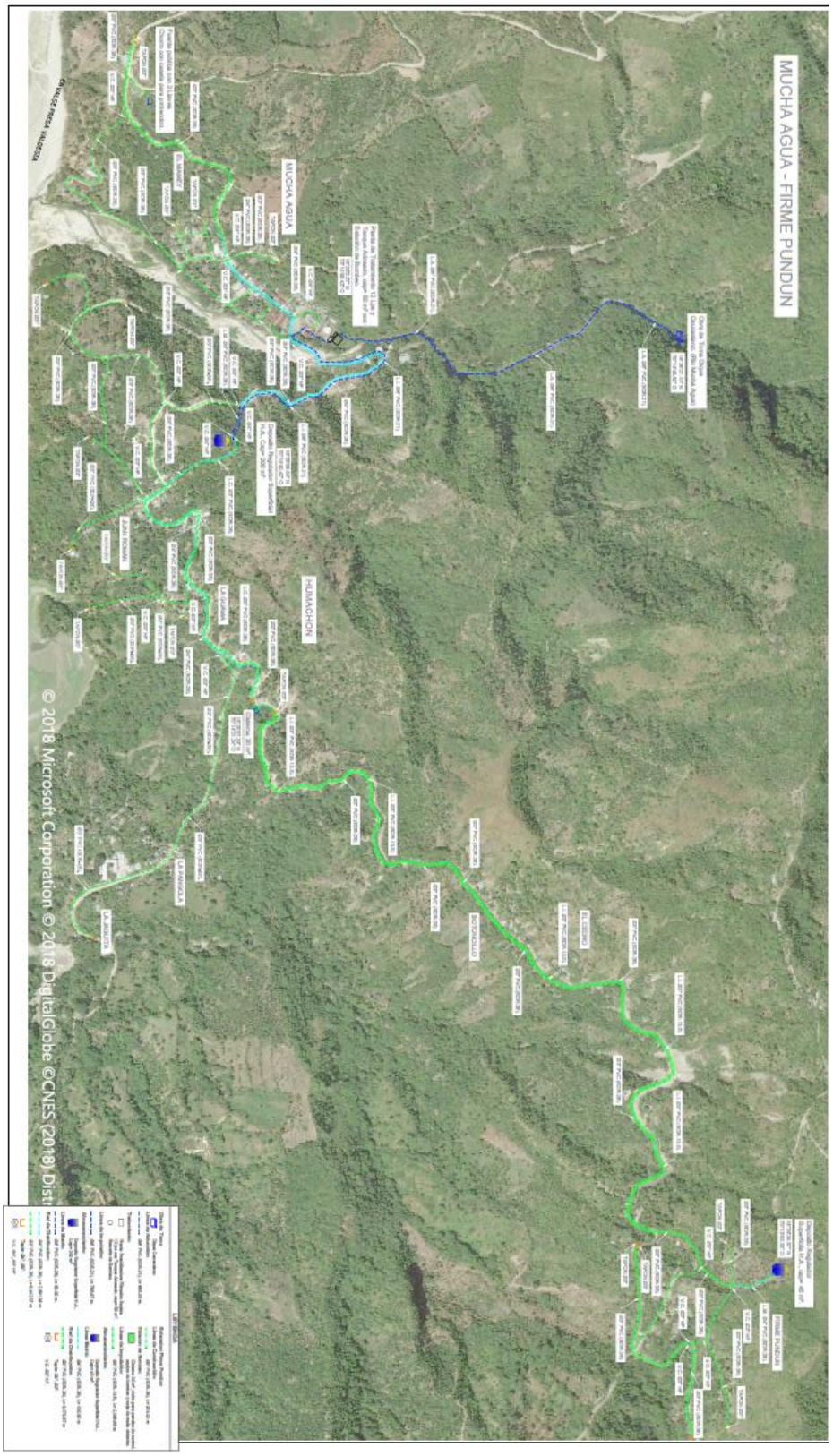
Proyecto X1 - Las Cole – La Estancia



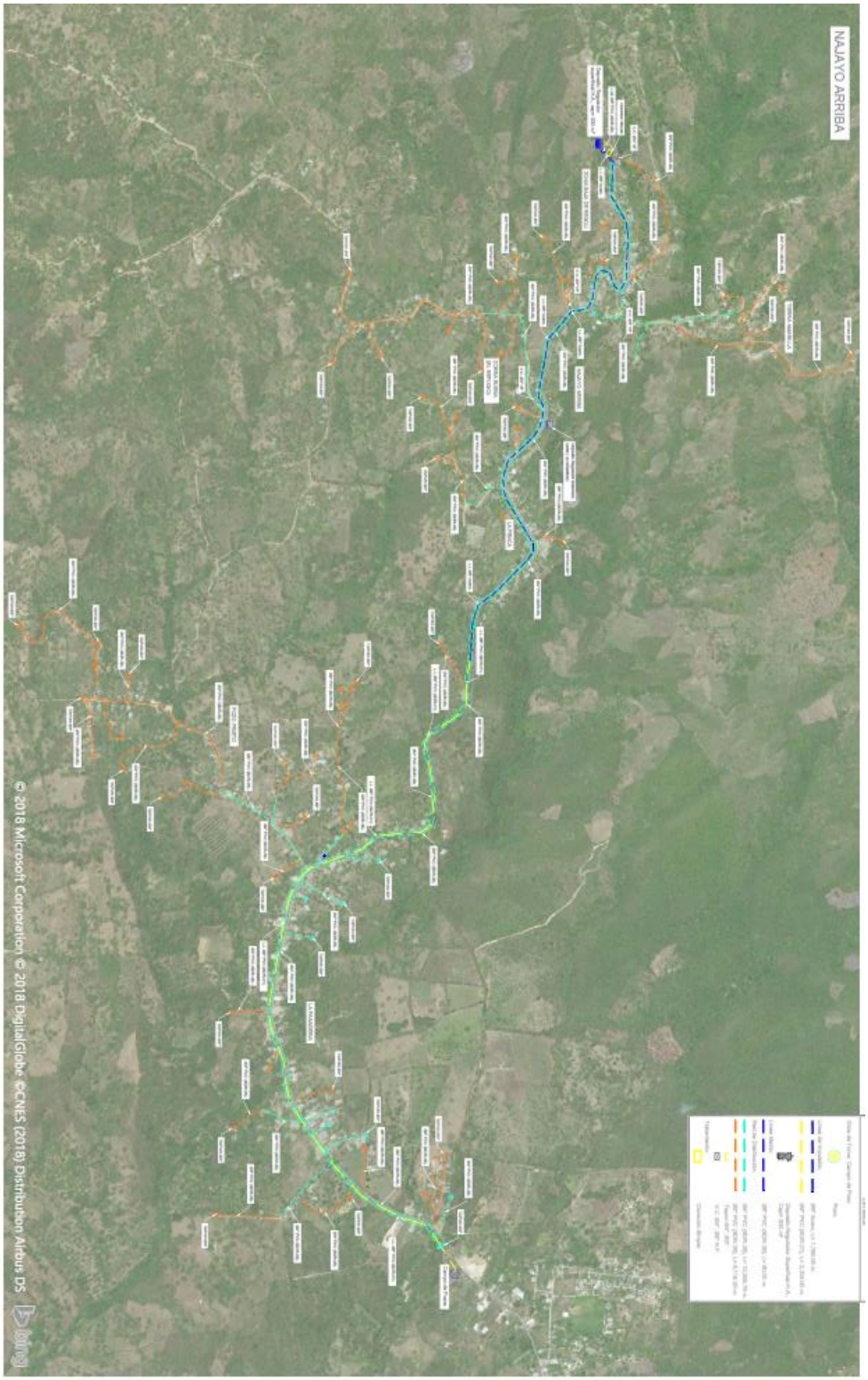
Proyecto X2: Mira Cielo – Dios Dirá



Proyecto X3: Mucha Agua – Firme PUNDUN



Acueducto Najayo Arriba



3. Especificaciones Técnicas

El diseño técnico de las intervenciones contempladas en el programa, se realizará según las normas y reglamentos vigentes en la República Dominicana. En casos que no exista normativa aplicable, se podrán considerar también las buenas prácticas y estándares internacionales.

Cuadro 3: Especificaciones Técnicas para el Diseño de las Intervenciones Programa[2]

Componente	Aspecto	Normativa	Referencia
Sistemas de abastecimiento de agua	Población de diseño, vida útil de los componentes, periodo de diseño por tipo de componente, usos del agua, dotación, pérdidas, demanda, consumo, caudales máximos diario y horario, caudal de incendios.	INAPA_REV00	Título II, Capítulo I
Fuentes de abastecimiento de agua	Fuentes superficiales, estudios previos, características del agua, calidad de la fuente, caudal máximo y mínimo. Fuentes subterráneas, estudios previos, características de la fuente, calidad del agua, capacidad de la fuente, rendimiento de los acuíferos, protección de las fuentes.	INAPA_REV00	Título II, Capítulo II
Captación de agua superficial	Capacidad de diseños, captaciones: laterales, sumergidas, flotantes, móviles, de rejilla, en toma directa, desalinización de agua, otras captaciones.	INAPA_REV00	Título II, Capítulo III
Captación de agua subterránea	Investigaciones preliminares, investigación del subsuelo, perforaciones, pruebas de bombeo, pozos (distancia, encamisado, y profundidad).	INAPA_REV00	Título II, Capítulo IV
Líneas de aducción, conducción e impulsión	Estudios previos, aspectos generales de la zona, recomendaciones de trazado, análisis hidráulico, protección contra la contaminación, vulnerabilidad y confiabilidad, parámetros de diseño, materiales y especificaciones, tuberías para conductos a presión, profundidad de instalación, accesorios y válvulas,	INAPA_REV00	Título II, Capítulo V
Redes de distribución	Información necesaria para el diseño de la red, parámetros de diseño, presiones máxima y mínima, condiciones de trabajo, operación crítica, conexiones, medidores, sistema de red, consumos y gastos, accesorios y obras complementarias de la red.	INAPA_REV00	Título II, Capítulo VI
Estaciones de bombeo	Edificaciones, localización, capacidad y características, diámetros para columnas de pozos, equipo de bombeo,	INAPA_REV00	Título II, Capítulo VII

[2] En caso de no disponerse de estándares locales para infraestructuras de agua, y según sea ello aplicable, las normas de referencia serán las de la AWWA (*American Water Works Association*), ASTM (*American Society for Testing and Materials*), AASHTO (*American Association of State Highway and Transportation Officials*), ISO (*International Standards Organization*), DIN (*German Institute for Standarization*).

	tuberías y válvulas en succión y descarga, equipamiento eléctrico ,motores, energía, operación.		
Tanques: almacenamiento y regulación	Capacidades mínimas, localización, tipos de tanques, operación, mantenimiento.	INAPA_REV00	Título II, Capítulo VIII
Sistemas de tratamiento y potabilización	Calidad de la fuente y calidad del agua, pretratamiento, procesos de oxidación (aeración, ventilación, química), cloración, ozonización, coagulación, floculación, filtración, desinfección, estabilización-ablandamiento, tratamientos alternativos.	INAPA_REV00	Título III
Viveros y lotes forestales	Diseño de viveros, componentes, selección del lugar, suministro de agua y calidad de la misma, terreno, clima, disponibilidad de mano de obra, selección de semillas, siembra, preparación de sustratos, llenado de envase, prevención de agentes daños, densidad, sanidad, limpieza y desinfección, control de malezas, fertilización, seguridad, empaque y transporte.	Manual de Diseño y Organización de Viveros CNC/CLUSVIDOM/CEDAF BID, 2016	
Esquemas de Re-forestación	Sistemas de gestión y aprovechamiento forestal, tipos de gestión (reforestación/ aforestación), propiedad forestal, terrenos con aptitud forestal, servicios ambientales, panes de manejo, plantaciones forestales, zonas de protección, aprovechamiento forestal, comercio, transporte e industrialización, protección fitosanitaria, protección contra incendios, investigación, extensión y transferencia de tecnología.	Reglamento para la gestión de los recursos forestales (2006) Normas Técnicas Forestales: Planes de Manejo Forestal Normas Técnicas Forestales: Funcionamiento de la Industria Forestal que Procesa Madera	
Microcrédito	Lineamiento para la administración y operaciones de microcréditos, requisitos para otorgamiento, calificación de los sujetos de créditos, administración del riesgo, políticas y procedimientos, consolidación de carteras, modelos para la evaluación, restructuración y garantías.	Reglamento de Microcréditos (Segunda resolución de la Junta Monetaria de fecha 12 de agosto del 2014)	
Asociación de usuarios del agua/ acueductos rurales	Formalización y preparación los usuarios del agua: núcleos, asociaciones y juntas de usuarios de lagua, cálculo de tarifas de agua y establecimiento de sistemas de facturación y cobro, creación de compromisos para la operación y mantenimiento de las infraestructuras. Promoción del cuidado, preservación y uso razonable del agua, así como la democratización del servicio.	Disponibles por el INAPA	
Fondos de Agua	Creación de alianzas público-privadas para la gestión sostenible del agua, bajo un marco de transparencia.	Recopilación de lecciones aprendidas e historias de éxito de los fondos de agua de Santo Domingo y Santiago	
Integridad ambiental	Normativa referente a Calidad de aire, emisiones de gases contaminantes a la atmosfera, protección contra ruido ambiental, gestión de residuos sólidos, control de descargas al subsuelo, seguridad e higiene laboral.	Normas y reglamentos sobre Emisiones, Calidad de Agua, Control de Ruidos, Gestión de Residuos Sólidos, Seguridad y salud ocupacional, etc.	

Otras normas serán observadas por el programa durante su ejecución y operación, como las que protegen los derechos de los trabajadores, las que rechazan el trabajo infantil, y las que protegen los derechos de las personas independientemente de su estatus migratorio, entre otros.

4. Presupuesto y Cronograma

Para ejecutar el programa propuesto, se requiere de una inversión total de 9,953,692.35 dólares.

Cuadro 4: Resumen del Presupuesto del Programa

Detalle	Inversión (en USD)
Componente 1	8,200,000.00
Componente 2	178,000.00
Total de implementación	**8,378,000.00**
Costo de ejecución del programa	795,910.00
Comisión por la Implementación	779,782.35
Costo Total del Programa	**9,953,692.35**

La ejecución del programa, se realizará según el siguiente cronograma de actividades.

Cuadro 5: Resumen del Cronograma del Programa

Hito / Avance	Fechas Esperadas
Envío de Propuesta	Agosto 2018
Aprobación por AF	Octubre 2018
Inicio del Programa	Enero 2019
Revisión intermedia	Enero 2021
Evaluación Final	Enero 2023
Cierre del Programa	Enero 2023

En los anexos de este informe se incluye un presupuesto y cronograma detallado, con notas y aclaraciones a nivel de componentes, resultados esperados, actividades e impactos esperados.

5. Riesgos e Impactos Asociados

En el desarrollo del diseño del Programa, se han analizado los riesgos clave, en conexión con las condiciones específicas de las comunidades beneficiarias. Un resumen de estos riesgos, así como las medidas previstas para evitarlos, reducirlos o evitarlos, se indica a continuación.

Cuadro 6: Matriz de Riesgos y Medidas de Mitigación

Riesgos	Nivel	Medidas de Mitigación	Responsabilidad
Falta de colaboración y de una coordinación adecuada entre entidades ejecutoras.	Medio	Acuerdos operacionales entre los asociados en la ejecución y las agencias con una definición adecuada de funciones y responsabilidades. Diálogo y construcción de consenso.	IDDI, Ministerio de Medio Ambiente, INAPA, INDRHI, Gobernación de SC
Cambios y rotación del personal de las entidades de ejecución pueden afectar el ritmo de las actividades.	Bajo	Capacitación, entrenamiento, información y comunicación. Acuerdos interinstitucionales que contemplen marcos para la designación de personal. Concienciación entre autoridades y fortalecimiento de los grupos destinatarios para la implementación de actividades.	IDDI, Entidades locales
Falta de aceptación y participación de actores clave y grupos objeto, o diferencias entre estos, pueden debilitar y retrasar las actividades.	Medio	Desarrollo de capacidades, capacitación y concienciación. Procesos participativos para promover el compromiso y la inclusión de las partes interesadas. Representación de grupos clave y stakeholders en comités comunitarios y actividades de campo. Mediación en conflictos.	IDDI, Entidades locales, Empresariado local
Los instrumentos que se desarrollen podrían tomar más tiempo para rendir resultados tangibles que la duración del Programa.	Bajo	Priorización de actividades que se pueden diseñar e implementar de manera efectiva dentro de la vida del proyecto. Inclusión de investigación a largo plazo en planes de trabajo institucionales. Sensibilización y cabildeo ante autoridades para la aprobación de incentivos / licencias dentro de un período que garantice un calendario suficiente para llevarlos al terreno.	IDDI, Ministerio de Medio Ambiente, INAPA, INDRHI, Gobernación de SC
Los decisores o políticos priorizan los beneficios económicos sobre los sociales y ambientales.	Bajo	Las actividades del programa integran explícitamente las necesidades de desarrollo social, económico y ambiental en un marco integrador de agricultura resiliente al clima y gestión del agua. El proyecto dará prioridad a las estrategias progresistas de resiliencia que demuestren su impacto en el ingreso.	IDDI
El Congreso está discutiendo una nueva ley que regula el uso de los recursos hídricos.	Medio	Mayor coordinación y comunicación con el Ministerio de Medio Ambiente que coordina la política ambiental y entre los diferentes niveles de gobierno, así como con entidades que trabajan operativamente en las comunidades como el INDRI e INAPA.	IDDI, Ministerio de Medio Ambiente, INAPA, INDRHI

Falta de información a nivel local y reducida sobre muchos aspectos del cambio climático.	Medio	Preparar estudios específicos sobre áreas específicas y/o a nivel comunitario con respecto a las amenazas del cambio climático. El programa prevé la necesidad de iniciar con una evaluación de corto plazo de las actividades e intervenciones prioritarias.	IDDI
Las demoras en el inicio del programa tienen un impacto en el logro de sus productos y resultados, y reducen el alcance para implementar el programa como se indica en la propuesta.	Bajo	Desarrollo de un plan de trabajo detallado para guiar la etapa de incepción.	IDDI
La inseguridad en la zona (bandidaje, huelgas, etc.) puede poner en peligro la implementación y el seguimiento del programa.	Bajo	Cooperación con comunidades y estructuras locales. Cooperación con las organizaciones locales para la ejecución de las actividades. Uso de redes sociales, noticias, y otros medios para crear alertas sobre conflictos sociales.	IDDI
Poca comprensión del programa y sus objetivos por parte del equipo.	Bajo	Asegurar una fuerte participación de los líderes, en particular de las entidades de ejecución y de los actores clave. Apoyo de expertos nacionales. Dialogo y capacitaciones focalizadas para cada grupo objeto.	IDDI
Baja integración de grupos objeto, debido a una baja comprensión del problema del cambio climático.	Bajo	Mayor colaboración con las comunidades beneficiarias. Utilizar enfoques participativos para tomar decisiones. Sensibilización a todos los niveles sobre el cambio climático.	IDDI, Ministerio de Medio Ambiente
Falta de capacidad para cumplir los compromisos financieros, y en particular los recursos, por parte de los socios en la ejecución del programa	Medio	Establecimiento de un diálogo continuo entre los socios, antes y después de la firma del documento del Programa. Asignación de recursos suficientes dentro de la propuesta y los arreglos de implementación para disponer de equipos de trabajo con suficiente capacidad (tanto en términos de su tamaño como de su capacidad técnica), que estén suficientemente integrados en las entidades de ejecución. Establecimiento de objetivos realistas para las contribuciones de los socios.	IDDI, Ministerio de Medio Ambiente
La falta de socios suficientemente calificados	Bajo	Creación y fortalecimiento de capacidades. Cuidadosa identificación y evaluación de los potenciales socios. Colaboración con las comunidades a nivel descentralizado.	IDDI, Gobernación de SC

Al analizar los impactos potenciales del proyecto, así como la magnitud de los riesgos principales que enfrenta el programa. Se concluye que el proyecto es viable desde el punto de vista de sus contribuciones a reducir la vulnerabilidad y aumentar la resiliencia de las comunidades objeto.

6. Conclusiones y Recomendaciones

Conclusiones

1. Las especificaciones técnicas de las intervenciones definidas para el proyecto, se basan en las normas y estándares nacionales. En caso de no disponer de normativas o reglamentos, se han considerado manuales técnicos, guías de buenas prácticas, y referencias internacionales.
2. Según la cantidad, tipo y especificaciones de las intervenciones del programa, se ha preparado un presupuesto y un cronograma de ejecución. Esto incluye un análisis de costos, el plan de desembolsos, y una estrategia de movilización de recursos para la implementación.
3. Los riesgos identificados para el programa no representan desafíos que puedan comprometer su implementación. No obstante, el nivel de riesgo asociados a las intervenciones podría ser alto si no se logran acuerdos de trabajo que incluyan fortalecimiento de capacidades locales.

Recomendaciones

1. Realizar capacitaciones y consultas adicionales con las instituciones y las comunidades, para socializar los estándares de diseño aplicables a las intervenciones del programa. Esto asegura disponer de la normativa actualizada, y que se cierren algunos “gaps” de normativa existentes.
2. Debe procurarse que la ejecución presupuestaria del programa sea muy rigurosa, ya que los componentes técnicos están muy interrelacionados a los económicos. A estos efectos, debe establecerse una línea presupuestaria específica para monitorear y auditar las inversiones.
3. Llevar un Registro de Riesgos que se actualice periódicamente, en intervalos de no menos de 6 meses. En este registro, los riesgos críticos deben ser identificados y analizados. Se deberá incluir también, una revisión de los avances logrados dentro de los acuerdos y contratos.

7. Anexos

Anexo 1: Descripción de los Proyectos

LEVANTAMIENTO COMUNIDADES SAN CRISTOBAL

4,260

57 COMUNIDADES A BENEFICIAR CON LOS SISTEMAS PROPUESTOS

No.	Comunidad	Sistema Actual	Posible Solución	Contacto	OBSERVACIONES	TOTAL PERSONAS INCLUIDAS	HOGARES A SER SERVIDOS CON AGUA POTABLE	HOGARES A SER SERVIDOS CON S. SANEAMIENTO
1	El Caobal	• Tanque de almacenamiento de 250 m3 con poca capacidad para abastecer la población actual. • La línea matríz es de un diametro inferior al requerido. • Redes de tuberìas de 3/4 y 1/2¨ colocada por los comunitarios presentando roturas y empalmes inadecuados. • Cisterna de 144 m3 construída por la comunidad en el año 2012	• Construir la lìnea matrìz con mayor diámetro. • Construir un tanque de almacenamiento de mayor capacidad. • Rehabilitar la red existente. • Ampliar la red para abastecer otras comunidades. • Organizar, formar y capacitar una ASOCAR.	• Sr. Diego Agramonte (Arcadio), Operador INAPA, (829) 368-6403. • Sr. Blas de León, (809) 474-3020, Presidente de la Junta de Vecino María Trinidad Sánchez	Con la rehabilitación del multiple El Caobal se estaría beneficiando a ocho comunidades: Cuco, Delgado, Puyenes, Los Mosquitos, La Yaguita, Domingo, Peleopoldo y Los Pinedas. Incluir sistema de saneamiento.	12,500	2,500	1,200
2	Loma Verde	• Obra de toma deteriorada por las lluvias ubicada en la loma El Aguacero. • Redes de tuberìas de diametro de 6¨, 4¨ y 2¨con roturas y muchas averías. • Planta de tratamiento sin operar. • Tanque de almacenamiento deteriorado	• Rehabilitar la obra de toma. • Rehabilitar la red de tuberia existente. • Rehabilitar planta de tratamiento. • Rehabilitar tanque de almacenamiento. • Organizar, formar y capacitar una ASOCAR	• Sr. Martin Suero Lorenzo (Beato), Plomero.	Incluir sistema de saneamiento.	3,500	700	450
3	Castaño	• Dos pozos con dos tomas publicas para toda la comunidad. • La comunidad comprò dos terrenos, uno por 90,000.00 pesos para la construcciòn del tanque de almacenamiento y otro por 30,000.00 pesos para la construcciòn del local de la ASOCAR. • Tienen una ASOCAR . • Disponen de una fuente en el río Jibanà.	Construir un acueducto multiple	• Sr. Alejandro Castillo Jimènez, vocal alacaldía de Medina, (849) 354-9059. • Sra. Dominga de Jesús, Secretaria de la ASOCAR (829) 366-8882. • Sr. Mario Torres, Presidente ASOCAR (829) 331-2113. • Sr. Ambrosio Torres, Presidente del Comité de Desarrollo de Castaño(CODECA) (809) 428-8405	Con la construcción del multiple de Castaño se estaría beneficiando a ocho comunidades: Castaño, Los Jesús, Nuñez Abajo, Los Mejías, Vietnan, La Cuaba, La Cuabita y una parte de Loma Verde. La comunidad tiene almacenado una cantidad considerable de tubos de diferentes diametros. Incluir sistema de saneamiento.	3,250	650	400
4	Algarrobo	Dos pozos, constuído por la alcaldía en el 2012, con dos tomas publicas. Una cisterna para almacenar agua en caso de emergencia.	• Construir un acueducto. • Formar una ASOCAR	• Sr. Ernesto Guillen Doñé (Guebito), presidente Junta de Vecino Amor y Paz (829) 428-1152. • Sra. Zunilda Altagracia Pineda, Promotora de salud (829) 338-2496	Incluir sistema de saneamiento.	900	180	120

LEVANTAMIENTO COMUNIDADES SAN CRISTOBAL

4,260

57 COMUNIDADES A BENEFICIAR CON LOS SISTEMAS PROPUESTOS

No.	Comunidad	Sistema Actual	Posible Solución	Contacto	OBSERVACIONES	TOTAL PERSONAS INCLUIDAS	HOGARES A SER SERVIDOS CON AGUA POTABLE	HOGARES A SER SERVIDOS CON S. SANEAMIENTO
5	El Fundo	• Planta de tratamiento a medio construir, con más de tres años de iniciada. • Obra de toma en el Arroyo Galán deteriorada.	• Construir la red. Rehabilitar la obra de toma. • Terminar la construcción de la planta de tratamiento. • Formar una ASOCAR	• Sra. Victorina Doñé Reyes vice sindica del distrito municpal Medina (809) 776-6439	Con la construcción del multiple de El Fundo se estaría beneficiando a ocho comunidades: El Fundo, Toronja, Esperanza, Juanita, Medina Abajo, La Sabana, Pachín y Juliana Abajo. Incluir sistema de saneamiento.	200	40	35
6	Mucha Agua	• Cisterna construída en el año 1988. • 1,400 ml de mangueras donada por ADRA. • Terreno para construir el tanque de almacenamiento	• Evaluar los nacimientos de Paso Seco y Humachón. • Construir un acueducto multiple. • Formar una ASOCAR.	• Sr. Modesto Guzmán (Edward), Presidente Junta de Vecinos La Unión (829) 797-9927. • Sr. Hipolito Lorenzo, tesorero (829) 569-9140. • Sra. Santa Guzmán Lachapell, vocal (829) 731-4755. • Sr. Santos Robles, asesor de la Junta de Vecinos (829) 410-2234	Con la construcción del multiple de Mucha Agua se estaría beneficiando a nueve comunidades: Mucha Agua, Jicotea, Juan Román, La Pangola, El Arroyo, El Alto, El Limón, El Firme y La Carrelilla. Incluir sistema de saneamiento.	5000	1,000	600
7	La Cole	• Dos posibles fuentes para la obra de toma.	• Evaluar las fuentes. • Construir un acueducto multiple. • Formar una ASOCAR.	• Sr. Regino Medina (Bertico), presidente Junta de Vecinos, (829) 527-5701. • Sr. Federico medina, Presidente Asociación Caficultores La Cole, (829) 865-4979	Con la construcción del multiple de La Cole se estaría beneficiando a cinco comunidades: La Cole, La Estancia, Tasasjera, Los Jugadeors, Queen y El Macao. En tiempo de zafra estas comunidades tienen una poblaciòn flotantes de 600 personas que deben ser consideradas a la hora de hacer el diseño del acueducto. Incluir sistema de saneamiento.	2,000	400	300
8	San Francisco	• Tanque de almacenamiento sin protecciòn de 50 m3. • Seis cruces de cañadas deteriorados. • Tuberías a flor de tierra y con roturas.	• Rehabilitar el tanque de almacenamiento y hacer protecciòn. • Rehabilitar la obra de toma. • Rehabilitar y anclar los cruces de cañadas. • Cambiar la red de tubería.	Sr. Pedro Suero, Enc. Operación INAPA, (829) 493-4727. (829) 961-3559	Incluir sistema de saneamiento.	500	100	90

LEVANTAMIENTO COMUNIDADES SAN CRISTOBAL

4,260

57 COMUNIDADES A BENEFICIAR CON LOS SISTEMAS PROPUESTOS

No.	Comunidad	Sistema Actual	Posible Solución	Contacto	OBSERVACIONES	TOTAL PERSONAS INCLUIDAS	HOGARES A SER SERVIDOS CON AGUA POTABLE	HOGARES A SER SERVIDOS CON S. SANEAMIENTO
9	Najayo	• Un acueducto en HG construído hace más de 50 años (Trujillo), completamente obsoleto. • Un tanque de almacenamiento deteriorado y no tiene la capacidad para abastecer la población actual. • Una red de tubería en pvc interrumpida en varios tramos desde la carcel hasta la comunidad La Capilla.	• Construir un campo de pozo. • Construir un tanque de almacenamiento en un terreno donado por un comunitario. • Hacer una torre de partición. • Rehabilitar dos tanques de almacenamiento existente. • Construir una línea matriz y una red de distribución. • Instalar las acometidas domiciliarias. • Conformar una ASOCAR	•Alcalde Eusebio Isabel (Macho Nina), (849) 630-3382. •Sr. Francisco De Los Santos, Presidente Junta de Vecinos El Progreso	Con la construcción del multiple de Najayo se estaría beneficiando a diez comunidades: Najayo, La Victorina, La Panadería, Pozo Prieto, Tierra Amarilla, Los Refugios, La Capilla, El Cayejón, La Penca, El Fuerte de Resolí.	4,000	800	400
10	Arroyo Higuero	• Tuberia colocadas por la comunidad de semipresiòn, de diferentes diametros, presentando multiples roturas y empalmado con gomas. • La obra de toma existente tiene mucha sedimentaciòn • Una tanquilla de 8m3 de almacenamiento de agua, la cual muestra problema de calidad por el tiempo de retención. • La comunidad dispone de terreno para la construcción de un tanque de almacenamiento. • La fuente disponible tiene suficiente en Arroyo Higuero, Arroyo María y el afluente de Yubazo.	• Construir un acueducto. • Tanque de almacenamiento. • Mover la obra de toma màs arriba construyendo una cajuela y colocarle un filtro.	•Sr. Felipe Pula Lorenzo. Operador nocturno acueducto Cambita (809) 767-9863. •Sr. Bautista Mota Félix, (809) 883-4025 Miembro dela Junta de Vecino Arroyo Higuero.		450	90	90

Anexo 2: Presupuesto de Inversiones

Annex 2 Total Budget and Output-level Notes (in USD)

Description		Total	Y1	Y2	Y3	Y4	Notes
Outcome 1: Implemented climate resilient management of water resources by 30 small rural communities of San Cristóbal							
Output 1.1 Community water supply and sanitation management plans developed for 30 communities to incorporate climate change-related risks							
	Local expert	31,200.00 ok	7,800.00	7,800.00	7,800.00	7,800.00	20% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	19,800.00 ok	4,950.00	4,950.00	4,950.00	4,950.00	15% of Field Coordinator @ $2,750/month x 48 months.
	Goods and services	29,695.00 ok	12,595.00	5,700.00	5,700.00	5,700.00	Meeting organization and venue costs for communities, government and key local institutions. 7 training events @ $2,850/event + short-time consultancy on planning @ $9,745
	Travel	8,750.00 ok	1,250.00	2,500.00	2,500.00	2,500.00	Travel support for workers and community members to attend workshops to develop community water supply and management plans @ $1,250/event.
	Travel	24,000.00 ok	6,000.00	6,000.00	6,000.00	6,000.00	12.9% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.1		**113,445.00**	**32,595.00**	**26,950.00**	**26,950.00**	**26,950.00**	
Output 1.2: Water supply increased for 30 small communities under change climate impacts							
	Local expert	70,200.00 ok	17,550.00	17,550.00	17,550.00	17,550.00	45% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	79,200.00 ok	19,800.00	19,800.00	19,800.00	19,800.00	60% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	50,400.00 ok	15,120.00	20,160.00	15,120.00	-	70% of Community Specialist @ $2,400/month x 30 months.
	Goods and services	6,133,830.00 ok	613,383.00	1,840,149.00	2,453,532.00	1,226,766.00	Detailed design, implementation and community training for: water supply for 4,260 households @ $725.11/home + doméstic sanitation sercives for 2,695 households @ $941.11/home.
	Travel	84,000.00 ok	12,000.00	24,000.00	24,000.00	24,000.00	45.2% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.2		**6,417,630.00**	**677,853.00**	**1,921,659.00**	**2,530,002.00**	**1,288,116.00**	
Output 1.3: Measures for water conservation under climate impacts implemented for 2,722 hectares							
	Local expert	39,000.00 ok	9,750.00	9,750.00	9,750.00	9,750.00	25% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	26,400.00 ok	6,600.00	6,600.00	6,600.00	6,600.00	20% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	21,600.00 ok	6,480.00	8,640.00	6,480.00	-	30% of Community Specialist @ $2,400/month x 30 months.
	Goods and services	1,518,925.00 ok	151,892.50	455,677.50	607,570.00	303,785.00	Detailed design, implementation and community training for re-afforestation schemes for 2,722 ha @ $558.02/ha.
	Travel	63,000.00 ok	9,000.00	18,000.00	18,000.00	18,000.00	33.9% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.3		**1,668,925.00**	**183,722.50**	**498,667.50**	**648,400.00**	**338,135.00**	
TOTAL OUTCOME 1		**8,200,000.00**	**894,170.50**	**2,447,276.50**	**3,205,352.00**	**1,653,201.00**	

Annex 1. Total Budget and Output-level Notes (in USD)

Description		Total	Y1	Y2	Y3	Y4	Notes
Outcome 2: Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according their respective competences							
Output 2.1: A set of manual and other materials on best practices for water and sanitation management are developed, including a fully operational website							
	Local expert	4,500.00 ok	-	-	-	4,500.00	12.5% of Communications Expert @ $3,000/month x 12 months.
	Goods and services	8,550.00 ok	-	-	-	8,550.00	Meeting organization and venue costs for communities, government and key local institutions. 3 training events @ $2,850/event.
	Goods and services	3,750.00 ok	-	-	-	3,750.00	Travel support for workers and community members to attend workshops on best practices for resilient water and sanitation management @ $1,250/event.
	Goods and services	3,500.00 ok	-	-	-	3,500.00	Detailed design, implementation and training for: a fully operational website and relevant social networking and social media.
	Goods and services	8,700.00 ok	-	-	-	8,700.00	Promo materials, including printing, broadcasting and social media.
	Travel	15,000.00 ok	-	3,000.00	6,000.00	6,000.00	8.1% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 2.1		**44,000.00**	**-**	**3,000.00**	**6,000.00**	**35,000.00**	
Output 2.2: A Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal							
	Goods and services	6,000.00 ok	1,500.00	1,500.00	1,500.00	1,500.00	4 annual meetings with ministries and other policy-makers @1,500 $/meeting
	Local expert	14,000.00 ok	3,500.00	3,500.00	3,500.00	3,500.00	Local expert @ $350/day x 10 days x annual meeting.
	Travel	12,000.00 ok	3,000.00	3,000.00	3,000.00	3,000.00	Travel support for top institutional members to attend high level meetings @ $3,000/meeting.
Sub total Output 2.2		**32,000.00**	**8,000.00**	**8,000.00**	**8,000.00**	**8,000.00**	
Output 2.3: Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihoods activities institutionalized in 30 communities							
	Local expert	15,600.00 ok	3,900.00	3,900.00	3,900.00	3,900.00	10% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	6,600.00 ok	1,650.00	1,650.00	1,650.00	1,650.00	5% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	31,500.00 ok	-	-	-	31,500.00	87.5% of Communications Expert @ $3,000/month x 12 months.
	Goods and services	19,950.00 ok	-	5,700.00	5,700.00	8,550.00	Meeting organization and venue costs for communities, government and key local institutions. 7 training events @ $2,850/event.
	Goods and services	8,750.00 ok	-	2,500.00	2,500.00	3,750.00	Community planning workshops: Travel support for workers and community members to attend workshops to develop community water supply and management plans @ $1,250/event.
	Goods and services	19,600.00 ok	-	-	-	19,600.00	Promo materials, including printing, broadcasting and social media.
Sub total Output 2.3		**102,000.00**	**5,550.00**	**13,750.00**	**13,750.00**	**68,950.00**	
TOTAL OUTCOME 2		**178,000.00**	**13,550.00**	**24,750.00**	**27,750.00**	**111,950.00**	

Annex 1. Total Budget and Output-level Notes (in USD)

Description	Total	Y1	Y2	Y3	Y4	Notes
Programme Implementation / Execution						
Total Implementation Cost	**8,378,000.00**	**907,720.50**	**2,472,026.50**	**3,233,102.00**	**1,765,151.00**	
Programme Execution Costs	795,910.00	251,530.00	179,080.00	181,460.00	183,840.00	Less than or equal to 9.50%
Total Programme Costs	**9,173,910.00**	**1,159,250.50**	**2,651,106.50**	**3,414,562.00**	**1,948,991.00**	
Implementing Entity Fee	779,782.35					Less than or equal to 8.50%
Total Amount Requested	**9,953,692.35**					

Anexo 3: Cronograma de Actividades

Annex 3. Project Plan and Gantt Chart

	Activity	Y1				Y2				Y3				Y4			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Programme Inception																
Outcome 1: Implemented climate resilient management of water resources by 30 small communities of San Cristóbal																	
1.1	**Community water supply and management plans developed for 30 small communities to incorporate climate change-related risks (Output 1.1)**																
1.1.1	Series of training workshops																
1.1.2	Community plans established via participatory approaches																
1.1.3	Support to communities in the continued evolution and implementation of the plans by the programme																
1.1.4	Periodical workshops for all communities																
1.2	**Water supply increased fo 30 communities under climate impacts (Output 1.2)**																
1.2.1	Design and construction of water supply and storage infrastructure and training of communities in use and maintenance of this																
1.2.2	Support to communities in the use and maintenance of infrastructure by the programme																
1.4	**Measures for water conservation under climate impacts implemented for 2,722 hectares (Output 1.3)**																
1.4.1	Design and development of reafforestation schemes and training of communities in use and maintenance of this																
1.4.2	Support to communities iin the ongoing management of schemes by the programme																
Outcome 2: Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according their respective competences																	
2.1	**A set of manual and other materials on best practices for water management and resilient livelihood are developed, including a fully operational website (Output 3.1)**																
2.1.1	Identification and documentation of best practices																
2.1.2	Dissemination of best practices																
2.1.3	Production and printing of lessons learnt documentation																
2.2	**A Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal (Output 3.2)**																
2.2.1	High level validation workshops ensuring ministerial level adoption of the plans and the importance of integrating these into community level plans																
2.2.2	Ongoing technical support and regular meetings to reach committee long-term development																
2.3	**Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihoods activities institutionalized in 8 municipalities (Output 3.3)**																
2.3.1	Production and printing of lessons learnt documentation																
2.3.2	Dissemination events																
3. Programme Implementation / Execution																	
3.1	**Programme Management Unit Established and Operational**																
3.1.1	Programme Staff Recruited																
3.1.2	Office facilities established																
3.1.3	Management Unit operational																
3.1.4	Establish programme exit strategy																
3.2	**Programme Monitoring and Evaluation**																
3.2.1	Inception report																
3.2.2	Quarterly reporting																
3.2.3	Continuous monitoring of activitiesn the ground																
3.2.4	Annual audits																
3.2.5	Programme evaluation (2)																
3.2.6	Programme Technical Report																

Anexo 4: Flujo de Caja (Desembolsos)

Annex 4. Disbursement Schedule

	Upon signature of Agreement	1st Disbursement	One Year after Project Start	Year 3	Year 4	Total
Schedule date	Jan-19		Jan-20	Jan-21	Jan-22	
Programme funds		718,673.46	2,818,412.18	3,757,882.91	1,878,941.45	9,173,910.00
Implementing Entity Fee	233,934.71	42,761.07	167,695.52	223,594.03	111,797.02	779,782.35
Total	**233,934.71**	**761,434.53**	**2,986,107.71**	**3,981,476.94**	**1,990,738.47**	**9,953,692.35**

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Project Proposal Development

Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme

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Informe 3:
Impacto Socioeconómico y Medioambiental

Este informe contiene la información relativa a los impactos socioeconómicos y medioambientales del programa, y la medida en que sus intervenciones son compatibles con lo establecido en las normas nacionales en materia de medio ambiente, gestión de riesgos, cambio climático y participación comunitaria. Así también, en el documento se desarrollan todos los elementos incluidos en la Política Social y Ambiental del Fondo de Adaptación, y en su Política de Género.

Elaborado por:

Brightline Institute, Inc.
proyectos@brins.org

Encargado por:

Instituto Dominicano de Desarrollo Integral (IDDI)

Fecha: 10 de diciembre del 2017

Contenido

Índice Extenso

Lista de Figuras

Lista de Tablas

1. Objetivos, metodología y resultados esperados

1.1 Objetivos

- Identificar y categorizar los impactos del programa propuesto.
- Evaluar los impactos socioeconómicos y medioambientales.
- Describir medidas de mitigación y/o reducción de impactos negativos.
- Proponer el plan de manejo y adecuación ambiental del programa.
- Identificar indicadores clave para el monitoreo y seguimiento.
- Revisar el cumplimiento de los criterios de participación pública.
- Establecer mecanismos adecuados para la resolución de disputas.
- Proponer alternativas para asegurar la sostenibilidad del programa.

1.2 Metodología

La metodología utilizada se basa en la combinación de informaciones y análisis relevantes a:

- Metodologías de evaluación de impactos medioambientales y socioeconómicos.
- Los criterios establecidos en la Política Social y Ambiental del Fondo de Adaptación.
- Los criterios establecidos en la Ley 64-00 sobre medio ambiente y recursos naturales.
- Normas, reglamentos y resoluciones del Ministerio de Medio Ambiente y Recursos Naturales.

Los aspectos anteriormente citados se reúnen en distintas matrices, de forma que se pueda evaluar como el programa se ajusta a los criterios y directrices del Fondo de Adaptación.

1.3 Resultados Esperados

Demostrar que el programa propuesto se ajusta a los criterios establecidos en la *Política Ambiental y Social* del Fondo de Adaptación, y que respeta la normativa local sobre evaluación ambiental y social, establecida por el Ministerio de Medio Ambiente y Recursos Naturales.

2. Declaración del Promotor

DECLARACIÓN DE ACEPTACIÓN

Declaramos haber leído, y al efecto aceptamos sin reservas, los resultados del estudio de impactos socioeconómicos y medioambientales, así como el programa de manejo y adecuación ambiental del programa ***Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural (ClimaComunidad)***. Reconocemos que el alcance del programa, en cuanto a las actividades por fase y los impactos que puedan generarse por su ejecución, se corresponden con lo especificado en el presente documento. Así también, nos hacemos responsables de realizar las actividades y/o implementar las medidas que sean necesarias para evitar, mitigar, corregir o neutralizar cualquier impacto negativo no previsto. Esto incluye, pero no se limita a, los permisos que sean emitidos a favor del proyecto y sus disposiciones, las regulaciones y normativas ambientales que apliquen, y también las disposiciones emanadas del Ministerio de Medio Ambiente y Recursos Naturales.

David Luther

Director Ejecutivo

Firmado en dos (2) originales, igualmente válidos, en el Municipio Santo Domingo Oeste, Provincia Santo Domingo, a los veinte (20) días del mes de diciembre del año dos mil diecisiete (2017).

3. Resumen Ejecutivo

A. DESCRIPCIÓN DEL PROYECTO

El Programa denominado "Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural (ClimaComunidad)" busca abordar los impactos negativos que tendrán las variaciones previstas de temperatura y precipitación en San Cristóbal, en términos de gestión hídrica, mayor número de días calurosos, periodos de sequía más largos, incremento de la ocurrencia de sequías, y mayor intensidad de lluvias en períodos más cortos. Estas amenazas aumentarán la vulnerabilidad de la población rural, especialmente para los pequeños productores y los hogares más pobres.

El principal objetivo del Programa es aumentar la resiliencia y la capacidad adaptativa de los medios de subsistencia rurales a los impactos climáticos y los riesgos sobre los recursos hídricos en la Provincia de San Cristóbal. Este objetivo se logrará a través de acciones concretas enfocadas en mejorar el acceso al agua, aumentar la capacidad institucional y comunitaria, y la coordinación para la gestión integrada del agua que incluya otros usos de los recursos hídricos, especialmente para la diversificación de los medios de vida de las comunidades rurales.

El Promotor del programa es: **Instituto Dominicano de Desarrollo Integral (IDDI)**
Dirección: Calle H #17, esquina Diagonal
Zona Industrial de Herrera, Santo Domingo Oeste
web: www.iddi.org
t.: +1 809 534-1077
e.: info@iddi.org

El IDDI será el implementador del programa. En la parte de ejecución, actuarán el Ministerio de Medio Ambiente y Recursos Naturales, el Instituyo Nacional de Agua Potable y Alcantarillados (INAPA), y el Instituto Dominicano de Recursos Hidráulicos (INDRHI). A nivel operacional, se ha contemplado trabajar con organizaciones comunitarias de base y con ONGs con presencia el área.

B. LOCALIZACIÓN DEL PROYECTO

El proyecto incluirá comunidades rurales de la Provincia San Cristóbal. Administrativamente, las intervenciones previstas se localizarán en comunidades de Los Cacaos, Medina, Cambita Garabitos, El Pueblecito, Hato Damas, Villa Altagracia, La Cuchilla y San José del Puerto.

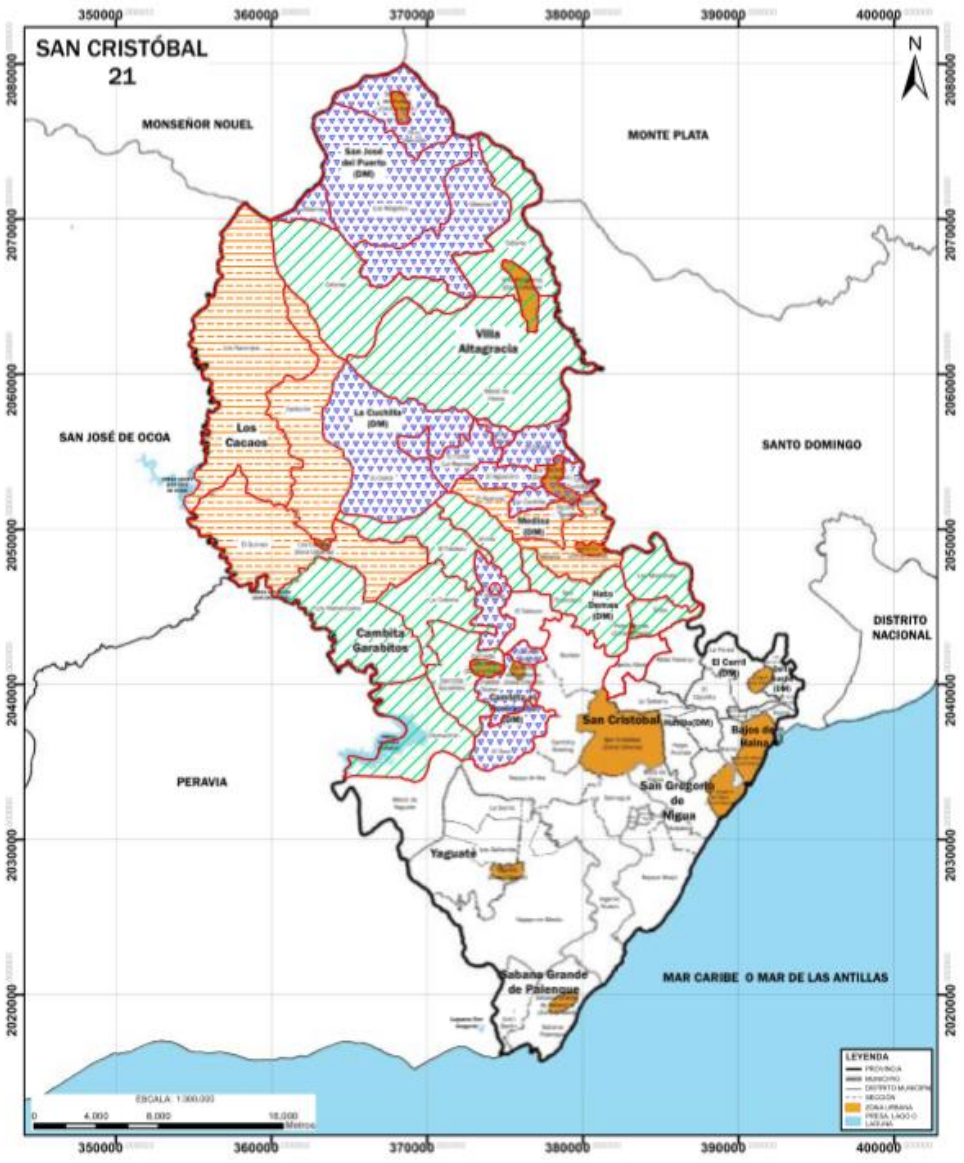

Figura A: Ubicación de las Comunidades a ser Incluidas el Programa

C. COMPONENTES DEL PROYECTO

Para el logro de los objetivos del proyecto, se contemplan las siguientes intervenciones.

Cuadro A: Listado de Comunidades Potenciales de Incluir en el Programa

Componente	Intervención	Cantidad	Unidad
1. Implementación a nivel comunitario de actividades de gestión de recursos hídricos resilientes al clima.	1.1 Planes comunitarios de abastecimiento y gestión del agua que incorporen los riesgos relacionados con el cambio climático.	8	Municipalidades

	1.2 Incremento en el suministro de agua para múltiples usos y usuarios durante períodos de escasez bajo impactos del cambio climático.	30	Comunidades
	1.3 Instalación de sistemas de riego a pequeña escala. Creación/ fortalecimiento de asociaciones de usuarios del agua para gestionar los sistemas y aumentar la eficiencia del uso del agua bajo condiciones de estrés climático.	30	Comunidades
	1.4 Medidas para la conservación del agua bajo impactos climáticos (cuenca/ ribera, esquemas de re-aforestación).	400	Hectáreas
2 Diversificación de medios de subsistencia de comunidades rurales bajo cambio climático.	2.1 Mejoramiento de la infraestructura de distribución de agua (como canales, tuberías, etc.) para adaptación y uso en sistemas agrícolas existentes.	8	Municipalidades
	2.2 Se crean o mejoran las actividades de estación seca y esquemas de procesamiento agrícola para mujeres (como miel, orquídeas o artesanía), para adaptarse al cambio climático.	20	Comunidades
	2.3 Establecimiento y gestión de viveros y lotes forestales para la gestión de riesgos climáticos (como rehabilitación de llanuras de inundación, laderas, cuencas, etc.).	20	Comunidades
	2.4 Establecimiento y apoyo de granjas demostrativas de peces	20	Comunidades
3 Creación de capacidades y desarrollo de capacidades en instituciones clave y en comunidades para gestionar los riesgos relacionados con el cambio climático a largo plazo	3.1 Desarrolla de un conjunto de manuales y otros materiales sobre las mejores prácticas para la gestión del agua y los medios de subsistencia resilientes, incluido un sitio web plenamente operativo.	¿?	Comunidades Instituciones Organizaciones Cooperación Empresas
	3.2 Establecimiento del Comité Provincial de Adaptación al Cambio Climático.	1	San Cristóbal
	3.3 Institucionalización de plataformas de aprendizaje y sistemas para integrar los riesgos relacionados con el cambio climático en la gestión comunitaria de recursos hídricos y actividades de medios de subsistencia.	8	Municipalidades

D. INVERSIONES DEL PROGRAMA

El valor del programa, se estima preliminarmente en US$ 9,953,692.35 (aproximadamente RD$ 481,261,025.10, calculados a una tasa de 48.3500 US$/RD$). Dichos recursos, serán provistos en su totalidad por el Fondo de Adaptación. Un valor adicional no cuantificado, se relaciona con los aportes de la comunidad (como terrenos, mano de obra, instalaciones, etc.) y de las instituciones.

E. PRINCIPALES ACTIVIDADES

Las actividades a desarrollarse por el programa son las siguientes:

- **Construcción de obras de infraestructura**: se refiere al conjunto de operaciones, trabajos y labores destinadas a la construcción, rehabilitación y actualización de obras para el suministro, tratamiento, almacenamiento y distribución de agua para consumo humano y productivo.
- **Establecimiento de instalaciones productivas**: son las acciones a establecer para que las comunidades beneficiarias puedan hacer más resilientes sus medios de subsistencia y poder así diversificar su ingreso. Estas facilidades pueden ser desde apiarios hasta granjas para peces.
- **Actividades de conservación de agua**: son medidas para la conservación y preservación de los recursos hídricos a nivel de comunidad, y bajo escenarios de estrés climático. Esta actividad puede incluir manejo de micro-cuencas, esquemas re-aforestación y siembra de agua.
- **Capacitación y Entrenamiento**: el programa tiene una alta orientación hacia la creación y fortalecimiento de capacidades de las comunidades y su tejido social, tanto para la gestión de sus recursos hídricos como para aumentar la resiliencia de sus medios de subsistencia.
- **Diseminación y socialización**: el programa tiene como objetivo crear estructuras que puedan asegurar su sostenibilidad en el largo plazo. Para esto, trabajará la creación y difusión de materiales educativos y promocionales, incluyendo guías de buenas prácticas y un sitio web. También se incluirá la participación en actividades nacionales e internacionales relevantes.

F. IMPACTOS IDENTIFICADOS

El proyecto presenta un conjunto de impactos típicos a la construcción de infraestructura y la operación las facilidades previstas. Los impactos identificados por cada fase son los siguientes:

Cuadro B: Impactos Identificados en la Fase de Construcción

Componente	Actividades
Suelo y Aire	- Levantamiento topográfico del solar - Remoción de vegetación y capa vegetal - Marcado y replanteo de edificaciones

	- Construcción de infraestructuras - Construcción de caminos y accesos - infraestructura de servicios
Aire	- Movimiento de material removido - Adecuación de vías y accesos - Movimiento de equipos de motor
Aire y Agua	- Levantamiento del material particulado - Transporte de material removido - Producción de aguas sanitarias - Aumento en la demanda de agua
Flora y Fauna	- Adecuación del terreno - Construcción de edificaciones
Paisaje	- Maquinaria para infraestructuras - Estructuras en construcción - Señalización - Presencia de maquinarias y equipos
Socioeconómico	- Contratación de personal - Pago de arbitrios e impuestos - Compras locales: insumos y materiales

Cuadro C: Impactos Identificados en la Fase de Operación

Actividades	Componente
- Operación de equipos y maquinaria - Tránsito de camiones - Utilización de quipos de mantenimiento - Implementación de equipos	**Aire**
- Aguas sanitarias domesticas - Aguas residuales de proceso	**Agua**
- Extracción de materiales - Recuperación de áreas minadas	**Suelo**
- Siembra de especies pre-existentes - Mantenimiento de áreas verdes	**Flora y Fauna**
- Contratación de personal - Capacitación y entrenamiento	**Socioeconómico**

- Responsabilidad social	

Otros impactos menores han sido analizados e incluidos dentro del Programa de Manejo y Adecuación Ambiental (PMAA) del programa y el plan de gestión de riesgos del mismo.

G. PARTICIPACIÓN SOCIAL

De conformidad con lo establecido en la normativa ambiental vigente, el proyecto ha realizado un análisis de interesados y ha concluido un proceso de consulta pública. El mismo ha incluido talleres de socialización y realización de encuestas en la comunidad cercana. Los resultados de dicho proceso indican que la comunidad no se opone al proyecto, y muy por el contrario lo apoya.


Figura B: Actividades de Consulta con la Comunidad (Dic.2017)

En adición, tal y como lo requiere el Ministerio de Medio Ambiente y Recursos Naturales, se ha diseñado el letrero informativo del programa, en cual será colocado en las vías de acceso a los sitios de intervención. En adición, se pondrá –a disposición de los interesados y comunitarios- los números de contacto del: Viceministerio de Gestión Ambiental y/o la Dirección de Participación Social del Ministerio de Medio Ambiente y Recursos Naturales, al teléfono 809-567-4300.

H. IMPACTOS IDENTIFICADOS

Cuadro D: Matriz de Valoración Cuantitativa de Impactos en la Construcción

Medio	Impacto	Tipo	Magnitud	Alcance	Plazos	Persistencia	Reversibilidad	Sinergia	Importancia
Suelo	Cambios en el perfil topográfico	-	1	1	1	2	2	2	-12
	Impermeabilización de suelos	-	1	1	1	2	2	1	-11
	Pérdida de capa vegetal	-	1	1	1	2	2	2	-12
	Contaminación por hidrocarburos	-	1	1	1	1	1	1	-9

Aire	Producción de polvo furtivo	-	1	1	1	1	1	2	-10
	Emisiones de gases/combustión	-	1	1	1	1	1	2	-10
	Generación de Ruido	-	1	1	1	1	1	2	-10
Agua	Afectación de aguas subterráneas	n/A							
	Afectación de aguas superficiales	n/A							
Flora	Desmonte de vegetación	n/A							
Socioeconómico	Afectación del tránsito local	-	1	1	1	1	1	1	-9
	Mejora de la economía local	+	3	3	3	2	1	2	23
	Dinamismo de la economía local	+	2	2	2	1	1	2	16
	Mejora de la calidad de vida	+	2	2	2	1	1	2	16
	Aumento de la oferta de empleo	+	2	2	2	1	1	2	16
	Mejora infraestructura servicios	+	3	2	3	2	1	2	21
Impactos Positivos		92							
Impactos Negativos		-83							
Balance de Impactos		5							

Esta valoración indica que los impactos positivos de las intervenciones del programa son ligeramente superiores a sus efectos negativos, cuando se analizan con un criterio cuantitativo. No obstante, los impactos no incluidos (por no ser significantes o relevantes) son igualmente incluidos en los mecanismos de monitoreo, en caso que existan elementos o efectos no previstos.

Cuadro E: Matriz de Valoración Cualitativa de Impactos en la Construcción

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Ruido	Fauna Personas	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	No	Simple	No	Bajo
Gases Vehiculares	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Simple	No	Bajo

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Polvo furtivo	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Acumulativo	No	Bajo
Pérdida de Capa Vegetal	Suelo Flora	Neg.	Bajo	Puntual	Corto plazo	Permanente	Reversible	Si	Si	Acumulativo	Continuo	Bajo
Residuos	Suelo Agua	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	No	Simple	No	Bajo
Impermeabilización del Suelo	Suelo Agua	Neg.	Bajo	Puntual	Corto plazo	Permanente	Irreversible	No	No	Simple	Continuo	Bajo
Cambios en la Topografía	Suelo	Neg.	Bajo	Puntual	Corto plazo	Permanente	Irreversible	No	Si	Simple	Continuo	Bajo
Desmonte Vegetación	Flora	n/A	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Simple	Continuo	Bajo
Empleos	Personas	Pos.	Alto	Extenso	Corto plazo	Temporal	Corto plazo	Si	Si	Simple	Continuo	Alto
Socioeconómico	Gobierno	Pos.	Alto	Parcial	Corto plazo	Temporal	Corto plazo	No	Si	Acumulativo	Continuo	Alto

Esta valoración indica que los impactos positivos de las intervenciones del programa son ampliamente superiores a sus potenciales efectos negativos, desde el punto de vida cualitativo. Esto es particularmente importante para establecer una correcta relación proyecto-comunidad.

Cuadro F: Matriz de Valoración Cuantitativa de Impactos en la Etapa de Operación

Medio	Impacto	Tipo	Magnitud	Alcance	Plazos	Persistencia	Reversibilidad	Sinergia	Importancia
Suelo	Contaminación de suelos	-	2	1	2	1	1	2	-14
Aire	Producción de polvo furtivo	-	2	1	1	1	1	2	-10
	Emisiones de gases/combustión	-	1	2	1	1	1	2	-12
	Generación de Ruido	-	1	2	1	1	1	2	-12
Agua	Presión sobre el medio hídrico	-	1	1	1	1	1	2	-10
Flora	Recuperación de vegetación	+	2	1	3	2	1	2	16
Socioeconómico	Afectación del tránsito local	-	1	1	1	2	1	2	-11
	Mejora de la economía local	+	2	2	3	2	1	2	18
	Mejora de la calidad de vida	+	2	2	3	2	1	2	18
	Aumento de la oferta de empleo	+	2	2	2	2	1	2	17
	Mejora visual e inmobiliaria	+	2	2	3	2	1	2	18
Impactos Positivos		+87							
Impactos Negativos		-69							
Balance de Impactos		+18							

Los efectos positivos en la fase de operación superan los potenciales efectos negativos; en especial porque las intervenciones son relativamente sencillas, se trabajará directamente con y para la comunidad, por los aportes al empleo, dinamización económica, y aumento en el valor de la tierra. Esto es fundamentalmente importante porque demuestra que, a la luz de la información

propia de la operación del programa y de data oficial relevante, este se mantiene como una actividad sostenible, generadora de bajos impactos, y que cumple con las leyes y las normas.

Cuadro G: Matriz de Valoración Cualitativa de Impactos en la Operación

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Contaminación de Suelos	Suelo Agua	Neg.	Bajo	Puntual	Corto plazo	Temporal	Corto plazo	Si	Si	Acumulativo	No	Medio
Gases Vehiculares	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Acumulable	No	Bajo
Generación de Ruido	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	No	Simple	No	Bajo
Presión sobre Medio Hídrico	Agua	Neg.	Bajo	Puntual	Corto plazo	Permanente	Corto plazo	Si	No	Simple	Continuo	Bajo
Contaminación Hídrica	Agua	Neg.	Bajo	Puntual	Corto plazo	Permanente	Corto plazo	Si	No	Simple	Continuo	Media
Recuperación de Vegetación	Flora	Pos.	Medio	Puntual	Corto plazo	Permanente	Reversible	Si	Si	Acumulativo	Continuo	Alta
Generación de Empleos	Personas	Pos.	Alto	Parcial	Largo plazo	Permanente	Corto plazo	n/A	Si	Simple	Continuo	Alto

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Socioeconómico	Gobierno	Pos.	Alto	Extenso	Largo plazo	Permanente	Corto plazo	n/A	Si	Acumulativo	Continuo	Alto

Realizado por el equipo del proyecto (noviembre, 2017).

Esta valoración indica que los impactos positivos en las operaciones propuestas del programa son ampliamente superiores a sus efectos negativos, cuando se analizan con un criterio cualitativo.

I. IMPACTO SOCIOECONÓMICO

- Mejora de la economía local: El desarrollo de proyectos de construcción o de instalación de facilidades productivas, en general, siempre trae dinamismo económico a sus respectivas zonas de influencia. Regularmente, se importa mano de obra especializada si no está disponible en el lugar, lo que ayuda a que el personal no-calificado aprenda de otros con más conocimientos y experiencia en otros oficios más especializados. La misma concepción del programa conlleva procesos técnicos, que creará trabajo profesional (ingeniería, arquitectura, derecho, contabilidad, etc.), y creará un flujo de caja adicional para el municipio y el gobierno.
- Dinamismo de la economía local: este impacto es directo y se relaciona con la creación de empleos temporales directos, indirectos, e inducidos. A esto se suma las ventas de las ferreterías, colmados y combustibles, y otros aumentos en la demanda de bienes y servicios (telefonía, comida, ropa, diversión, etc.), y un efecto extendido de bienestar para las personas involucradas, en especial por la densidad poblacional.
- Mejora de la Calidad de Vida: La calidad de vida de la población es positivamente impactada por el desarrollo, construcción e instalación de las intervenciones del programa, tanto en los aspectos económicos como en los sociales y ambientales. Entre los efectos positivos están: el aumento de la demanda de mano de obra, el fortalecimiento del tejido social, y la creación de más y mejor capital humano.
- Aumento de la oferta de empleo: La importancia del aumento de la oferta de mano de obra es de vital importancia para cualquier población; ya que genera la oportunidad que más personas puedan disponer de recursos para su sustento y el de sus familias. Un aspecto diferenciador del programa es justamente este, ya que se estima que en la construcción de las

intervenciones previstas por el programa podrían trabajar más de 3,300 personas en empleos de calidad. Una gran parte de estos, podría ser permanente.

J. RESUMEN DE MATRIZ DEL PMAA

Cuadro H: Resumen de Costos del PMAA para la Fase de Construcción (en RD$)

Medio	Impacto	Valor	Total Anual
Calidad de Aire	Polvo/ Polvillo	210,000.00	**530,000.00**
	Gases contaminantes	120,000.00	
	Generación de ruido	200,000.00	
Suelo	Pérdida de suelo	242,000.00	**270,500.00**
	Residuos peligrosos	28,500.00	
Calidad de Agua	Descargas al subsuelo	147,000.00	**294,000.00**
	Variación del drenaje	147,000.00	
Flora y Fauna	Pérdida de cobertura	282,500.00	**282,500.00**
	Migración de especies	-	
Ecosistema y Paisaje	Cambio del paisaje	72,000.00	**72,000.00**
Comunidad	Polvo/ Ruido	70,500.00	**121,000.00**
	Accidentes de tránsito	38,000.00	
	Empleo local	12,500.00	
Responsabilidad	Seguridad e higiene laboral	150,000.00	**230,000.00**
	Prevención de riesgos	80,000.00	
Otros Aspectos	Donaciones / Contingencias	200,000.00	**200,000.00**
TOTAL PMAA			**2,000,000.00**

Cuadro I: Resumen de Costos del PMAA para la Fase de Operaciones (en RD$)

Medio	Impacto	Valor	Total Anual
Calidad de Aire	Polvo/ Polvillo	21,000.00	**221,000.00**
	Gases contaminantes	85,000.00	
	Generación de ruido	115,000.00	
Suelo	Residuos peligrosos	21,000.00	**21,000.00**
Calidad de Agua	Descargas al subsuelo	50,000.00	**50,000.00**
Flora y Fauna	Afectación de la biota	70,000.00	**70,000.00**
Ecosistema y Paisaje	Afectación del ecosistema	59,000.00	**59,000.00**

Comunidad	Polvo/ Ruido	35,000.00	**97,000.00**
	Accidentes de tránsito	32,000.00	
	Empleo local	30,000.00	
Responsabilidad	Seguridad e higiene laboral	77,000.00	**132,000.00**
	Prevención de riesgos	55,000.00	
TOTAL PMAA			**650,000.00**

K. COMENTARIOS AL ESTUDIO AMBIENTAL

La motivación del presente Estudio de Impacto Ambiental, es evaluar objetivamente lo impactos medioambientales y socioeconómicos del proyecto "*Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural (ClimaComunidad)*" y proponer un Plan de Manejo y Adecuación Ambiental adecuado a las condiciones del mismo. El estudio, incluye la información pertinente y necesaria para realizar la evaluación ambiental que corresponde al programa, según las normas nacionales y también las buenas prácticas nacionales e internacionales sobre gestión ambiental.

Esta Estudio ha sido realizada por encargo del Implementador del Programa, Instituto Dominicano de Desarrollo Integral, Inc. (IDD), en persona de su Director Ejecutivo, Sr. David Luther. El mismo ha sido elaborado de conformidad con los Términos de Referencia elaborados según las más recientes directrices emitidas por el Ministerio de Medio Ambiente en relación al tema. En adición, el trabajo incluye otros lineamientos adicionales, dados por las buenas prácticas de la gestión de proyectos y la sostenibilidad ambiental, así como de la experiencia de los técnicos participantes.

Siempre que ha sido posible, se han integrado las fuentes de información que soportan los datos, juicios, análisis, estimaciones y cálculos incluidos dentro del documento. Es nuestro mejor entender, que el presente Estudio responde con calidad y oportunidad a las exigencias establecidas por el Ministerio de Medio Ambiente y Recursos Naturales y el Fondo de Adaptación.

Con el mejor interés de asegurar la comprensión y entendimiento de la información contenida en este documento, estamos a disposición del Ministerio de Medio Ambiente y Recursos Naturales y cualquier otra persona -física o jurídica- interesada o afectada (potencial o efectivamente) por el programa, en la Anacaona #10, Los Cacicazgos, D. N. (7mo. piso) o al teléfono 809-354-1077.

Brightline Institute, Inc.

4. Descripción del programa

4.1 Datos Generales del Programa

4.1.1 Presentación del Programa

El Programa denominado "*Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural (ClimaComunidad)*" busca abordar los impactos negativos que tendrán las variaciones previstas de temperatura y precipitación en San Cristóbal, en términos de gestión hídrica, mayor número de días calurosos, periodos de sequía más largos, incremento de la ocurrencia de sequías, y mayor intensidad de lluvias en períodos más cortos. Estas amenazas aumentarán la vulnerabilidad de la población rural, especialmente para los pequeños productores y los hogares más pobres.

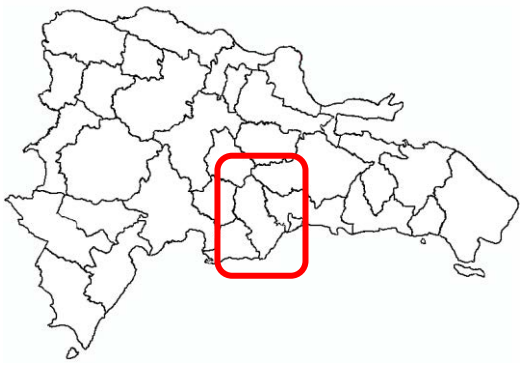

Figura 1: Ubicación de la Provincia de San Cristóbal en el Mapa Político de RD

El Programa se enfoca en amenazas específicas sobre los recursos hídricos y la gestión del agua en áreas determinadas. Entre estas amenazas se incluyen los efectos climáticos, la falta de recursos y capacidades de las comunidades para gestionar recursos hídricos, y los efectos de la gestión del agua sobre la salud de las personas. Esto crea otros impactos positivos en las poblaciones objeto, en especial sobre su agricultura, ganadería, salud y medios de subsistencia, ya que, por su diseño, los beneficiarios finales del programa son pequeños productores y comunidades pobres.

4.1.2 Objetivos del Programa

El principal objetivo del Programa es aumentar la resiliencia y la capacidad adaptativa de los medios de subsistencia rurales a los impactos climáticos y los riesgos sobre los recursos hídricos

en la Provincia de San Cristóbal. Este objetivo se logrará a través de acciones concretas enfocadas en mejorar el acceso al agua, aumentar la capacidad institucional y comunitaria, y la coordinación para la gestión integrada del agua que incluya otros usos de los recursos hídricos, especialmente para la diversificación de los medios de vida de las comunidades rurales[1].

En las comunidades meta, el Programa aumentará la resiliencia a través de medidas de adaptación inmediatas y a largo plazo, en forma de programas, proyectos y otras acciones de desarrollo rural. Dichos productos se organizan de acuerdo con los componentes y resultados esperados:

1. Implementación de actividades comunitarias de gestión de recursos hídricos resilientes al cambio climático

1.1 Planes comunitarios de abastecimiento y gestión de agua para que las municipalidades incorporen los riesgos relacionados con el cambio climático son desarrollados.

1.2 El suministro de agua para múltiples usos y usuarios en comunidades durante períodos de escasez bajo impactos climáticos (i.e., sequías, calor, etc.) se incrementa.

1.3 Sistemas de riego a pequeña escala instalados y asociaciones de usuarios de agua gestionan sus sistemas de riego son establecidos y/o reforzados para mejorar la eficiencia del uso del agua bajo condiciones de estrés climático.

1.4 Medidas para la conservación del agua bajo impactos climáticos (cuenca / ribera, esquemas de repoblación forestal) son implementadas.

2. Diversificación de los medios de subsistencia de las comunidades rurales en relación al cambio climático

2.1 La infraestructura de distribución de agua (como canales, tuberías, etc.) para su adaptación y uso en sistemas agrícolas existentes es mejorada.

2.2 Actividades de jardinería en temporada seca y emprendimientos comunitarios para la adaptación climática (miel, orquídeas, artesanía, etc.) se implementan.

2.3 Viveros y lotes para la gestión de riesgos climáticos (como rehabilitación de zonas inundables, laderas, cuencas, etc.) se establecen y gestionan localmente.

[1] Los medios de subsistencia son los medios que permiten a las personas ganarse el sustento. Estos abarcan capacidades, bienes, ingresos y actividades necesarias para que las personas cubran sus necesidades vitales. Un medio de subsistencia es sostenible cuando permite a las personas hacer frente a, y/o recuperarse de, situaciones negativas (i.e., desastres naturales, depresiones económicas o agitaciones sociales) y mejorar su bienestar y el de las futuras generaciones sin debilitar el medio ambiente o la base de recursos naturales.

2.4 Granjas piscícolas demostrativas se establecen y se apoyan a las comunidades para su sostenibilidad.

3. Creación de capacidades y desarrollo de capacidades institucionales y comunitarias para gestionar los riesgos relacionados con el cambio climático a largo plazo

3.1 Una serie de manuales y otros materiales sobre buenas prácticas en gestión del agua y medios de subsistencia resistentes son elaborados, incluido un sitio web.

3.2 Un Comité Provincial de Vigilancia de la Adaptación al Cambio Climático se establece en San Cristóbal.

3.3 Plataformas de aprendizaje y sistemas para integrar los riesgos climáticos relacionados con la gestión comunitaria de los recursos hídricos y las actividades de subsistencia en los municipios son institucionalizadas.

4.1.3 Naturaleza del Programa

El Programa es un proyecto de asistencia técnica y económica para lograr una correcta adaptación al cambio climático, disminuir la vulnerabilidad y aumentar la resiliencia de las comunidades más pobres de la provincia de San Cristóbal. El programa será implementado y ejecutado con recursos provenientes del Fondo de Adaptación[2]. Las intervenciones previstas por el programa propuesto, son básicamente acciones para la mejora de las condiciones y calidad de vida de dichas comunidades, y son actividades de bajo impacto ambiental y poro riesgo de seguridad (Tipo B).

Aunque el programa no requiera una autorización ambiental, todas las intervenciones se ajustarán a lo establecido en la Ley 64-00 sobre medio ambiente y recursos naturales, así como a las normas, reglamentos y resoluciones emanadas del Ministerio de Medio Ambiente y Recursos Naturales.

4.1.4 Promotor del Programa

El Promotor del programa es: **Instituto Dominicano de Desarrollo Integral (IDDI)**

Dirección: Calle H #17, esquina Diagonal

Zona Industrial de Herrera, Santo Domingo Oeste

[2] El Fondo de Adaptación es un fondo establecido por la Convención Marco de las Naciones Unidas sobre Cambio Climático, para financiar proyectos y programas concretos de adaptación en países que son parte del Protocolo de Kioto y que son particularmente vulnerables a los efectos adversos del cambio climático. Información sobre el fondo, sus actividades y operaciones, está disponible en www.adaptation-fund.org.

web: www.iddi.org

t.:+1 809 534-1077

e.: info@iddi.org

El promotor será el representante del programa ante el Fondo de Adaptación y ante el Ministerio de Medio Ambiente y Recursos Naturales y podrá nombrar otros representantes según considere. El desarrollo del programa propuesto, ha sido encargado por el promotor a **Brightline Institute**, una entidad dedicada a desarrollar iniciativas que promuevan la sostenibilidad y la transferencia de tecnologías, de forma innovadora, sistemática, eco-amigable y con vocación de largo plazo.

4.1.5 Localización del Programa

Administrativamente las intervenciones del programa se localizarán en distintas comunidades de la Provincia de San Cristóbal. Las comunidades beneficiarias, son las indicadas a continuación.

Cuadro 1: Listado de Comunidades Potenciales de Incluir en el Programa

Satage 2: Communities	Households in Poverty
Los Cacaos	**1,586**
Los Cacaos (urban area)	
El Guineo	
Los Naranjos	
Calderón	
Medina (D.M.)	**1,084**
Medina (urban area)	
Loma Verde	
El Pedrero	
Castaño	
Medina	
Cambita Garabitos	**3,013**
Cambita Grabitos (urban area)	
Cambita Garabitos	
Humachón	
La Colonia	
Los Manantiales	
El Tablazo	
La Cuchilla (D.M.)	**1,350**
La Cuchilla (urban area)	
La Cuchilla	
El Aguacero	
El Caobal	
El Cidral	
El Cidral (La Represa)	
Cambita El Pueblecito (D. M.)	**1,301**
Cambita El Pueblecito (urban area)	
Llanada Grande	
Pueblo Nuevo	
El Toro	
Hato Damas (D.M.)	**2,198**
Hatos Damas (urban area)	
Los Montones	
Dasa	
San Francisco	
Jamey	
Villa Altagracia	**6,697**
Villa Altagracia	
Catarey	
Maná de Haina	
San José del Puerto	**1,485**
San José del Puerto (urban area)	
Básima	
Los Mogotes	
Pino Herrado	
Households in Poverty	**18,714**
Included communities	**37**
Municipalities/ Districts	**8**

Fuente: Informe 1: pre-Identificación de comunidades beneficiarias (Brightline Institute, 2017).

La tabla anterior indica que el programa abarca 8 municipalidades (entre municipios y distritos municipales). Estas zonas, totalizan unas 37 comunidades, excediendo la meta propuesta de 30.

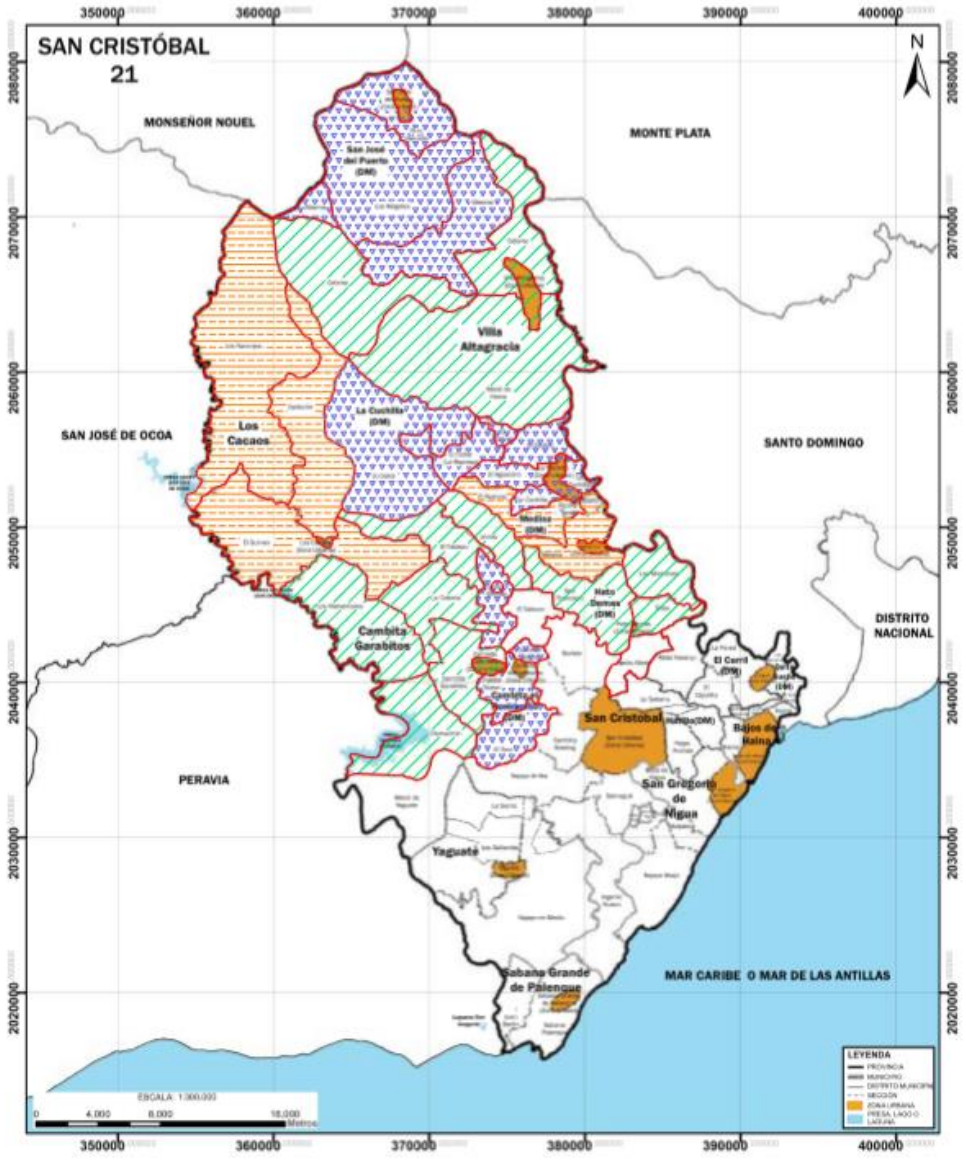

Figura 2: Ubicación de las Comunidades a ser Incluidas en el Programa

Fuente: Informe 1: pre-Identificación de comunidades beneficiarias (Brightline Institute, 2017).

4.1.6 Inversiones del Programa

El valor del programa, se estima preliminarmente en US$ 9,953,692.35 (aproximadamente RD$ 481,261,025.10, calculados a una tasa de 48.3500 US$/RD$). Dichos recursos, serán provistos en

su totalidad por el Fondo de Adaptación. Un valor adicional no cuantificado, se relaciona con los aportes de la comunidad (como terrenos, mano de obra, instalaciones, etc.) y de las instituciones.

4.1.7 Otros Actores Relevantes

En el contexto del Programa propuesto, tal y como establece el Fondo de Adaptación, el IDDI actuará como implementador del programa. En la parte de ejecución, actuarán el Ministerio de Medio Ambiente y Recursos Naturales, el Instituyo Nacional de Agua Potable y Alcantarillados (INAPA), y el Instituto Dominicano de Recursos Hidráulicos (INDRHI). A nivel operacional, se ha contemplado trabajar con organizaciones comunitarias de base y con ONGs con presencia el área.

4.2 Actividades y Componentes

4.2.1 Intervenciones Contempladas

Para el logro de los objetivos del proyecto, se contemplan las siguientes intervenciones.

Cuadro 2: Listado de Comunidades Potenciales de Incluir en el Programa

Componente	Intervención	Cantidad	Unidad
2. Implementación a nivel comunitario de actividades de gestión de recursos hídricos resilientes al clima.	3.4 Planes comunitarios de abastecimiento y gestión del agua que incorporen los riesgos relacionados con el cambio climático.	8	Municipalidades
	3.5 Incremento en el suministro de agua para múltiples usos y usuarios durante períodos de escasez bajo impactos del cambio climático.	30	Comunidades
	3.6 Instalación de sistemas de riego a pequeña escala. Creación/ fortalecimiento de asociaciones de usuarios del agua para gestionar los sistemas y aumentar la eficiencia del uso del agua bajo condiciones de estrés climático.	30	Comunidades
	3.7 Medidas para la conservación del agua bajo impactos climáticos (cuenca/ ribera, esquemas de re-aforestación).	400	Hectáreas
4 Diversificación de medios de subsistencia de comunidades rurales bajo cambio climático.	4.1 Mejoramiento de la infraestructura de distribución de agua (como canales, tuberías, etc.) para adaptación y uso en sistemas agrícolas existentes.	8	Municipalidades

	4.2 Se crean o mejoran las actividades de estación seca y esquemas de procesamiento agrícola para mujeres (como miel, orquídeas o artesanía), para adaptarse al cambio climático.	20	Comunidades
	4.3 Establecimiento y gestión de viveros y lotes forestales para la gestión de riesgos climáticos (como rehabilitación de llanuras de inundación, laderas, cuencas, etc.).	20	Comunidades
	4.4 Establecimiento y apoyo de granjas demostrativas de peces	20	Comunidades
5 Creación de capacidades y desarrollo de capacidades en instituciones clave y en comunidades para gestionar los riesgos relacionados con el cambio climático a largo plazo	5.1 Desarrolla de un conjunto de manuales y otros materiales sobre las mejores prácticas para la gestión del agua y los medios de subsistencia resilientes, incluido un sitio web plenamente operativo.	¿?	Comunidades Instituciones Organizaciones Cooperación Empresas
	5.2 Establecimiento del Comité Provincial de Adaptación al Cambio Climático.	1	San Cristóbal
	5.3 Institucionalización de plataformas de aprendizaje y sistemas para integrar los riesgos relacionados con el cambio climático en la gestión comunitaria de recursos hídricos y actividades de medios de subsistencia.	8	Municipalidades

Fuente: Informe 2: Definición de las intervenciones de adaptación (Brightline Institute, 2017).

4.2.2 Actividades en la Fase de Construcción

El proyecto contempla la construcción de infraestructuras de servicios, como obras de toma de agua, pozos, plantas de tratamiento de agua potable, tanques de regulación y almacenamiento, canales, canaletas, tuberías y drenajes. Así también, se instalarán centros para el procesamiento de productos agropecuarios, y otras facilidades productivas como viveros de plantas, granjas de peces, colectores de miel, etc. Otros servicios a ser demandados serían levantamiento topográfico, nivelación de terrenos, caminos de acceso y facilidades complementarias (como energía eléctrica, iluminación, combustibles, agua potable, recolección y tratamiento de aguas servidas, así como los complementos para recolectar, separar, acopiar y maneja los residuos sólidos que se generen).

Actividades previstas

El proceso de construcción incluirá las siguientes actividades:

- Levantamiento topográfico de terrenos
- Replanteo de las diferentes edificaciones
- Excavación para fundaciones (zapatas)
- Colocación de acero de refuerzo
- Vaciado de hormigón/concreto de fundaciones
- Levantamiento de columnas y muros
- Colocación de aceros y tuberías
- Colocación de encofrados (de madera y/o metálicos)
- Vaciado de hormigones de las estructuras
- Remoción de encofrados
- Colocación de finos e impermeabilizantes
- Colocación de andamios
- Terminación de superficies (internas y externas)
- Colocación de líneas sanitarias
- Colocación de líneas eléctricas
- Colocación de pisos y cerámicas
- Colocación de puertas, ventanas y herrería
- Instalación de aparatos sanitarios (baños)
- Pintura
- Construcción de plantas y tanques
- Adecuación de caminos
- Instalación de techos
- Colocación de luminarias
- Áreas para manejo de combustibles
- Colocación de verjas (mallas ciclónicas y barreras vivas)
- Señalización
- Limpieza y bote de escombros

- Otros trabajos menores

Equipos y materiales a utilizar

Los equipos e implementos a utilizar en el proyecto son comunes a los que se utilizan en cualquier otra obra civil en el país. En principio, los equipos que -se anticipa- serán utilizados son:

- Camiones volteo
- Cargador frontal (pala mecánica)
- Motoniveladoras (gredar)
- Compactador (rodillo)
- Ligadoras (de concreto)
- Grúa (incluyendo guinches o ying/yang)
- Torres de vaciado
- Topográficos (nivel, tránsito o teodolito, estadias o miras, estación total)
- Perforadoras (para pozos)
- Cinta métrica
- Sierras y taladros
- Equipo para pintura
- Otros menores (como carretillas, palas, picos, martillos, serruchos, etc.)

Demanda de materiales

En la fase de construcción, se estiman necesarios los siguientes materiales[3]:

- Arena lavada : 38,715 m^3
- Grava triturada : 19,982 m^3
- Tosca (relleno) : 4,453 m^3
- Acero estructural : 733 t

[3] Estimaciones basadas en los volúmenes reportados por INAPA (2015 y 2016) para acueductos rurales y obras de agua en comunidades con similares condiciones (población a servir, dotación estimada, etc.).

- Concreto : 1,927 m^3
- Pinturas : 3,416 gl (mínimo)
- Cemento : 2,107 m^3
- Tuberías : por determinar
- Acero no estructural : 28 t
- Otros : por determinar

En la medida de lo posible, estos materiales serán adquiridos localmente (en ferreterías de la zona o propietarios de minas o fábricas cercanas). Esto tiene el doble efecto de reducir tiempo y costos (como los de transporte) y también contribuye a movilizar y dinamizar la economía de la zona.

Figura 3: Estructuras Típicas para el Tratamiento y Almacenamiento de Agua
Fuente: Visitas de campo realizada entre octubre y noviembre del 2017.

Terracería (movimiento de tierras)

Dado que los perfiles topográficos de las comunidades a intervenir son muy diversos, se entiende que eventualmente será necesario realizar cortes y también rellenos. Las excavaciones a realizar

serán para las fundaciones, tanques, cisternas, depósitos; y para las líneas eléctricas y sanitarias (según aplique). El material resultante del corte, se podrá utilizar como relleno de compensación si su calidad final lo permite, y su utilización no causa otros problemas a la obra. Si hubiera un excedente de este material, es decir, si se pueda usar como relleno de compensación y quedara algún remanente, el mismo será esparcido en el área o destinados a usos menores.

Figura 4: Estructuras de Aprovechamiento de Aguas Lluvias (Reservorios)
Fuente: Visitas de campo realizada entre octubre y noviembre del 2017.

Para los rellenos necesarios para alcanzar los niveles de diseño de las construcciones y áreas de circulación, y buscando aumentar la capacidad portante de las áreas de circulación, de estructuras y demás; se utilizará material clasificado. Este material se comprará localmente. En la Provincia de San Cristóbal existen grandes y diversas explotaciones de material adecuado para relleno (minas), pero sólo se comprará a aquellos emplazamientos mineros que tengan sus permisos ambientales y de minería al día. La necesidad de material clasificado para relleno, se estima en 4,532 m^3.

Disposición de escombros

Como ocurren en toda obra de infraestructura, en las intervenciones previstas por el programa se generarán residuos de construcción (escombros, demoliciones, rechazos, etc.). Estos residuos se podrán utilizar como material de relleno, dada su elevada calidad para estos fines. Los volúmenes restantes se enviarán a sitios cercanos de disposición que tengan autorización ambiental para ello.

Procesos constructivos

Desde un punto de vista constructivo, la construcción de obras de agua (como obras de toma, campos de pozos, tanques del almacenamiento, platas de tratamiento, colocación de tuberías, etc.) no representa ninguna complejidad, ya que en el país y la zona hay mucha experiencia en la

construcción de estas, por lo que no se espera ocurra ninguna contrariedad. La construcción de toda las instalaciones e infraestructuras, se realizará conforme a lo establecido en los reglamentos para obras civiles, electicas y sanitarias del Ministerio de Obras Públicas y Comunicaciones, del Instituto Nacional de Agua Potable y Alcantarillados (INAPA) y del Ministerio de Medio Ambiente.

En relación a las obras propuestas para diversificar los medios de subsistencia locales, y también las previstas para hacerlo os actuales más resilientes, se prevé usar infraestructuras simples, de poco o ningún impacto sobre el medio natural. En este aspecto hay mucha experiencia en el país.

Figura 5: Estructuras Para Viveros Agrícolas (izq.,) y Forestales (der.)
Fuente: Plan Sierra, Inc. (Plan Sierra, 2017).

Figura 6: Estructuras Para Procesar Mieles (izq.) y Orquídeas (der.)
Fuente: Instituto Dominicano de Investigaciones Agropecuarias y Forestales (IDIAF, 2017).

4.2.3 Actividades en la Fase de Operación

Las actividades en la fase de operación se relacionan con el mantener la oferta de servicios de las intervenciones del programa, y de anticipar situaciones adversas que pudieran comprometer la

seguridad y eficiencia de dichos servicios. Estas actividades no están llamadas a producir impactos ambientales significativos, y más bien su función será maximizar los beneficios socioeconómicos del programa. No obstante, la implementación y ejecución de dichas actividades se hará según los criterios ambientales establecidos en el país, y los incluidos dentro del diseño del programa.

Actividades previstas

La fase operación incluirá -entre otras- las siguientes actividades:

- Limpieza y mantenimiento de obras de captación, tratamiento y almacenamiento
- Mantenimiento y reparaciones de sistemas de bombeo y casetas de cloración
- Limpieza periódica de plantas de tratamiento, filtros, desarenadores y otras obras de control
- Mantenimiento de los caminos de acceso a los sitios de las obras
- Revisión que las líneas de conducción y distribución funciones adecuadamente
- Realizar detección y corrección de fugas, escapes, filtraciones o derrames
- Limpieza y remoción de malezas en las zonas cercanas a las obras
- Mantenimiento de viveros, plantaciones, apiarios, granjas, piscinas, etc.
- Reparar daños por vandalismo, ciclones, excesos de presión, mal uso, desuso, etc.
- Preparación, elaboración y reproducción de documentos técnicos y educativos

Manejo de combustibles

Los vehículos y personas a pie que manejen combustibles, tanto en las obras de agua como en las instalaciones de producción y/o diversificación del ingreso, sólo ingresarán a dichas facilidades por los accesos desde/hacia la vía dispuestos para tales fines. Una vez en el lugar, se solicitará que se apague el motor y las luces de los vehículos. Cada conductor que trabaje o provea servicios al programa, será responsable que no haya derrames ni goteos de combustible ni de aceites. Si se manejaran combustibles fuera de los vehículos (por ejemplo, llevar combustible para una bomba o plana de emergencia), se utilizará un garrafón especial para tales fines (de 5 galones).

Salvo no se deba a una causa justificada, cada inspector, suplidor, contratista o cliente servido deberá abandonar las instalaciones, siempre y cuando no necesite algún otro de los servicios que en ella se brinda. Esto será un aspecto que se manejará con el personal y la seguridad.

Limpieza de instalaciones

La limpieza de las instalaciones productivas y/o de procesamiento se realizará en una base diaria, para todas las áreas sin excepción (salvo exista alguna limitación que lo impida). El personal y los comunitarios serán instruidos para dar una limpieza especial -más completa- a la instalación 1 vez al mes. Esta limpieza se realizará con agua y detergentes, en caso que haya derrames o goteos de aceites o hidrocarburos, y siempre de acuerdo a las buenas prácticas en seguridad e higiene.

Horarios de operación

Las obras de agua trabajarán 24 horas durante todo el año, salvo exista alguna parada obligada Las instalaciones productivas y de comercialización trabajarán de lunes a domingo desde las 06:00 hasta las 18:00 durante todo el año. En horas no laborables, las instalaciones estarán cerradas al público y no se permitirá el acceso a ellas. Los horarios de trabajo, de descanso y de vacaciones del personal serán los indicados en el Código de Trabajo. Parte del personal laborará en rotativo.

Prevención de accidentes

Las vías de acceso principal a las obras e intervenciones del programa se mantendrán en buenas condiciones, según la categoría y condiciones de las mismas. Esto se hará en coordinación con las municipalidades, que tienen a su cargo esta atribución. Se ha constatado en las visitas de campo, que las condiciones de mucho de los caminos son muy precarias, dado lo remoto y apartado de los mismos, como la falta de mantenimiento y rehabilitación de los mismos. En lo posible, se tratará que los vehículos puedan transitar sin causar obstrucción del tráfico o exponerse a peligro.

Figura 7: Estado de los Caminos de Acceso en Algunas Comunidades de San Cristóbal
Fuente: Visitas de campo realizada entre octubre y noviembre del 2017.

En las instalaciones productivas y/o de procesamiento, se instalará un sistema de prevención de incendios que incluirá extintores, señalización, capacitación del personal, cisternas y vinculación con entidades como los cuerpos de bomberos y la defensa civil. Los extintores estarán ubicados en diferentes zonas, siempre visibles y accesibles. En lo posible, en cada instalación se instalará al menos 1 hidrante (o se procurará su instalación por ante el INAPA). La bocatoma de los hidrantes será de 3" de diámetro a fin de que los bomberos puedan utilizarlos (aunque podría distinto, según sea necesario para adaptarse a los equipos y mangueras que utilizan los bomberos locales).

Sistema de señalización

A fin de reducir cualquier riesgo natural o inducido, según sea aplicable, en las intervenciones del programa se contempla instalar un conjunto de señalizaciones horizontales, verticales y acústicas para asegurar el nivel de servicio óptimo en condiciones seguras y funcionales.

Entre las señales horizontales se indicarán:

- Dirección del flujo vehicular;
- Indicación de entrada y salida;
- Espacio asignado a carga/descarga y parqueos; y
- La velocidad máxima de circulación.

Las señales verticales indicarán:

- Indicación de entrada y salida;
- Restricción de accesos y maniobras;
- Identificación de áreas de servicios;
- Límites de velocidad; y
- Rutas de evacuación y escape.

Las señales acústicas serán básicamente alarmas (contra robo o ante accesos no autorizados). Otras señales a incluir en la instalación se relacionan con el horario del personal, horarios para el aseo, indicación de ubicación de extintores, acceso para discapacitados y embarazadas, señales de no fumar, peligro (de voltaje), no pasar, precios de los productos, y los teléfonos de emergencia de la Cruz Roja, Defensa Civil, Policía Nacional, Cuerpo de Bomberos, y el Ministerio de Ambiente.

Fortalecimiento de capacidades

Las actividades de capacitación y entrenamiento del personal local y comunitario que trabaje en las obras, así como los cursos y talleres para los beneficiarios de las intervenciones para diversificar los medios de subsistencia, se realizarán, en lo posible, en las mismas comunidades. Si esto no fuera viable, dichas las actividades se realizarán en alguna facilidad cercana adecuada para tales fines (salón multiusos, club deportivo, escuela o iglesia cercana, centro comunitario, etc.).

Las principales actividades de capacitación a realizar serán:

- Capacitaciones permanentes: gestión hídrica, cambio climático, asociatividad, cooperativismo, gestión comunitaria, diversificación del ingreso, emprendurismo, seguridad laboral y salud ocupacional, buenas prácticas agrícolas, ganaderas y forestales, siembra de agua, gestión de residuos, ahorro energético, esquemas comercio justo, artesanía, gestión de MIPYMES, etc.
- Capacitaciones esporádicas: empoderamiento comunitario, servicio al cliente, reducción de la vulnerabilidad de mujeres, control de calidad, ahorro doméstico, reducción del consumo de energía, seguridad personal, autoestima y relaciones interpersonales, violencia doméstica, etc.

4.2.4 Actividades en la Fase de Clausura

Al final de la vida útil de las intervenciones del programa, las estructuras han de ser desmanteladas y los restos de las estructuras y cimientos deberán ser retirados. En estos casos, la mayor atención se centrará sobre los agentes que puedan persistir en cada lugar (como aceites, metales o residuos peligrosos), y cualquier otro material contaminante producido en los años de operación. Todas las áreas se dejarán lo más limpia y libre de remanentes que sea posible, para que los terrenos reciban otros emprendimientos de servicios, industriales, comerciales, domésticos o recreativos.

4.2.5 Servicios Complementarios

Áreas de comida

En cada instalación productiva y/o de procesamiento se destinará una pequeña área para comida. Esto es básicamente un área acondicionada para la ingesta de comidas y bebidas. Esta zona, según el tipo de instalación tendrá un pequeño espacio para cuido de bebés y/o para la lactancia. Los servicios de estas áreas (agua, electricidad, etc.), serán comunes a los del resto de las instalaciones.

En estas áreas, habrá zafacones marcados para restos de papel, plástico, comida, etc., para facilitar la correcta gestión de los residuos y su reciclaje. Los residuos serán manejados por el personal de aseo hasta que sean puestos en los lugares adecuados, y luego recogidos para su disposición.

Venta de productos

En las instalaciones productivas y/o de procesamiento, se tendrá un pequeño inventario ("*stock*") de productos para su venta al público (venta de conveniencia). Esta venta, se realizará en el mismo ambiente y con el personal que trabaje en la instalación. Los clientes podrán solicitar y/o recibir los servicios o productos disponibles sin restricciones, siempre y cuando sean mayores de edad.

El acceso a las instalaciones, se garantizará proporcionando parqueos para clientes y suplidores, rampas de acceso para discapacitados, y parqueos para personas vulnerables (discapacitados, envejecientes y embarazadas). Una vez que el cliente identifique los productos y/o servicios de su interés, deberá facturarlos y pagarlos en caja antes de poder consumirlos o recibirlos.

Auxilio y socorro

Cada instalación productiva y/o de procesamiento, tendrá un kit de primeros auxilios al servicio de todas las personas que lo requieran. En caso que los usuarios, clientes, o el público en general necesite los servicios de auxilio o socoro, podrá solicitar el apoyo y/o direccionamiento del personal del área de expendio y/o del área administrativa. Estos servicios no tendrán costo alguno.

Baños y servicios

Cada instalación productiva y/o de procesamiento, estarán provistas de baños y aseos. Estos baños contendrán las facilidades básicas de lavamanos, W.C., jabón, papel higiénico y zafacón. Habrá baños distintos para hombres y mujeres, no importando si son personal, clientes o público.

4.2.6 Ubicación de Componentes

Como parte del proceso de construcción e instalación de las facilidades productivas del programa, Estas tendrán sus planos definitivos, estos planos deberán indicar la ubicación precisa de los componentes principales y accesorios de cada instalación, así como la distribución de sus infraestructuras. Entre estos planos se incluyen los de ubicación y georreferenciación, planta y conjunto, planta dimensionada, instalación eléctrica, instalación sanitaria, y otros relevantes.

4.3 Demanda de Servicios

4.3.1 Instalaciones y Servicios de Apoyo

Cuarto eléctrico

Para asegurar el suministro eléctrico de las infraestructuras e instalaciones, estas podrán disponer un cuarto eléctrico, que deberá estar ubicado adecuadamente, para albergar y proteger la planta eléctrica de emergencia. El diseño de esta caseta, considerará el efecto acústico y las eventuales vibraciones de la planta, por lo que estará provista de protección anti-ruido en paredes y ventanas, y en el piso; para asegurar que no exceda los niveles permitidos por el Ministerio de Ambiente.

Verja perimetral

Cada instalación productiva y/o de procesamiento tendrá una verja perimetral en malla ciclónica.

Figura 8: Modelos de Verjas Perimetrales a Utilizarse en las Instalaciones
Fuente: Visitas de campo realizada entre octubre y noviembre del 2017.

Vías de acceso

Las vías de acceso a las infraestructura e instalaciones, se pondrán en condiciones adecuadas para permitir el acceso en condiciones seguras y funcionales. No se requiere otras estructuras viales.

Área de bombeo

En las zonas donde sea necesario bombear agua, tanto en infraestructuras como en instalaciones, se destinará un pequeño espacio para bombeo, que incluso podría incluir una cisterna (en el caso de las facilidades productivas y/o de procesamiento). En estos casos, ambas construcciones serán

de bloques y concreto armado. Este sistema deberá tener la suficiente capacidad de suplir las necesidades de la instalación, así como soportar el sistema contra incendio de cada instalación.

Ventilación general

Las instalaciones serán diseñadas considerado la topografía del sitio y las corrientes de viento, de forma que estos puedan penetrar libremente y ventilar las instalaciones, lo que además de aportar confort, reducirá la demanda de ventilación artificial y el correspondiente consumo eléctrico.

Áreas verdes

Según establece la arquitectura moderna, el planteamiento de las infraestructuras e instalaciones, conllevan áreas destinadas a la jardinería y/o conservación de árboles. Esto no sólo obedece a cuestiones de embellecimiento –como mejorar o mantener el ornato- sino que también mantiene la vegetación que anteriormente tenía el lugar destinado a cada acción. Por estas razones, para mejorar las condiciones de la zona, aumentar la belleza, purificar el aire y disipar el ruido, se establecerán áreas verdes en los alrededores de las obras y centros; y también barreras vivas con árboles de follaje alrededor de todo lo largo de los linderos (esto se puede incluirá en los planos).

4.3.2 Infraestructura de Servicios

Suministro de agua potable

En cada instalación, se tendrá el agua mediante tuberías de ½ y ¾" alimentadas desde una cisterna con una bomba de mínimo 2 HP (ubicada al lado del cuarto eléctrico). El suministro de agua se obtendrá desde el acueducto de local (INAPA), el cual podrá estar -eventualmente- incluido dentro del contexto del programa. El agua se almacenará en una cisterna de 225 m^3 (equivalentes a casi 60,000 gl), suficientes para suplir todas las necesidades diarias de la instalación más un volumen adicional de seguridad, y para cubrir casos de incendios o para épocas de sequía.

Aguas residuales domésticas

En cada instalación productiva y/o de procesamiento, estarán habilitado baños para el personal, clientes y visitantes. Los baños contarán con lavamanos, inodoros (WC) y desagües de piso, y tendrán líneas de descarga en PVC de 4". Como tratamiento, se utilizará un registro a la salida de los baños, que conecta con una cámara séptica con volumen útil de 5.2 m3 que, a su vez, descargará en un pozo filtrante construido para tales fines. Este sistema cumplirá con las normas establecidas por el Ministerio de Obras Públicas y Comunicaciones y por el Ministerio de Medio Ambiente y Recursos Naturales; organismos oficiales con competencia sobre estos sistemas.

Cuadro 3: Características Estimadas de las Aguas Residuales Antes del Tratamiento

pH	SST (mg/l)	ST (mg/l)	DBO_5 (mg/l)	DQO (mg/l)
6.5 – 9.5	400	1,600	35	900

Basado en concentraciones típicas de aguas servidas en comercios y viviendas.

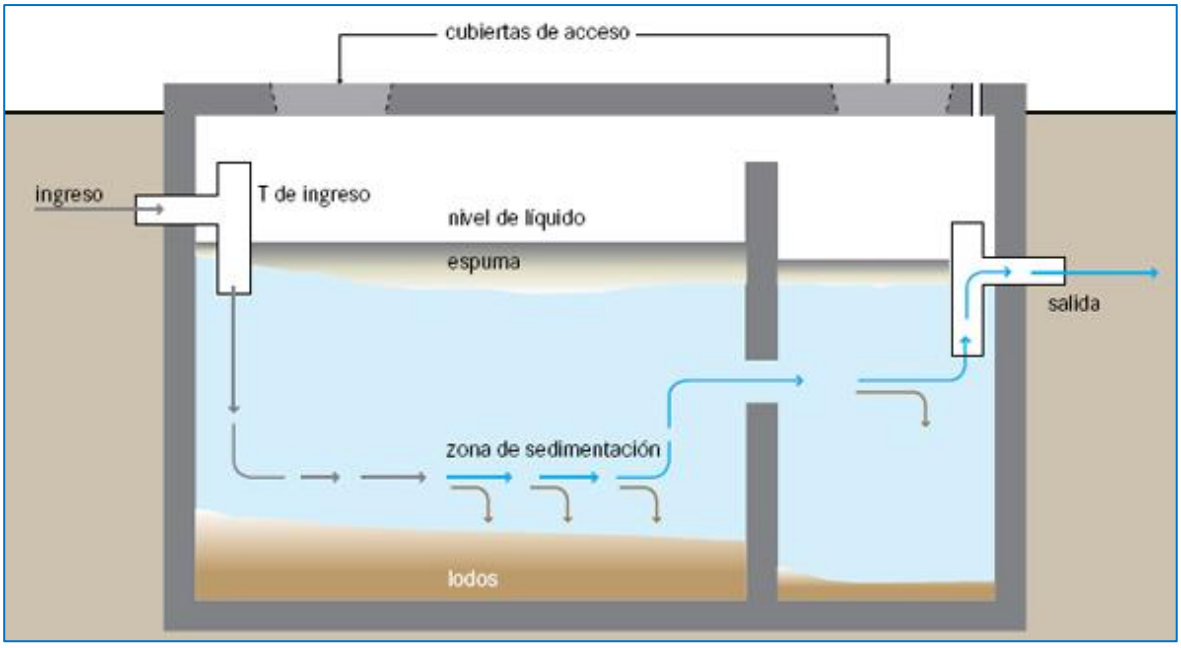

Figura 9: Esquema de Cámara Séptica a Utilizarse en las Intervenciones del Programa

El agua así tratada, deberá cumplir con la normativa ambiental vigente, especialmente con las concentraciones indicadas en la Norma Ambiental Sobre Calidad de Agua y Control de Descargas.

Cuadro 4: Características Estimadas de las Aguas Residuales Tras el Tratamiento

pH	SST (mg/l)	DBO_5 (mg/l)	DQO (mg/l)	Cl2 (mg/l)	Grasas (mg/l)	CT NM/100 ml
6 - 9	50	50	250	0.2	10	400

Fuente: Norma Ambiental Sobre Calidad de Agua y Control de Descargas, tabla 4.2.2.

En esta norma, el Ministerio de Medio Ambiente y Recursos Naturales establece los límites permitidos para descargas en receptores o el subsuelo, así como los parámetros a monitorear.

Aguas residuales de lavado

El sistema para lavado y limpieza de las instalaciones de productivas y/o de procesamiento incluirá un conjunto de canaletas para colectar las aguas de lavado y su propia cámara de tratamiento. Esta será básicamente una cámara cerrada con función de trampa de grasa y sólidos, la cual será limpiada periódicamente. Los residuos que puedan recuperarse serán aprovechados, y los lodos serán secados al sol y dispuestos como basura. Si hubiere residuos peligrosos (como aceites), estos serán entregados a un gestor ambiental registrado ante el Ministerio de Medio Ambiente. En los diseños de cada instalación, se incluirán planos del sistema sanitario y de aguas residuales.

Manejo de residuos sólidos

Todo proceso productivo, ya sea de proveer bienes o servicios, genera residuos. Según la actividad que se trate, estos residuos pueden ser peligrosos o no-peligrosos; o se pueden clasificar como desechos domiciliarios, comerciales e industriales. El funcionamiento de los centros productivos y/o de procesamiento previstos en el programa generará residuos de varios tipos y de diferentes características. Entre estos, se pueden citar los domésticos, los institucionales y los industriales.

Por ejemplo, los desechos de origen domestico son los producidos por las actividades humanas del día a día, similar a los que se generan en una vivienda. Los residuos de origen institucional, muy al contrario, se componen de los materiales descartados de las oficinas especialmente. Entre estos desechos, hay no-peligrosos (i.e., papeles, empaques, lápices, clips, etc.) y los hay peligrosos (i.e., tóneres, cartuchos, lámparas, etc.). Así también, existen residuos de manejo especial entre los que se encuentran los filtros de aceite generados durante las operaciones de mantenimiento, aceites usados, restos de gomas, baterías ya descartadas, paños de limpiar grasas, etc.

Otros residuos cuyo manejo es importante para el programa, son los derivados de las actividades agrícolas o forestales. En la medida que sea técnicamente posible y económicamente viable, estos residuos se valorizarán con fines de alimento animal, biomasa, subproductos o en artesanías.

Desafortunadamente, en nuestro país no hay una cultura de disposición adecuada de los residuos, y los avances en materia de 3R (reducir, reusar y reciclar) son muy tímidos. Actualmente, en todo el país los residuos son recolectados por los ayuntamientos de manera indiscriminada (juntando los residuos domésticos con los institucionales no-peligrosos) y enviados a los botaderos sin haber sido clasificados. Por esa razón, el proyecto puede manejar una media de 1 kg de residuos por persona por día y, como cada centro de procesamiento tendrá unos 25 empleados, habrá una

tasa de residuos propia de 25kg/día. Si sumamos los residuos típicos de los procesos y servicios, se podría agregar unos 75 kg adicionales por día, haciendo un total estimado de 100 kg/día.

Figura 10: Estado del Vertedero de los Municipios de Medina (izq.) y Cambita (der.)
Fuente: Visitas de campo realizada entre octubre y noviembre del 2017.

Los residuos no-peligrosos de las instalaciones proyecto se entregarán a la municipalidad, de tal forma que sean llevados a los botaderos municipales. No obstante, se buscarán alternativas de reciclado para vidrios, latas, papel, y cartón; y los orgánicos pueden ir al compostaje. Esto es un aspecto con el que cada instalación contribuirá a mejorar la calidad ambiental de la zona, ya que los vertederos locales son lugares donde personas ingresan a sacar materiales (buzos) arriesgando su salud, se producen vectores de enfermedades y se contamina la atmosfera con emisiones de metano, olores y polvo. Estas complicaciones afectan la salud pública y alejan el incipiente turismo.

Los residuos peligrosos serán empacados y almacenados por tipo, y luego transferirlos hacia instalaciones adecuadas para su tratamiento; siempre que las mismas sean gestoras autorizadas para ello por el Ministerio de Medio Ambiente y Recursos Naturales. El mismo tratamiento recibirán las baterías descartadas, los aceites usados, las gomas de vehículos, y los escombros.

Suministro de electricidad

Tanto las infraestructuras de suministro de agua como las instalaciones productivas incluidas en el programa, eventualmente necesitarán un suministro eléctrico constante, económico, y continuo para cumplir sus funciones. Esto no sólo implica la electricidad que mueve motores, bombas, o equipos electrónicos, sino también la que alimenta el alumbrado y los dispositivos de seguridad.

La fuente de energía eléctrica del proyecto será la red pública, específicamente la operada por ESEDESUR, que es la empresa distribuidora de electricidad para la parte suroeste del país. Esto tiene la ventaja de que las redes ya están disponible en las comunidades objeto del programa. Sin embargo, y con la finalidad de que no se interrumpan las actividades de la estación ni los servicios que ofrece al público, cada instalación dispondrá de una planta de emergencia de 30kW y/o motobombas. Estas plantas, se accionará automáticamente ante toda interrupción del servicio. En caso de averías o interrupciones por periodos que excedan al que la planta o los generadores puede soportar en condiciones normales, se alquilarán otros generadores (si ello resultara viable).

Figura 11: Obras de Agua con Instalación Eléctrica (izq.) y sin Instalación Eléctrica (der.)
Fuente: Visitas de campo realizada entre octubre y noviembre del 2017.

Todas las instalaciones eléctricas serán herméticas. Los motores eléctricos, las bombas y las plantas serán blindados y tendrán interruptores automáticos de sobrecarga (fusibles y "*breakers*"). En general, las instalaciones e infraestructuras tendrán un panel desde donde se controlará -total o parcialmente- el flujo de electricidad de la respectiva instalación. Los tableros estarán blindados.

En la fase de operación, se estima que el consumo de electricidad de las infraestructuras e instalaciones será relativamente bajo (especialmente si se usan tomas de agua por gravedad). En la fase de construcción no se considera tampoco un gran consumo de electricidad, ya que sólo se trabajará en horario diurno (luz solar) y los trabajos eléctricos y mecánicos se realizarán en talleres.

En el diseño original no se contempla, pero una vez que las instalaciones productivas y/o de procesamiento alcancen su lógica económica y social, estas podrán abordar el instalar paneles solares en los techos de las instalaciones, y así generar energía más limpia y más económica.

5. Factores socioeconómicos y medioambientales

5.1 Medio Físico-Natural

5.1.1 Clima e Hidrología

El clima de la provincia San Cristóbal está influenciado -básicamente- por las características orográficas de la Cordillera Central y la Sierra de Yamasá, constituyendo el principal controlador del clima de la zona, con variantes por el clima de la costa del caribe en la parte sur. Los datos de climatología se han obtenido de las estaciones meteorológicas de la provincia y de publicaciones de la NOAA. De estas fuentes se han obtenido datos de viento, lluvias, humedad y temperatura.

Pluviometría

La pluviometría media es de 2270 mm. El mes más seco es enero (86 mm), mientras que el más lluvioso es agosto (291 mm). La variación de la precipitación (la diferencia entre la precipitación del mes más seco y el más lluvioso) es de 205 mm. Existen datos desagregados por municipio.

Cuadro 5: Precipitación Mensual Máxima (en mm)

Precipitación	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic
Promedio	86	91	119	157	240	240	246	291	251	271	173	106

Fuente: Estación Meteorológica y Datos de la NOAA. Serie de datos 1985-2015.

Vientos

En la provincia San Cristóbal Los vientos ocurren con velocidad entre 12.2 km/h en septiembre y 14.1 km/h en enero, y su media anual es de 13.3 km/h, siendo los meses de febrero a julio, los que exhiben velocidades mayores a los 13 km/h. La Dirección predominante de los vientos es hacia el noreste. La humedad relativa oscila entre 72% a 79%, siendo el promedio anual 76%.

Temperatura

La temperatura media anual de la zona es de encuentra a 25.9 °C. El mes más caluroso es septiembre (26.2 °C), mientras que el menos caluroso es enero (24.0 °C). La variación de temperatura (diferencia entre el mes más caluroso y el menos caluroso) es de 2.2 °C.

Cuadro 6: Temperatura Mensual: Media, Máxima y Mínima (en °C)

Temperatura	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic
Promedio	24.0	24.0	24.5	25.1	25.3	25.7	26.0	26.1	26.2	25.9	25.4	24.2
Mínimo	19.3	19.1	19.2	19.6	20.2	20.6	20.8	21.0	20.8	20.7	20.4	19.6
Máximo	29.4	29.7	30.5	30.9	31.0	31.4	31.6	31.6	31.9	31.6	30.6	29.8

Fuente: Estación Meteorológica y Datos de la NOAA. Serie de datos 1985-2015.

Según los registros de la Oficina Nacional de Meteorología para los años 1965-1990 y 1990-2015, y vistos los valores de otros Estudios de Impacto Ambiental realizados para otros proyectos en la zona, se advierte una ligera diferencia en los valores registrados de temperatura y precipitación de los años mencionados. Estas diferencias, se manifiestan en una disminución de la precipitación y un ligero aumento en los valores de temperatura. Aunque no son muy significativas entendemos que son interesantes, y que deberían tomarse en cuenta en futuros estudios sobre el clima local.

Hidrología

Los principales ríos de la provincia son el río Haina, que constituye el límite oriental de la provincia; el *Nizao*, que forma el límite con la provincia Peravia, y el *Nigua*. Otros ríos son *Mana*, *Yubaso* (o *Blanco*), *La Toma* y los arroyos *Itabo*, *Sainaguá* y *Najayo*. Las áreas húmedas se encuentran en las zonas intramontanas y de sierra, ocurriendo los períodos húmedos más largos, hasta 5-7 meses, en las cuencas de los ríos *Isabela*, *Haina*, *Nigua* y *Nizao*. Estas cuencas se incluyen en los anexos.

Eventos extremos

No existen registros de grandes afectaciones en San Cristóbal por fenómenos climatológicos extremos. Sin embargo, se han analizado los más relevantes al país con incidencia en la Provincia.

1980 Huracán ALLEN paso al sur de la isla, suficientemente cerca para crear grandes oleajes en todas las costas sur y condiciones de Huracán en Barahona.

1987 Huracán EMILY con una típica trayectoria parabólica penetro sobre las costas sur cerca de Nizao y la bahía de Neiba saliendo al atlántico al norte de Haití.

1998 Huracán GEORGES pasa a lo largo de todo el país, con gran destrucción, y fuertes precipitaciones en la cordillera central, causando desbordamientos e inundaciones

2003 Tormenta Tropical ODETTE entra por el suroeste del país sobre provocando abundantes precipitaciones y deslizamientos de tierras en toda la costa suroeste.

5.1.2 Usos del Suelo

Clasificación agrológica

La zona de estudio, presenta -en casi su totalidad - un suelo Tipo VII, con algunas zonas de suelo Tipo VI. Los suelos Tipo VII son terrenos escabrosos de montaña, con topografía accidentada, no cultivables, y aptos para fines de explotación forestal. Los suelos Tipo VI son aptos para bosques, pastos y cultivos de montaña, con limitantes severas de topografía, profundidad y rocosidad[4].

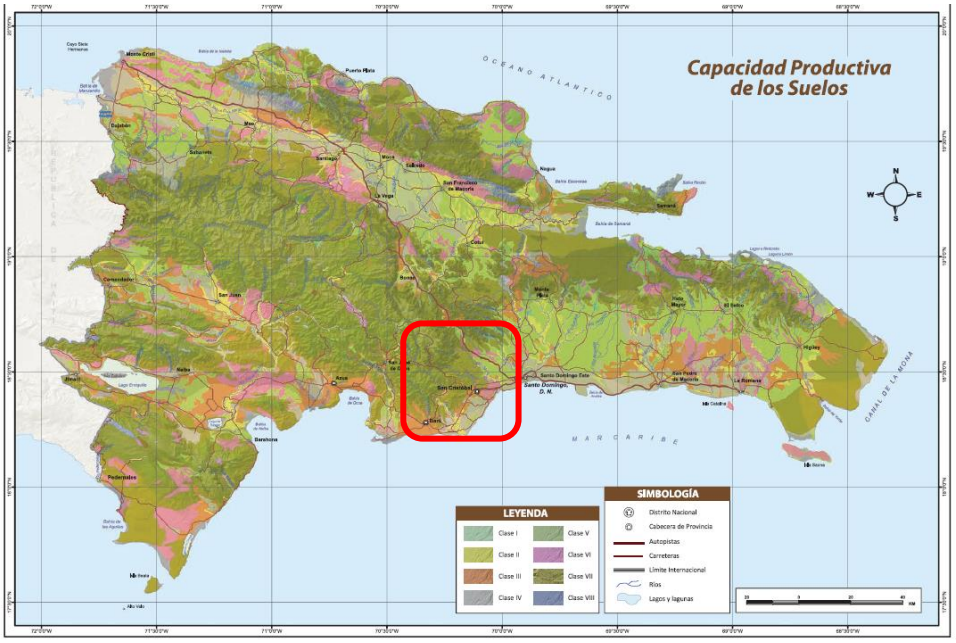

Figura 12: Capacidad Productiva de los Suelos en la Zona de Intervención del Programa
Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

Uso actual y potencial

Para el año 2003, según el mapa de Uso y Cobertura de la Tierra elaborado por el Ministerio de Medio Ambiente y Recursos Naturales, la provincia contaba con diferentes usos agropecuarios ocupando una superficie de 567.19km^2, de los cuales el cacao, pasto, cítricos, caña y cultivo intensivo ocupando 536.99 km^2 equivalente al 95% de su superficie agrícola, mientras que el 5% restante es ocupado por la agricultura mixta, palma africana, coco y café.

[4] Cabe resaltar que los suelos Tipo VII representan casi el 50% de los suelos del país, cubriendo unos 23,584 km^2. Los suelos Tipo VI e; 8.7% de los suelos del país, cubriendo aproximadamente 4,207 km^2.

En el Estudio de Uso y Cobertura del Suelo 2012, la cobertura boscosa ocupa 554.1 km^2 (44.8% de la superficie de la provincia), donde el bosque conífero tiene una extensión de 79 km^2 (6.4%), y el latifoliado 474.8 km^2 (38.3%). La superficie agropecuaria compuesta por cultivos perennes o permanentes, cultivos intensivos anuales y pasto tiene una extensión de 617.6 km^2.

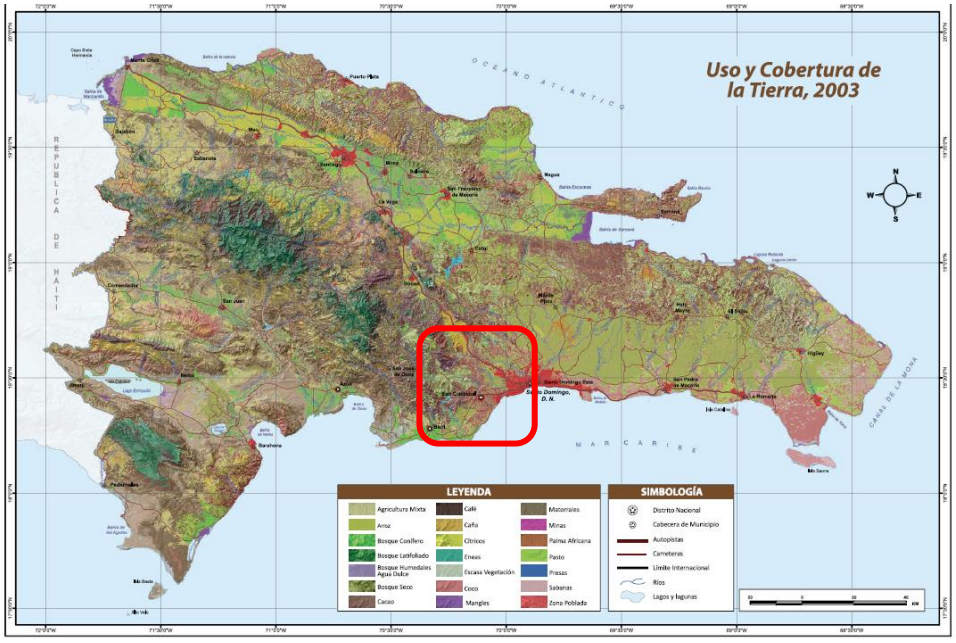

Figura 13: Uso de los Suelos en la Zona de Intervención del Programa
Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

Durante las visitas de campo realizadas a las comunidades durante octubre y noviembre, se pudo constatar que el uso actual del suelo en las zonas de interés es agrícola y forestal. No obstante, la actividad agrícola está muy deprimida en muchas zonas, limitándose a la subsistencia. Además, no se evidenciaron grandes emplazamientos forestales, y la producción industrial es muy escasa.

En la investigación con las municipalidades, se constató que no existen otros usos proyectados para los suelos, ya que este aspecto de planificación territorial aún no está fortalecido en dichas zonas. Por el contrario, el desarrollo de nuevas actividades se estudia proyecto-por-proyecto.

Área de influencia

El área de influencia definida para el programa es la Provincia de San Cristóbal. Esta definición, se refiere al ámbito espacial donde se manifiestan los impactos sociales, económicos o ambientales

que puedan producirse como consecuencia de la ejecución de las intervenciones del programa.

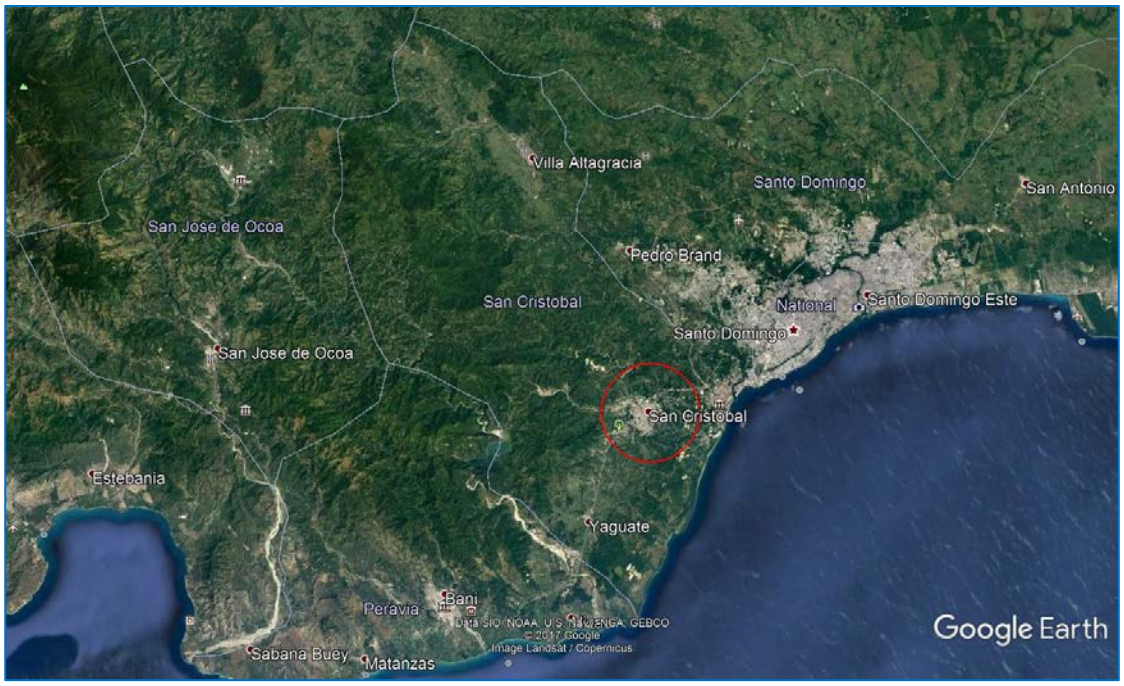

Figura 14: Delimitación Geográfica de la Provincia de San Cristóbal
Fuente: Google Earth Pro, 2017.

Como ocurren en todo el país, la mayor concentración de personas y de infraestructura están localizadas en el municipio cabecera. En el caso del Municipio San Cristóbal (círculo de color rojo) en una pequeña área de 5 km^2 se localiza casi la mitad de la población de la provincia.

El resto de zonas de la provincia, corresponde a zonas rurales, muy remotas, de difícil acceso, y en general la actividad económica está muy deprimida. Existe muy poco desarrollo industrial, minero, o turístico. Por aspectos como la dispersión geográfica y la pobreza, los servicios públicos como electricidad, agua potable, alcantarillado sanitario, y recogida de residuos son precarios.

Desde una perspectiva ecosistémica, se resalta que la provincia cuenta con 8 áreas protegidas, agrupadas en 4 categorías de manejo: Monumento Natural, Paisaje Protegido, Parque Nacional y Reserva Natural, ocupando una superficie de 272.62 km^2. Esto implica que, aproximadamente el 22% del área total de la provincia, está dentro de Sistema Nacional de Áreas Protegidas.

5.1.3 Calidad de los Suelos

Resistencia

Casi la totalidad de los suelos encontrados en las zonas potenciales de intervención son de vocación agrícola, lo cual los hace poco aptos para otros usos. En promedio, el suelo tiene poca capacidad portante (menor de 1.4 kg/cm^2) y un grado de acidez y de aridez relativamente bajo, por lo que no se consideran aptos para construir estructuras pesadas. Al respecto, toda obra deberá ser construcción ligera, salvo se hagan mejoras para aumentar la capacidad del suelo.

Pendientes

El 53% de los suelos que conforman la zona del proyecto presentan pendientes que oscilan desde 15 a 30%, con relieve plano a ondulado; y el 32% aproximadamente se encuentra en el rango de 36 a 60% con relieve suavemente ondulado. El resto del terreno tiene pendientes menores a 15%. Durante la investigación realizada, no se encontraron lugares con pendientes mayores a 60%.

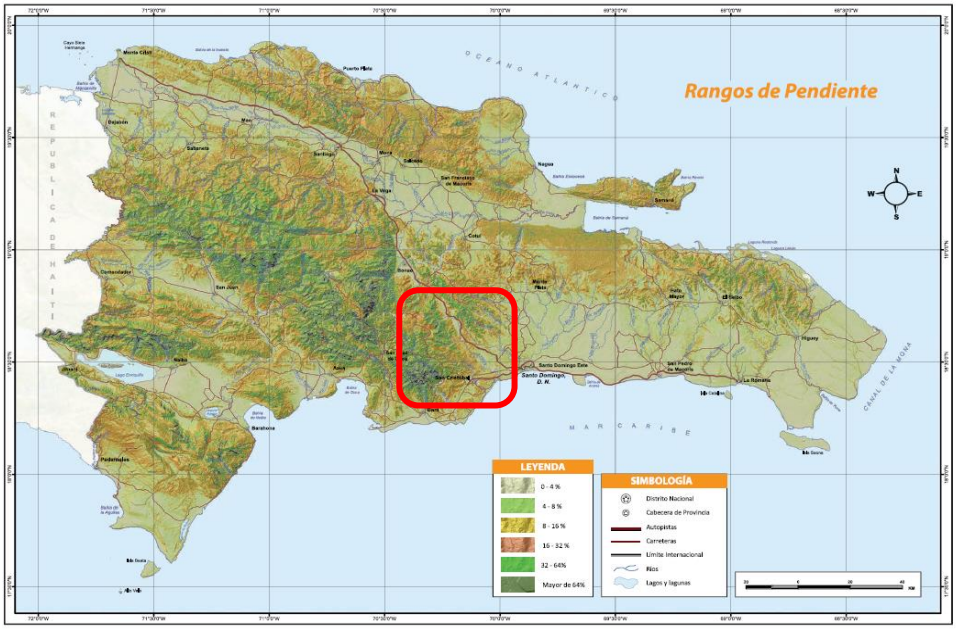

Figura 15: Mapa de Pendientes de los Suelos en la Zona del Proyecto
Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

Estabilidad

La estabilidad del suelo está relacionada con la resistencia que los agregados del suelo ofrecen a los agentes disgregantes externos (agua, viento, variación de temperatura, oxidación, vibraciones,

manipulación mecánica, etc.). Según informaciones provistas por el Servicio Geológico Nacional, los suelos de las zonas potenciales de intervención son de estabilidad alta (79 a 83%, determinado por el Método del tamizado en húmedo, o Método de Yoder). Algunos sondeos aleatorios realizados por el equipo de trabajo en la fase de campo (octubre del 2017), usando el Método de Emerson ("Método de la Borona") reportaron estabilidades de 82% en 12 de 15 puntos.

Permeabilidad

Para las áreas de aportación de caudal de escorrentía, se han obtenido distintos valores promedio de permeabilidad de los suelos. Haciendo un promedio ponderado entre estos valores, se obtiene que el índice de permeabilidad media del suelo (K) es de 0.003x10-2. Esto indica que el terreno tiene buenas condiciones para el drenaje de aguas a la cuenca. Este parámetro es sólo indicativo, ya que cada obra deberá revisar las condiciones propias de las cuencas que son intervenidas.

Resumen

A continuación, se resumen las propiedades de los suelos de la zona del proyecto.

Cuadro 7: Resumen de las Propiedades de los Suelos de las Zonas a Intervenir

Parámetro	Valor	Comentario
Clasificación	VII VI	Vocación: aptos para fines de explotación foresta Vocación: bosques, pastos y cultivos de montaña
Resistencia	>1.4 kg/cm^2	Baja capacidad portante
Estabilidad	79 a 83% 82%	Método Húmedo Método de la Borona
Composición	Tipo B	Materia Orgánica- Arcilla-Arena-Cuarzo
Permeabilidad	1.1 a 1.3x10^{-5}	
Riesgo de desertificación	Muy bajo	Consistente con otros estudios independientes para otros fines
Vulnerabilidad Climática	Media	Sectores: Seguía, Inundaciones, Agua potable, Energía
Pendiente Promedio	22%	Dispersión de ± 11.4%

Elaborado por el equipo del proyecto. Noviembre del 2017.

Dada la dispersión de las zonas incluidas y los tipos de intervenciones en cada lugar, es una buena práctica realizar estudios a escala reducida (al contexto del sitio especifico) según sea aplicable.

5.1.4 Geología y Geomorfología

Geomorfología

La Isla de la Hispaniola tiene 30 regiones geomorfológicas (20 en República Dominicana y 10 en Haití). Cada región de cada país tiene continuidad en el territorio de las adyacentes, y en general con características semejantes, pero con muy marcadas diferencias; las que se deben –sobre todo- al modelaje terrestre por acción humana.

Figura 16: Regiones Geomorfológicas de la República Dominicana
Fuente: Servicio Geológico Nacional (Solicitado el 15.oct.2017)

Las zonas a incluir en el marco del programa se localizan, desde el punto de vista geomorfológico, en los relieves correspondientes a la Llanura Costera del Caribe (que se extiende desde el límite del río Nizao hasta la porción oriental del país). Su relieve se modifica hacia el NNW donde pasa a los relieves del extremo meridional de la Cordillera Central (una zona geomórfica continua), junto con la orla de depósitos fluviales que descienden hasta la línea de costa.

Las unidades geomórficas involucradas con la zona son:

- Llanura Costera del Caribe (X)
- Cordillera Central (XIII)

La Llanura Costera del Caribe consiste en una serie de terrazas que suben gradualmente desde la costa hacia el pie de las cordilleras que la limitan en todo su flanco septentrional. La Cordillera Central presenta, en el entorno, pliegues apretados con una dirección NOSSE. En la configuración de la estructura también ha intervenido una familia de fallas direccionales, con dirección NE-SO a ENE-OSO de movimiento vertical importante. La mayor parte de la fisiografía de la zona viene marcada por la dirección estructural de las estribaciones meridionales de la Cordillera Central, que condiciona tanto la orientación (NNO-SSE) de sus relieves, que alcanzan su cota máxima (522 m).

Entre las elevaciones que se ubican en el área están *Loma Majagua* (1,969 m), *Loma El Grito* (1,800 m), *Loma Pio* (1,400 m), *Loma Vieja* (1400 m), *Loma La Humeadora* (1,315 m), etc. Dicha pendiente general aparece surcada por varios cursos fluviales, entre los cuales, los más importantes son los ríos Nigua, Nizao y Haina. Los deslizamientos se distribuyen de forma dispersa, siendo mayores y más frecuentes en las laderas de los valles de los ríos Nigua y Nizao. Se desarrollan en pendientes pronunciadas a medias sobre todo tipo de litologías si bien tienden a concentrarse en los intervalos lutíticos. La litología depende directamente de la naturaleza del sustrato y corresponde esencialmente a arcillas con cantos y bloques (característica principal de los suelos de la zona).

Zonas como Los Cacaos, Cambita Garabito, Medina y parte de San Cristóbal son los más afectados por el efecto de los derrumbes y deslizamientos, además algunas áreas se involucran con abanicos aluviales, cuyos materiales se movilizan con facilidad y se mueven desestabilizando las áreas.

Geología

La provincia de San Cristóbal está caracterizada desde el punto de vista geológico por la presencia de vastos depósitos carbonaticos arréciales, limitados hacia arriba por los relieves de naturaleza predominantemente magmática de la Cordillera Central. Depósitos cuaternarios de origen terrígeno están presentes en forma de cojines aluviales de los principales ríos del sector occidental. El mapa geológico de la zona, indica la gran diversidad de formaciones presentes.

La zona de interés para efectos de las intervenciones del programa, descansa sobre una gran diversidad de formaciones geológicas, que cronológicamente se distribuyen de la siguiente forma:

1. Cretácico Inferior (K1)

Fm Arroyo Jigüey Rocas volcánicas masivas, intermedias - ácidas con metamorfismo de contacto.

Además, presencia de límites y capas de chert y calizas. Predominancia de basaltos y rocas ultramáficas.

2. Cretácico Superior (K2)

Fm Tireo. Rocas piroclásticas y tufitas de carácter básico-intermedia con metamorfismo de contacto y Gabros.

3. Cretácico Inferior - Paleógeno (K1 - P22)

Granitoides.

Tonalitas foliadas (19). Cretácico Inferior.

Dioritas, cuarzodioritas y cuarzomonzonitas (20). Post-Eoceno medio.

4. Eoceno Inferior - Medio (P21 - 2)

Fm Loma Rodríguez. Calizas estratificadas en parte margosa de colores crema y rosada de plataforma.

5. Eoceno Superior (P22)

Fm Valdesia. Conglomerados poligénicos con clastos de rocas volcánicas y plutónicas y de calizas con una matriz solidificada en alternancia con areniscas y limolitas.

6. Eoceno Superior - Mioceno Inferior (P22 - N1)

El *Grupo Río Ocoa* se deposita discordante sobre los materiales del *Grupo Peralta*. Está constituido por las *Fms Ocoa*, *Limonal* y *Majagua*, desarrolladas en una cuenca detrás del arcoisla cretácico muerto, o ya inactivo, representado por el *Grupo Tireo*.

Las *Fms Limonal* y *Majagua* se forman en ambientes sedimentarios muy similares, si bien es más evidente en sus facies la influencia de un sistema deltaico cercano. La aparición de slumps y pequeños evidencian la existencia de cierta inestabilidad tectónica en la cuenca.

Los conglomerados y olistolitos de la *Fm Ocoa* registra ambientes de depósito en una cuenca turbidítica, en un contexto de talud, que recibía grandes olistolitos desde el borde activo de la cuenca (Falla de San José-Restauración).

7. Mioceno Inferior (N12)

Fm Fort Resolue. Alternancia de conglomerados, areniscas gravosas y areniscas.

Fm San Cristóbal. Marga arenosa con capas de arenisca calcárea.

Formación *Río Nizao*. Conglomerados, arenas y Lutitas calcáreas.

8. Mioceno Inferior – Pleistoceno (N12 - Q1)

El *Grupo Ingenio Caei* se deposita sobre una discordancia angular y erosiva sobre los materiales del *Grupo Río Ocoa*. Este grupo registra discordancias progresivas que registra la sedimentación sincrónica al levantamiento de la Cordillera Central desde el Mioceno superior hasta la actualidad.

En conjunto, las *Fms Río Nizao* e *Ingenio Caei* representan un sistema marino-costero de sedimentación siliciclástica y carbonatada en el que predominan las facies deltaicas y que experimenta repetidas oscilaciones relativas del nivel del mar.

Formación *Ingenio CAEI*. Calcarenitas y calizas. Miembro *Boca de Los Arroyos* Conglomerados, arenas, limos y calizas. Miembro Loma de Duveaux. Conglomerado polimíctico. Miembro Sabana Grande. Calizas, calcarenitas y arenas finas.

9. Cuaternario (Q1- 4)

9.1 Pleistoceno (Q1-3)

Depósitos pleistocenos marinos y costeros.

Fm La Isabela. Calizas arréciales, calcirruditas y calcarenitas y margas y calcarenitas con corales.

Cordón litoral antiguo Arenas finas con fragmentos de moluscos.

Piedemonte antiguo (19). Lutitas y arenas con gravas y cantos.

9.2 Pleistoceno-Holoceno (Q 3-4)

Terrazas altas. Conglomerados y arenas.

9.3 Pleistoceno-Holoceno

Glacis (21). Arenas y arenas limosas con niveles de cantos y gravas

Terrazas medias-altas (22) y bajas (23). Cantos, gravas y arenas.

Holoceno.

Terrazas bajas. Conglomerados y gravas.

Abanicos aluviales. Arenas y lutitas

Piedemonte. Arcillas, limos y arenas con cantos.

Aluvial-coluvial. Arenas y lutitas con cantos.

Zona con derrames y avulsión de canal y llanura de inundación. Lutitas y arenas con cantos y gravas.

Coluviones. Limos y arcillas con cantos.

Fondos de valle. Conglomerados, gravas y arenas.

Áreas endorreicas. Lutitas negras con restos vegetales.

Playas y cordón litoral. Arenas y gravas bioclásticas.

Deslizamientos de ladera. Bloques, cantos y arenas

Conos de deyección. Gravas arcillas y arenas

Coluviones. Arenas limosas con cantos y bloques

Llanura de inundación. Limos con niveles de cantos y arenas

Fondos de valle con funcionamiento estacional y fondos de valle (depósitos localmente discontinuos).

Cantos, arenas y gravas.

La mayor parte de las zonas a intervenir en el contexto del programa, se sitúa sobre el *Cinturón Metamórfico Intermedio*, dominio definido por Bowin para denominar un conjunto de unidades metamórficas que configuran el flanco septentrional de la Cordillera Central. La presencia de este conjunto de unidades metamórficas en el centro de la isla se ha relacionado con los estadios primitivos (pre-Cretácico superior) de su evolución. Dentro de ella se destaca el *Complejo Duarte*, del Jurásico superior, que representa el conjunto litológico más antiguo de la isla.

La estructura más importante en la región es la terminación suroriental de la Zona de Falla de San José-Restauración que separa dos bloques con claras diferencias estructurales y estratigráficas. Su funcionamiento más reciente es como falla inversa de componente sinestral y vergencia hacia el suroeste en que la transpresión ha originado una estructura en flor positiva.

Tectónica

La isla de la Hispaniola tiene importantes fallas geológicas, muchas de las cuales están en la cordillera septentrional (al norte del Valle del Cibao); la Hispaniola, (al sur del Valle del Cibao); el límite de las placas tectónicas norteamericanas y las placas tectónicas del Caribe (al norte de Puerto Plata); la de Camú (al sur de Puerto Plata); la de San Juan de la Maguana y la falla del Lago Enriquillo. Esta última es la de más reciente activación, y es aún objeto de diversos estudios.

Figura 17: Principales Fallas Geológicas de la Isla de la Hispaniola
Fuente: Servicio Geológico Nacional (Solicitado el 15.oct.2016)

Existe un gran número de trabajos de investigación con relación a la sismicidad de la Hispaniola, que plantean desde el desarrollo geológico y tectónico de la isla hasta estudios de detalle en áreas específicas. No obstante, el conocimiento en detalle de las fallas con potencial sismogénico es muy limitado, restringiéndose básicamente a la Falla Septentrional, sobre la cual se han hecho varios trabajos de investigación importantes. Las provincias del Cibao son las más expuestas al riesgo de terremotos, pues la zona está cerca del borde de la interacción entre las placas tectónicas de Norteamérica y del Caribe. Por esto, la zona del programa no es de alta sismicidad.

Las consideraciones para la selección de las fallas sismogénicas consideradas, han sido tomadas con base en la información geológica disponible, en la estructura morfotectónica de la zona y en la concentración de eventos sísmicos en los alrededores de aquéllas. Las zonas que influyen en la región bajo estudio son la Falla San José-Restauración, Falla Bonao y Falla Hatillo.

- Falla San José – Restauración: Corre en sentido WNW-ESE por la parte central y flanco sur de la cordillera central. Se considera una falla transcurrentesinestral y con buzamiento hacia el norte. Su traza no es continua a todo lo largo, pero puede ser inferida a partir de la geomorfología. La sección correspondiente a las cercanías de San José de Ocoa se considera como falla inversa y posiblemente activa.

- Falla Bonao: Es una falla de trazo curvo cóncavo hacia el este, que va de la cordillera central hasta el valle del Cibao, en las inmediaciones de Bonao. Se considera una falla inversa por la disposición de las unidades geológicas a ambos lados de la misma (*Complejo Duarte* y *Formación Tireo*). Estudios para hidroeléctricas la señalan como una falla inactiva. No obstante, la actividad sísmica de la zona es considerable.

- Falla Hatillo: Es una falla de cabalgamiento con trazo ligeramente curvo cóncavo hacia el NE y buzamiento hacia el SW. No tiene una alta relevancia a los fines del programa.

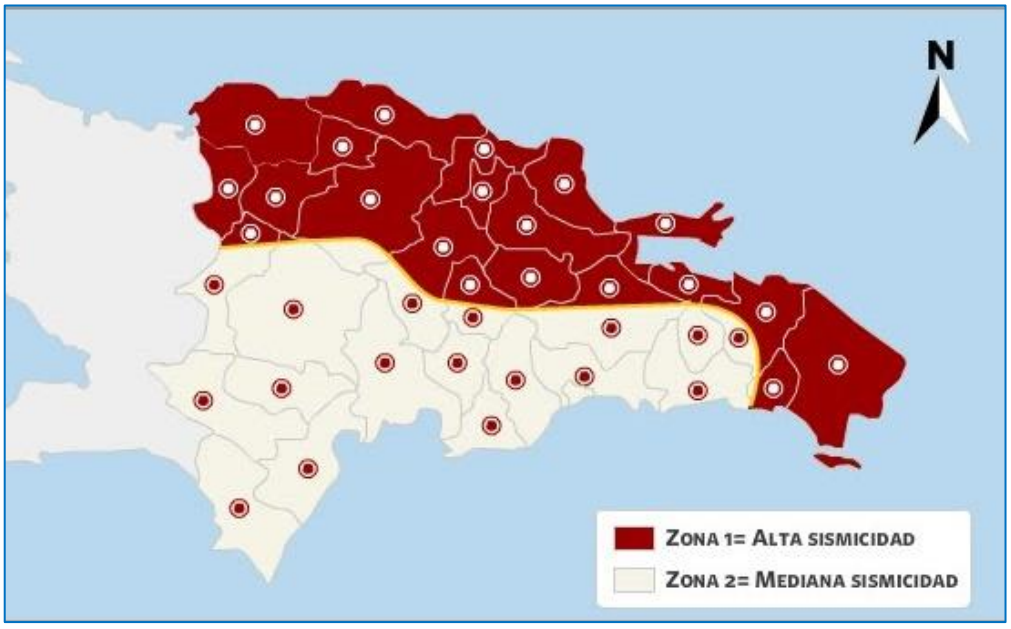

Figura 18: Zonificación Sísmica de la República Dominicana
Fuente: Servicio Geológico Nacional (Solicitado el 15.ene.2016)

Los lineamientos que se han utilizado para el análisis de la tectónica han sido levantados de los resultados de la fotointerpretación de las imágenes satelitales realizadas por otros proyectos de prevención de riesgos sísmicos. Estos fueron clasificados en dos grupos en función de la longitud de las trazas detectadas: un grupo de 4 km y otro de 2 km. Dichos lineamientos corresponden a:

- Terreno Loma Caribe
- Terreno Duarte

El cuadro siguiente indica las características de dichos lineamientos.

Cuadro 8: Distribución de los Lineamientos en la Zona del Programa

Terreno	Longitud	No. De Datos	Rumbo Principal
Loma Caribe – Tavera	2 km	214	N80° - 90° N120°- 130°
		43	N60º - 70º
Duarte	4 km	499	N80° - 90° N120° - 130°
		102	N70º - 80º

Fuente: Informe Reducción de la Vulnerabilidad Sísmica de la Provincia de San Cristóbal, JICA, 2015.

5.2 Medio Biótico

5.2.1 Flora y Fauna

Zonas de vida

La zona de vida en el área es el bosque húmedo subtropical (bh-S). Las zonas de esta formación se extienden desde el nivel del mar hasta los 500 metros. En el sur del país, dicha zona va por el sur de las vertientes de la Cordillera Central hacia los valles cuyos ríos desembocan en el Caribe.

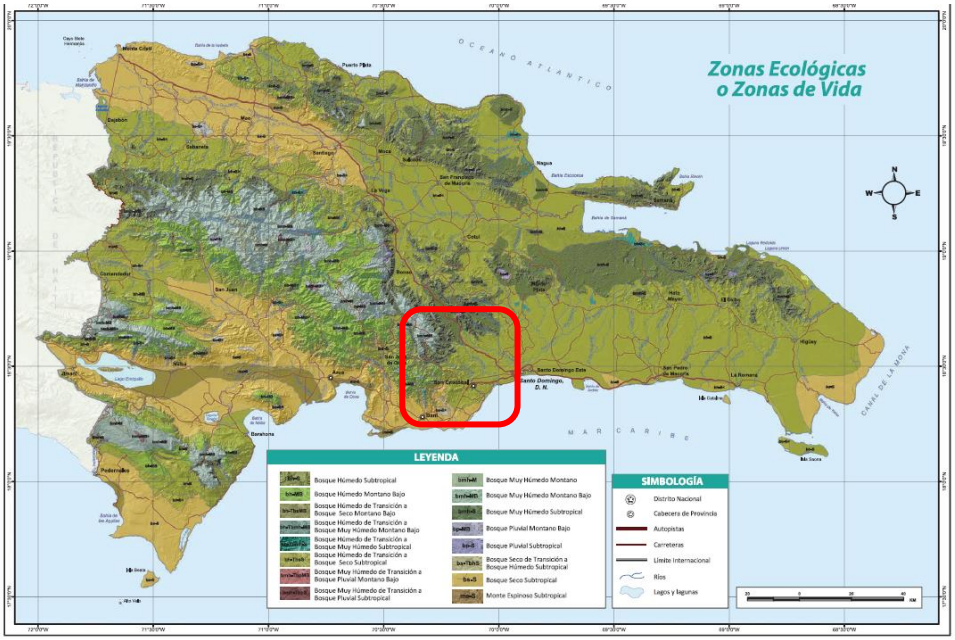

Figura 19: Zonas de Vida Predominantes en el Área de Interés

Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

Otras zonas ecológicas identificadas en el estudio son: bosque muy húmedo subtropical (bmh-S) y, hacia la franja costera de la provincia persiste el bosque seco subtropical (bs-S).

Flora y vegetación

Para el levantamiento de las informaciones en la zona, se realizaron cuatro viajes de campo en noviembre del 2017. Se realizaron muestreos preferenciales directos, que consisten en ubicar las unidades muestrales consideradas como relevantes al estudio. Este muestreo, se basa en suposiciones sobre las propiedades de la vegetación (Matteuci & Colma, 1982). Este método se adapta a los requerimientos del programa, tanto para la vegetación que sería potencialmente afectada dentro del límite del programa, así como las afectaciones que pueda sufrir el entorno.

La pre-identificación de especies fue realizada *in-situ*. Especies que no pudieron ser identificadas en el campo, se colectaron y luego se identificaron (por comparación) con los especímenes de archivo disponibles en el Herbario del Jardín Botánico Nacional. Los nombres comunes fueron tomados del Diccionario de *Nombres Vulgares de La Española*, del guía acompañante, y de la propia experiencia del técnico de campo líder. En otros casos, se recurrió al uso de claves taxonómicas contenidas en los tomos de Liogier. Los elementos incluidos en el muestreo fueron:

- Vegetación
- Ambientes
- Sotobosque
- Cultivos

Los resultados de la etapa de pre-identificación fueron los siguientes:

Vegetación: en toda la zona del programa, se observa una vegetación muy diversa, la que se debe a los diferentes tipos de ambiente que dan allí. Por ejemplo, en la zona hay pastizales, frutales, arbustos, maderables, cultivos menores, temporales y permanente. Las áreas destinadas a ser minadas, presentan también esas condiciones de vegetación.

Ambientes: en la zona este se presentan variedades como Coco (*Cocos nucifera*) con una altura de entre 3 y 5 metros, sobresaliendo también algunos árboles dispersos de Ciruelillo (*Buchenavia*

tetraphylla), Pino (*Pinus caribaea*) y Maricao (*Byrsonima spicata*). En la parte este, hay arbustíferas como Palo Santo (*Myrsine coriacea*), Mala Mujer (*Cordia mirabiloides*) y también hay herbáceas como Tibouchina (*Tibouchina longifolia*), Amor Seco (*Desmodium spp*), Escoba (*Sida spp*), y otras. También existen en esta parte del terreno, como lianas y bejucos, como el Bejuco de Costilla (*Serjania polyphylla*), Bejuco de Leche (*Mesechites angustifolia*) y la Marabelis (*Securidaca virgata*).

En la parte más al norte, se presentan Ciruelillo (*Buchenavia tetraphylla*), Pino (*Pinus caribaea*), Guzuma (*Guazuma tomentosa*), etc. También se aprecia Peluda (*Clidemia hirta*) y herbáceas como Cadillo (*Bidens pilosa*), Rabo de Mulo (*Andropogon bicornis*) Rompezaragüey (*Eupatorium odoratum*), y helechos tipo Calimete (*Pteridium aquilinum*).

En la zona cercana a los ríos se han identificado extractos arbóreos superiores, que incluye -entre otras- Aguacataillo (*Ocotea leucoxylon*), Sablito (*Didymopanax morototoni*), Amacey (*Tetragastris balsamífera*), Ciruelillo (*Buchenavia tetraphylla*), Jina (*Inga fagifolia*), etc. En otro extracto de menor altura existen Cocuyo (*Hirtella triandra*), Caimitillo (*Chrysophyllum oliviforme*), Guárano (*Cupania americana*), Maricao (*Byrsonima spicata*), y otros. Entre las arbustíferas existen Caimoní (*Wallenia lavrifolia*), Palo de Leche (*Tabernaemontana citrifolia*), Cascarita (*Casesaria arbórea*), entre otros.

Sotobosque: está conformado por helechos de distintos tipos y un gran cúmulo de plántulas pequeñas de las especies de árboles y arbustos antes mencionados. En este ambiente, son notorias las lianas y epífitas como Samo (*Entada gigas*), Bejuco de Tabaco (*Ipomoea spp*), Bejuco de Costilla (*Serjania polyphylla*), Orquidea (*Epidendrun*), y varios Bejucos (*Anthrurium scandens*) y Cactus (*Rhipsalis baccifera*). Hay una significativa presencia de pasto en las zonas de ganadería.

Cultivos: existen en el lugar cultivos menores como Yuca (*Manihot esculenta*) Guandul (*Cajanus cajan*), Yautía (*Colocasia esculenta*), Piña (*Ananas comosus*), Platanos y Guineos (*Musasea spp*), entre otros. Así también, existen cultivos permanentes, como Aguacate (*Persea americana*), Naranja, Mandarinas y Chinas (*Citrus spp*), Coco (*Cocos nucifera*) y Orégano (*Lippia micromera*), etc. Entre las variedades forestales observadas en el lugar están el Pino (*Pinus caribaea*) y la Acacia (*Acacia mangium*). Un amplio ambiente de pastizales incluye una mezcla de Yerba de Guinea (*Panicum maximum*), Pangola (*Brachiaria Decumbens*) y Yerba Estrella (*Cynodon nlemfuensis*), etc.

Resultados: se identificaron 320 especies de plantas vasculares, pertenecientes a 243 géneros y distribuidas en 84 familias de angiosperma y 19 pteridophytas. Las familias con mayor número de

especies fueron: *Poaceae* (20), *Fabaceae* (19), *Asteraceae* (16) y *Melastomataceae* (16). Según su forma de vida, los resultados fueron los siguientes:

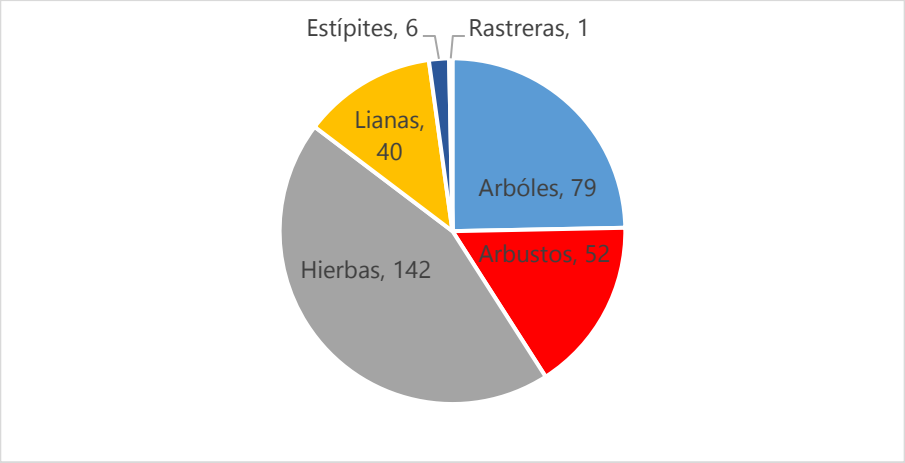

Figura 20: Formas de Vida Predominantes en el Área
Fuente: Estudios de Flora y Fauna realizados por el equipo del proyecto (2017).

Cuadro 9: Formas Biogeográficas de las Plantas Observadas en el Sitio

Estatus	Cantidad	Porciento
Nativas	260	81.3
Naturalizadas	6	1.9
Endémicas	4	1.2
Introducidas	50	15.6

Fuente: Estudios de Flora y Fauna realizados por el equipo del proyecto (2017).

De las 320 especies identificadas, sólo hay 4 especies protegidas (o amenazadas): Palma Catey (*Bactris plumeriana*), Cola (*Mora abbotti*), Cedro (*Cedrela odorata*) y Palma Real (*Roystonea hispaniolana*). Afortunadamente, ninguna de las especies mencionadas se encuentra dentro de las comunidades estudiadas. Esto ha sido verificado en campo y constatado en las ortofotos (fotos aéreas y satelitales), aunque se reconoce la limitación de que estos son resultados de un muestreo.

En las incursiones realzadas, se confirmó que en el área de influencia sólo existen 4 especies endémicas de la isla Hispaniola: Palma Catey (*Bactris plumeriana*), Cola (*Mora abbottii*), Vernonia (*Vernonia springeliana*) y Palma Real (*Roystonea hispaniolana*).

Fauna

Ambientes: El área correspondiente al desarrollo del proyecto constituye un espacio de trascendental importancia para la estancia y realización de las actividades fundamentales de las especies de la fauna, ornitofauna, herpetofauna y especies asociadas, para el cumplimiento adecuado de sus funciones ecológicas y de reproducción. Los diversos ambientes presentes, constituidos por vegetación tropical y especies características de ambientes húmedos, subsistemas hídricos conformados por arroyos, ríos, y otras fuentes acuíferas, suelos húmedos forestales y la diversidad de bloques de vegetación y de árboles receptivos a la presencia de la ornitofauna y otras categorías, hacen del lugar un sitio apacible para la habilitación de una amplia diversidad de especies animales.

Metodología: El equipo de trabajo hizo el levantamiento del estudio, se diseminó en toda el área de muestreo del mismo, y trazó varios transectos lineales y circulares para tomar los datos pertinentes para conocer el estado situacional de la fauna en sentido general, y de la ornitofauna en sentido particular. Para esto se establecieron estaciones y transectos para la observación del desenvolvimiento de todas las especies de la fauna y la avifauna, anotar su comportamiento y contabilizar el número de individuos presentes en el área.

Para cada especie identificada, se identificaron:

- Vulnerabilidad
- Grado de amenaza
- Status
- Nombre común y científico
- Especie, género y familia
- Frecuencia relativa
- Clase a la que pertenece

En ese sentido, se establecieron tres (3) estaciones de observación con un radio de 1 km (cada una) en tres comunidades elegidas aleatoriamente. La primera (los cacaos), en un sitio con condiciones apropiadas para toma de agua, otra hacia el norte de villa Altagracia, en una propiedad privada con vocación de producción de café y cacao, y la tercera en la comunidad de Catarey (próximo a una cañada cercana a un extinto ingenio azucarero del CEA).

Desde cada estación se trazaron transectos de a 100 metros en cada estación hasta 1 km, para ir anotando a lo largo de cada una de ellas y a ambos de estas, las presencias o no. Esta aproximación tiene el nivel de precisión adecuado, con respecto a los objetivos del estudio.

Figura 21: Estaciones de Observación de Fauna

Fuente: Estudios de Flora y Fauna realizados por el equipo del proyecto (2017).

Conteos: En la primera estación (Fauna1), fueron observadas las siguientes especies: Aura Tiñosa (*Cathartes aura*) con dos (2) individuos; Petigre (*Tyrannus dominicensis*) con tres (3) individuos; Garza Ganadera (*Bubulcus ibis*) con seis (6) individuos; Zumbadorcito (*Mellisuga minima*) con un (1) individuo; y Cigüita común (*Coereba flaveola bananivora*) con dos (2) individuos.

En la segunda estación (Fauna 2) se avistó: Cigua Palmera (*Dulus dominicus*) con seis (6) individuos; Ruiseñor (*Mimus polyglottos*) con un (1) individuo; Cigua Saltarina (*Seiurus aurocapillus*) con tres (3) individuos; Rolita (*Columbina passerina*) con dos (2) individuos. Además se observaron dos (2) individuos de Rana Lucia (*Celestus spp*); dos (2) individuos de Lagarto Verde (*Anolis chlorocyanus*); un (1) individuo de Lagarto Cabezón (*Anolis cybotes*); cuatro (4) individuos del Lagarto Común (*Anolis distichus*); y un (1) individuo de *Antillophis parvifrons* (Culebrita sabanera negra).

En la tercera estación (Fauna 3), aquí fueron identificadas las especies: Julian chivi (*Vireo altiloquus*) con dos (2) individuos; Zumbador grande (*Anthracothorax dominicensis*) con un (1) individuo; Carpintero (*Melanerpes striatus*) con cuatro (4) individuos; Cotorra (*Amazona ventralis*) con dos (2) individuos; Barrancolí (*Todus subulatus*) con un (1) individuo) y Guinea Cimarrona (*Numida meleagris*) con cuatro (4) individuos; y el Perico (*Aratinga chloroptera*) con dos (2) individuos.

Matriz de fauna: en base a su status, al número de individuos observados, el orden, la familia, la especie y la frecuencia o abundancia relativa, se estructuró una matriz del estado situacional-poblacional de las especies presentes, así como su grado de amenaza. Esto sirve de base para la toma de decisión de manejo de fauna en el Plan de Manejo y Adecuación Ambiental.

Cuadro 10: Matriz de la Fauna Observadas en el Sitio

Nombre Común	Estatus	Observados	Frecuencia Relativa	Abundancia Relativa	Amenazado
Zumbador Grande	E	1	2.32	Escaso	Si
Zumbadorcito	ER	1	2.32	Escaso	Si
Julián Chiví	N	2	4.64	Escaso	No
Cigua Palmera	E	6	13.92	Media	No
Cigüita Común	N	2	4.64	Escaso	No
Cigüita Saltarina	N	3	6.96	Escaso	No
Ruiseñor	N	1	2.32	Escaso	Si
Petigre	N	3	6.96	Escaso	No
Aura Tiñosa	M	2	4.64	Escaso	Si
Garza Ganadera	M	6	13.92	Media	No
Rolita	ER	2	2.32	Escaso	Si
Carpintero	E	4	9.28	Media	Si
Cotorra	ER	2	4.64	Escaso	No
Perico	E	2	4.64	Escaso	No
Barrancolí	E	1	2.32	Escaso	No
Guinea Cimarrona	I	4	9.28	Media	No
Pájaro Bobo	E	1	2.32	Escaso	No

Fuente: Estudios de Flora y Fauna realizados por el equipo del proyecto (2017).

Resultados: de acuerdo a los resultados arrojados por la matriz de fauna en donde aparece un listado de las principales especies detectadas y observadas se concluye que:

- Se identificaron diez (10) órdenes: *Coraciformes*, Passeriformes, Piciformes, Apodiformes, Ciconiformes, Columbiformes, Falconiformes, Psittaciformes, Galliformes y Cuculiformes.
- Fueron identificadas quince (15) familias (Trochilidae, Vireonidae, Dulidae, Coerebinae, Parulinae, Mimidae, Tyrannidae, Cathartidae, Ardeidae, Columbidae, Picidae, Psittacidae, Todidae, Phasianidae, y Cuculidae).
- Resultaron un total de 43 (cuarenta y tres) individuos, siendo los de mayor frecuencia relativa, las familias Dulidae y Ardeidae, representadas por la Cigua y la Garza.

En relación al status de las especies observadas, unas seis (6) resultaron endémicas de la República Dominicana (E), unas tres (3) especies son endémicas de la Región de Las Antillas (ER); unas cinco (5) especies son nativas (N) y dos (2) especies son migratorias. En el estudio contabilizó unas diecisiete (17) especies, incluyendo una introducida. La mayoría de las especies son escasas y presenten una abundancia media o baja. Las especies no presentan amenazas, y las que estén amenazadas se compensarán con las debidas acciones incluidas en el plan de manejo definitivo.

De la observación realizada, comparación de información y registro, se resalta que ninguna de las especies encontradas está incluida en las categorías de especies amenazadas. En esto se verificó con la data incluida en los listados de la UICN, consultas a expertos, y las regulaciones de CITES5. En el Plan de Manejo y Adecuación Ambiental, se debe incluir el monitoreo de estas especies.

5.2.2 Ecosistema y Paisaje

Sistemas de entorno natural

Del estudio realizado, se ha producido un primer inventario de los sistemas ambientales en la zona de interés. Dicho inventario, se ha obtenido para la totalidad de comunidades beneficiarias.

[5] Se refiere respectivamente a la *Lista Roja de Especies Amenazadas*, elaborada por la Unión Internacional para la Conservación de la Naturaliza (UICN); y lo dispuesto en la *Convención sobre el Comercio Internacional de Especies. Amenazadas de Fauna y Flora Silvestres* (CITES). La República Dominicana tiene su propio libro rojo de especies con estos criterios, pero igual ninguna de las especies observadas aparece en ellos.

Cuadro 11: Sistemas Ambientales del Entorno

Sistema	Dentro	Fuera	No Existe	Dist. (m)	Fuente
Acuífero	X				Google Earth
Línea de Costa			X		Google Earth
Arrecifes			X		Google Earth
Bahías			X		Google Earth
Bosques	X	X			Google Earth, Visita al sitio
Cayos			X		Google Earth
Cuevas			X		Google Earth
Dunas					Google Earth
Ensenada					Google Earth
Estuario					Google Earth
Lago	X	X			Google Earth
Laguna		X			Google Earth
Manantiales	X				Google Earth
Manglares	X				Google Earth
Humedales	X				Google Earth
Pantanos			X		Google Earth
Pozos	X				Visita al sitio
Cañadas	X	X			Google Earth, Visita al sitio
Refugio de Aves			X		Google Earth
Embalses	X				Google Earth
Ríos	X	X			Google Earth, Visita al sitio
Playas			X		Google Earth, Visita al sitio
Bosques Costeros			X		Google Earth
Canteras	X	X			Visita al sitio (proyecto)
Minas (metales)	X		X		Google Earth
Canal	X		X		Google Earth
Sistema de Riego	X		X		Google Earth
Vertedero	X	X	X		Google Earth, Visita al sitio
Farallones			X		Google Earth
Otros					No observados

Fuente: Construida con imágenes satelitales y visitas guiadas por la zona. (2017).

Integridad del hábitat

No se han evidenciado una fragmentación relevante del hábitat, ya que muchas de las zonas han pasado de ser agrícolas (en la época de bonanza del Ingenio Caratey) y estar dedicada al cultivo de caña; a ser un espacio de terrenos baldíos, escasa población y reducida productividad. También, muchas zonas de montaña conservan la condición de bosque, aunque existen los vicios de la deforestación para producción ilegal de carbón y para la expansión de la frontera agrícola.

Áreas protegidas

La provincia San Cristóbal cuenta con 8 áreas protegidas, agrupadas en 4 categorías de manejo que son las siguientes: Monumento Natural, Paisaje Protegido, Parque Nacional y Reserva Natural, ocupando una superficie de 272.62 km² lo que corresponde aproximadamente al 22% del área total de la provincia están dentro de Sistema Nacional de Áreas Protegidas (SINAP).

Tras consultar el Mapa de Áreas Protegidas, y hacer una comparación georreferenciada de estas áreas; se constató que las zonas de intervención del programa tienen coincidencias con áreas protegidas y/o sus zonas de amortiguamiento. Así también, hay coincidencias con otras áreas de cobertura boscosa o destinadas a emprendimientos agrícolas. Esto implica que el programa tiene la oportunidad de maximizar sus impactos positivos, con la mejora de las condiciones agrícolas o forestales. En los anexos, se incluye un mapa de coincidencias con las áreas protegidas.

5.3 Medio Socioeconómico

5.3.1 Contexto General

Demografía

La provincia San Cristóbal forma parte de la región Valdesia y cuenta con una superficie de 1,240.63 km². Limita al norte con las provincias Monseñor Nouel y Monte Plata, al este con la provincia Santo Domingo, al sur con el mar Caribe, y al oeste las provincias San José de Ocoa y Peravia. Sus coordenadas son 18º 33’ latitud norte y 70º 12’ longitud oeste. Está conformada por 8 municipios, 6 distritos municipales, 48 secciones, 463 parajes, 94 barrios y 236 sub-barios.

Según las estadísticas oficiales, la provincia tiene una población de 569,930 habitantes. De estos, el 50.04% son hombres y 49.96% son mujeres. La población urbana es de 295,539 habitantes

(51.86%), mientras que la población rural es de 274,391 personas (48.14%). A nivel provincial, el 10% de la población son niños menores de 5 años de edad, lo que se repite en los municipios.

Empleo

Según las estadísticas oficiales, de una población económicamente activa de 447,270 habitantes, solo el 39.1% está ocupado (empleo formal, informal, permanente, temporal, etc.). Esto indica que el desempleo es un estreso importante para las comunidades, especialmente para segmentos vulnerables como mujeres, envejecientes, personas con alguna discapacidad, y los desalentados[6]. La distribución del empleo, según reportan las autoridades, es la indicada a continuación.

Cuadro 12: Personas Ocupadas por Rama de Actividad Económica

Rama de actividad	Hombres	Mujeres	Total	%
Agricultura, ganadería y pesca	9,253	905	10,158	5.8
Industria y minería	20,658	9,130	29,788	17.0
Servicios financieros e inmobiliarias	5,196	2,181	7,377	4.2
Transporte y actividades relacionadas	14,639	752	15,391	8.8
Comercio y hostelería	28,976	13,764	42,740	24.5
Servicios domésticos	1,075	17,136	18,211	10.4
Administración pública	7,479	8,429	15,908	9.1
Construcción	12,295	299	12,594	7.2
Otros servicios	5,096	9,425	14,521	8.3
No declarada	4,988	3,062	8,050	4.6
TOTAL	**109,655**	**65,083**	**174,738**	**100.0**

Fuente: IX Censo Nacional de Población y Vivienda 2010 (ONE, 2014).

Esta estadística refleja una gran asimetría de acceso a oportunidades laborables en San Cristóbal, ya que las mayores fuentes de ingreso (Industria y Minería, y Comercio y Hostelería) están muy concentradas en la zona urbana (San Cirstóbal y Bajos de Haina). Otras actividades importantes que demandan mano de obra, como el servicio doméstico y el transporte, están muy orientados a las ciudades (pueblos principales o municipios cabecera), igual que la administración pública.

[6] Las personas desalentadas son aquellas que no trabajan, no buscan empleo y tampoco declaran otro tipo de actividad (estudio, quehaceres domésticos, etc.), pero que están disponibles para aceptar un empleo si se les ofrecieran uno. Esta definición es parecida, pero no igual a los "Ni-Ni".

Esto también tiene otras implicaciones externas, como la demanda de productos locales o la cantidad de personas que tienen afiliación al Sistema Nacional de Seguridad Social, entre otros.

5.3.2 Contexto Especifico

Socioeconómico

Las zonas de intervención del programa son esencialmente comunidades rurales, cuya principal vocación es agricultura de auto subsistencia, y la ganadería extensiva familiar. Como se establece en los criterios de selección de comunidades beneficiarias, dichas comunidades son -en su gran mayoría- deprimidas económica y socialmente. Esto se exacerba con la presencia de dominicanos descendientes de haitianos y de nacionales haitianos inmigrantes, muchos de los cuales viven en condiciones de profunda marginalidad. La infraestructura de servicios de estos lugares es de calidad baja a precaria, por lo que los comunitarios valoran positivamente el proyecto y su aporte.


Figura 22: Condiciones de Marginalidad de las Comunidades
Fuente: Visitas de campo realizada entre octubre y noviembre del 2017[7].

Social y Cultural

Organización: En las zonas de intervención del programa, son comunidades no muy populosas y que no disponen de una infraestructura social muy desarrollada. Los principales núcleos identificados son Juntas de Vecinos, Asociaciones de Padres, Maestros y Amigos de la Escuela, y Asociaciones de Productores. Por estas razones, el programa deberá integrar las estructuras provinciales, y crear y fortalecer capacidades locales para desarrollar dichas zonas, combatir su pobreza, y desde luego disminuir su vulnerabilidad climática mediante una correcta adaptación.

Científico: No existen en la zona, o al menos no han sido descubiertos, elementos u objetos con valor arqueológico, antropológico, o histórico. En el caso que fueran descubiertos algunos en el futuro, el promotor del proyecto dará parte a las autoridades para proceder al efecto. En estos casos, se deberá establecer el debido protocolo con el Ministerio de Medio Ambiente y Recursos Naturales, el Ministerio de Cultura, y las comunidades relevantes a los hallazgos encontrados.

La definición anterior, no abarca las áreas protegidas coincidentes con las zonas de intervención del programa, las cuales pueden tener valor científico desde el punto de vista de la biodiversidad.

Perspectivas: aunque no se ha comunicado el estimado de empleos a generar por el programa en cada comunidad (especialmente para no crear sobre-expectaciones entre las comunidades). No obstante, se pudo constatar que la comunidad conocía sobre el proyecto y sus posibles beneficios.

[7] NA: estas imágenes han sido captadas con fines técnicos y científicos y, de ninguna manera, pretenden ofender, irrespetar o herir la sensibilidad de las personas o comunidades incluidas en las mismas. Se ruega a los lectores abordarlas con el debido respeto que merecen las personas fotografiadas y su condición.

6. Impactos identificados para el programa

6.1 Impactos Generales del Programa

6.1.1 Aspectos generales

Impacto medioambiental

El impacto ambiental puede definirse como cualquier alteración significativa, positiva o negativa, de uno o más de los componentes del medio ambiente y/o los recursos naturales, provocada por la acción humana, por acontecimientos de la naturaleza, o bien por una combinación de estos.

Toda actividad humana, de una manera u otra, afecta el ambiente en el que se desarrolla. Esta afectación, dependiendo del caso, puede ser negativa (es decir, que tiende a dañar o a degradar el medio, dañándolo parcial o totalmente, de forma transitoria o permanente), pero también pueden ser positivas -desde el punto de vista del balance entre los elementos naturales que pueden o deben sacrificarse, comparadas con los elementos que pueden mejorar o los beneficios.

Impacto socioeconómico

Los impactos sobre el medio socioeconómico, contribuyen a distintas dimensiones de la existencia humana. En sentido general, entre estos impactos se pueden distinguir:

Económicos: aunque los efectos económicos de las acciones humanas suelen ser positivos desde el punto de vista de quienes los promueven, pueden llevar equivalentes consecuencias negativas para otros colectivos, especialmente sobre segmentos de la población desprovistos de influencia.

Culturales: alteraciones de los esquemas previos de relaciones sociales y de los valores, que vuelven obsoletos patrones de comportamiento de las personas y/o de sus hábitos de consumo. Esto incluye, la adopción de nuevos valores, la migración, la re-educación, y la transculturización.

Tecnológicos: las innovaciones económicas pueden forzar cambios técnicos. Así, por ejemplo, una tecnología puede hacer obsoleta una anterior, o a las personas que no la dominan correctamente.

Humanos: son los efectos directos sobre el bienestar de las personas o las comunidades. En esto se incluye, la educación formal, la salud, la seguridad alimentaria, los medios de subsistencia, etc.

Impactos del programa

Los impactos característicos de un programa como el propuesto, tanto en la etapa de desarrollo, como en la de construcción y operación, son: generación de ruido, vertido o derrame de aceites e hidrocarburos, residuos sólidos generados durante la construcción y la operación, emisiones al aire (por los escapes de los vehículos y generadores), emisiones de polvo furtivo, y el manejo de aguas residuales domesticas e industriales. En adición, están los efectos de remoción de árboles y capa vegetal para realizar actividades de agricultura resiliente y/o prácticas de re-aforestación.

Responsabilidad ambiental

El programa se compromete a ejecutar en todas sus partes el PMAA (Plan de Manejo y Adecuación Ambiental), incluyendo, pero no limitándose a remediación de impactos no-previstos y a nuevas condiciones que puedan ser relevantes por efecto de nuevas leyes y/o disposiciones del Ministerio de Ambiente. El IDDI, que será implementador del programa, es responsable de la gestión y correcto manejo ambiental del mismo, y esto deberá exigirlo también al INAPA, al Ministerio de Medio Amiente y Recursos Naturales, así como a toda otra organización o socio participante.

6.1.2 Componentes Impactados

Los elementos que componen el ambiente, tomado desde su parte integral son: aire, agua, tierra, fauna, flora, paisaje y sociedad. Este es el mismo criterio que se tomará en cuenta en el proceso de evaluación de los impactos del programa tanto en la fase de construcción, en la de operación y en la de clausura. Los componentes a ser potencialmente impactados se indican a continuación:

Cuadro 13: Componentes del Medio donde Ocurren los Impactos

Medio	Componente	Actividades
Físico-Natural	Suelo	- Propiedades físicas, químicas y biológicas - Capacidad Agrologica - Uso del Suelo - Morfografía (formas y procesos) - Estabilidad

	Agua	- Patrones de drenaje - Caudales - Uso y consumo - Recarga y descarga hídrica - Nivel freático - Propiedades físicas, químicas y biológicas
	Aire	- Calidad del aire (emisiones) - Nivel de polvo/ polvillo - Ruidos y estrés sonoro
Biótico	Flora	- Cobertura vegetal - Biomasa
	Fauna	- Especies - Hábitat
	Ecosistema y Paisaje	- Calidad paisajística - Valor de futuros usos
Socioeconómico	Social	- Demografía - Dinámica poblacional - Empleo - Calidad de vida - Servicios básicos
	Económico	- Nivel de ingreso - Productividad - Consumo - Economía local
	Cultural	- Sentido de pertenencia - Estilos de vida - Activos arqueológicos

Realizado por el equipo del proyecto (noviembre, 2017).

La realización de la evaluación, procede entonces haciendo un análisis de correspondencia entre las actividades de la zona y los elementos del medio. Esto permitirá luego -en términos generales- caracterizar los impactos que pueden modificar la calidad ambiental y establecer los mecanismos de como compensarlos. Algo similar deberá hacerse con cada intervención del programa.

6.1.3 Metodología de Evaluación

Sistema de evaluación

Para la valoración de impactos, el proyecto se acoge al *Sistema SIN Canter*; asignando valores a la magnitud, el alcance, los plazos, la persistencia y la reversibilidad del efecto considerado. En los anexos al presente documento, se describe en detalle la metodología y su aplicabilidad.

El carácter del impacto determina si este se considera negativo, positivo o previsible; dependiendo de la información disponible o si existen estudios detallados relativos. La magnitud del impacto, que se define en función del carácter del impacto, puede ser baja (1), media (2), o alta (3).

- El alcance del impacto, que es la escala o proporción del efecto con relación al total del factor en el entorno no considerado. Su escala puede ser puntual (<30% = 1), parcial (de 30 a 70% = 2), y extenso (>70% = 3).
- Los plazos de los impactos, son los momentos en que se producen los impactos (o el tiempo que transcurre entre su ocurrencia y la aparición de sus efectos). Estos se miden como de corto plazo (>3 años = 1), de mediano plazo (de 3 a 10 años = 2) y de largo plazo (>10 años = 3).
- La persistencia del impacto es el tiempo de permanencia de sus efectos. La persistencia puede ser temporal (1) o permanente (2).
- La reversibilidad del impacto, se interpreta sobre la base del carácter del impacto y de la naturaleza del factor afectado. Cada efecto puede ser reversible (1) o irreversible (2).
- El efecto sinérgico del impacto, se refiere a la probabilidad real de que un impacto pueda o no afectar a otros. Cada efecto puede ser sinérgico (2) o no sinérgico (1).

Formulación utilizada

La importancia del impacto, en el contexto del programa, no es más que la valoración numérica de los indicadores que caracterizan al impacto, y se puede representar con la siguiente fórmula:

$$\boldsymbol{Importancia = 3xMagnitud + 2xAlcance + Plazo + Persistencia + Reversibilidad + Sinergia}$$

Esta fórmula se aplicará a cada uno de los impactos identificados en el proyecto.

6.1.4 Identificación de Impactos

Impactos en la construcción

Los impactos durante la construcción de las infraestructuras que implican las intervenciones del programa, son quizá más importantes que los que ocurren en la fase de operación de las mismas. Contrario a esto, la edificación de instalaciones productivas y/o de procesamiento no tendrá impactos significativos, ya que sus mayores efectos ocurrirán durante la operación de las mismas. No obstante, en la construcción ocurren muchos impactos permanentes, por lo que su análisis debe ser muy cuidadoso. Para esta fase, se han considerado los siguientes impactos.

Cuadro 14: Impactos Identificados en la Fase de Construcción

Componente	Actividades
Suelo y Aire	- Levantamiento topográfico del solar - Remoción de vegetación y capa vegetal - Marcado y replanteo de edificaciones - Construcción de infraestructuras - Construcción de caminos y accesos - infraestructura de servicios
Aire	- Movimiento de material removido - Adecuación de vías y accesos - Movimiento de equipos de motor
Aire y Agua	- Levantamiento del material particulado - Transporte de material removido - Producción de aguas sanitarias - Aumento en la demanda de agua
Flora y Fauna	- Adecuación del terreno - Construcción de edificaciones
Paisaje	- Maquinaria para infraestructuras - Estructuras en construcción - Señalización - Presencia de maquinarias y equipos
Socioeconómico	- Contratación de personal - Pago de arbitrios e impuestos - Compras locales: insumos y materiales

Realizado por el equipo del proyecto (noviembre, 2017).

Impactos en las operaciones

Los impactos esperados durante la operación de las infraestructuras del proyecto son muy bajos, dado las mejoras introducidas en el diseño de las mismas y las tecnologías disponibles. El marco de actuación ambiental en esta etapa, se relaciona más con la seguridad de las infraestructuras y que su operación vaya según la planificación, y hacerlo con eficiencia, seguridad y calidad.

Las instalaciones productivas y/o de proceso, por su parte, tendrán mayores impactos en la fase de operación, por tratarse de facilidades productivas (con tendencia a la industrialización) para propiciar un desarrollo más sostenible y resiliente de las comunidades beneficiarias, y diversificar el ingreso en el proceso. El programa ha considerado los siguientes impactos en la fase operativa:

Cuadro 15: Impactos Identificados en la Fase de Operación

Actividades	Componente
- Operación de equipos y maquinaria - Tránsito de camiones - Utilización de quipos de mantenimiento - Implementación de equipos	**Aire**
- Aguas sanitarias domesticas - Aguas residuales de proceso	**Agua**
- Extracción de materiales - Recuperación de áreas minadas	**Suelo**
- Siembra de especies pre-existentes - Mantenimiento de áreas verdes	**Flora y Fauna**
- Contratación de personal - Capacitación y entrenamiento - Responsabilidad social	**Socioeconómico**

Realizado por el equipo del proyecto (noviembre, 2017).

6.2 Impactos en la Fase de Construcción

6.2.1 Impactos sobre el Suelo

Cambios en la topografía

Durante el proceso de construcción, el suelo sufre transformaciones que modifican o alteran el perfil topográfico. Al cambiar los perfiles topográficos del terreno, y al operar equipos y maquinas, se altera el drenaje natural de las zonas y se transforman las condiciones que dan albergue a la fauna que habita en los primeros estratos del suelo. Estos efectos pueden causar migraciones temporales o desplazamiento de los animales que habitan los ecosistemas cercanos al sitio.

- Valoración: Negativo, bajo (1), en parte será transitorio pero un gran porcentaje será permanente (2), puntual (1), corto plazo (1), irreversible (2), y sinérgico (2).
- Mitigación: (a) limitar las acciones a las áreas que son estrictamente necesarias; (b) limitar el uso de equipos pesados al mínimo necesario para obtener los resultados que se esperan según los requerimientos establecidos en el plan de construcción; (c) en la medida de lo posible, recuperar las áreas circundantes y llevarlas a los perfiles de suelo pre-existentes.

Impermeabilización de suelos

al compactar los suelos para mejorar su capacidad portante, en función de ponerlo en condiciones para soportar las cargas que implican las infraestructuras y el transito típico de las construcciones; los espacios intersticios de los estratos disminuyen, impidiendo o dificultando el paso del agua de infiltración, con lo cual de inhibe la capacidad de recarga de los acuíferos subterráneos y la napa freática. Además, esto influye sobre las condiciones de drenaje, que de por si serán alteradas.

- Valoración: Negativo, bajo (1), permanente (2), puntual (1), corto plazo (1), irreversible (2), no sinérgico (1).
- Mitigación: (a) realizar una distribución tributaria de las aguas de escorrentía en las superficies afectadas, para lograr que las aguas se distribuyan uniformemente a los cuerpos receptores. Esto ayudará a que los acuíferos inferiores no disminuyan sus factores de recarga (aunque esto sea un poco dilatado); (b) limitar los trabajos a las áreas estrictamente necesarias.

Pérdida de capa vegetal

Para poder construir cualquier obra o instalación, lo primero es remover la capa vegetal, ya que este estrato de suelo no tiene propiedades mecánicas que sirvan para efectos constructivos. Por el contrario, generalmente la capa vegetal contiene muchos nutrientes esenciales que permiten el crecimiento de especies vegetales y la acumulación de agua, reducen la erosión.

- Valoración: Negativo, bajo (1), permanente (2), puntual (1), corto plazo (1), irreversible (2), sinérgico (2).
- Mitigación: (a) no se prescribe ninguna medida relevante. La capa vegetal removida puede ser depositada en escombreras para luego ser re-aprovechadas en actividades agrícolas.

Contaminación por hidrocarburos

Debido al descapote de los suelos para la construcción de infraestructuras y facilidades, y por efecto de la operación de quipos pesados y/o vehículos de motor, existe la posibilidad de que -por accidente o error humano- pueda contaminarse el suelo. Este impacto se evita totalmente con la adopción de medidas apropiadas y la realización de mantenimientos preventivos.

- Valoración: Negativo, bajo (1), transitorio (1), puntual (1), corto plazo (1), reversible (1), no sinérgico (1).
- Mitigación: (a) utilización de prácticas de descontaminación de suelos con hidrocarburos; (b) realizar los programas de mantenimientos de los quipos, maquinarias y vehículos.

6.2.2 Impactos sobre el Aire

Producción de polvo furtivo

La producción de polvo es inherente a la modificación del perfil topográfico del terreno, aun cuando este adecuado al diseño de la infraestructura. El movimiento de equipos pesados, la apertura/rotura de terrenos, el manejo de materiales de bote y/o para relleno, el uso de bloques y cemento, y el proceso mismo de construcción, afecta momentáneamente la calidad del aire de las zonas inmediatas a los sitios de intervención. Este impacto es transitorio, ya que las partículas se precipitan a poca distancia.

- Valoración: Negativo, bajo (1), transitorio (1), puntual (1), corto plazo (1), reversible (1), sinérgico (2).
- Mitigación: (a) limitar la velocidad de circulación en las zonas de obras; (b) humectación (rociado de agua) periódica; (c) limitar el tiempo de operación a lo estrictamente necesario; (d) instalación de verjas perimetrales para reducir los escapes de polvo; (e) siembra de barreras vivas; (f) ajustarse al cronograma para reducir el tiempo de construcción.

Emisiones de gases de combustión

Se refiere al impacto en el aire por la operación de vehículos y motores de combustión interna, que emiten gases contaminantes (como el azufre, por ejemplo) que reducen la calidad del aire del entorno. Estos gases son de corta duración ya que usualmente son arrastrados y dispersados por los vientos y tienden a depositarse a nivel de suelo tras un muy corto recorrido. Además, por el tiempo tan reducido que deben tomar las construcciones del programa, no se considera que causen un impacto significativo sobre los ecosistemas de las zonas de intervención.

- Valoración: Negativo, bajo (1), transitorio (1), corto plazo (1), temporal (1), reversible (1), sinérgico (2).

- Mitigación: (a) limitación de la velocidad en la zona de trabajo; (b) prohibir que los equipos estén encendidos en los tiempos que no estén operando; (c) buena planificación que evite retrasos en los tiempos de obra; (d) mantenimiento preventivo de equipos y vehículos (y reparaciones si hace falta) para mantener su eficiencia.

Generación de ruido

La operación de equipos pesados y el proceso de construcción de infraestructuras o caminos, implican la generación de ruido que pueden generar estrés sobre el personal, además de afectar la fauna vecina al sitio. Debido al corto tiempo de construcción estimado para las infraestructuras y facilidades productivas, este impacto será de muy corta duración.

- Valoración: Negativo, bajo (1), transitorio (1), puntual (1), corto plazo (1), reversible (1), sinérgico (2).
- Mitigación: (a) limitación de la velocidad de circulación en las zonas; (b) verificación de uso de silenciadores en vehículos y motores; (c) buena planificación que evite retrasos en los tiempos de obra; (d) mantenimiento preventivo de equipos y vehículos para mantener su eficiencia; (e) protección auditiva.

6.2.3 Impactos sobre el Agua

Afectación de aguas subterráneas

En la etapa de construcción, no se prevén impactos significativos sobre las aguas subterráneas, salvo la recarga de acuíferos (los procesos de compactación e impermeabilización de suelos limitan la infiltración de aguas en algunas áreas, así también, en algunas zonas la captación del agua podría provenir de pozos). Debido a que las zonas de afectación son relativamente limitadas, no se espera que la recarga de los acuíferos sea afectada. La infraestructura y caminos deberán contar sistemas de canalización y pendientes adecuadas para drenar por gravedad la lluvia.

- Valoración: No significativo.
- Mitigación: (a) instalación de baños portátiles; (b) instrucción al personal en usar el baño; (c) sancionar toda persona que no haga sus necesidades en el baño.

Afectación de aguas superficiales

Dado que las intervenciones del programa se basan en el aprovechamiento y manejo sostenible del recurso agua, muchos cuerpos de agua podrían ser afectados por las intervenciones del

programa (para aumentar, en especial, la cantidad y la calidad del agua disponible). No obstante, con el manejo adecuado se evitará afectar permanentemente dichos cuerpos receptores.

- Valoración: No significativo.
- Mitigación: como este impacto no es significativo, no se hace necesaria la implementación de ninguna medida adicional de mitigación, salvo las establecidas para las obras de agua.

6.2.4 Impactos Socioeconómicos

Afectación del transito

El incremento del tránsito durante la etapa de construcción de las intervenciones del programa no se espera que sea significativo, debido a lo remoto de los sitios a intervenir, y que las comunidades incluidas no son muy populosas. No obstante, el paso de camiones y equipos pesados por dichas comunidades, introduce una variable de riesgo de accidentes, producción de polvo, ruido y polución. Si se toma en cuenta que la longitud de la vía de acceso al pasar por cada comunidad sea menor o igual a 1 km, y que el ancho de los caminos permita mínimamente la circulación en dos sentidos, se concluye que el incremento del tránsito no es un impacto relevante.

- Valoración: Negativo, bajo (1), transitorio (1), puntual (1), corto plazo (1), reversible (1), no sinérgico (1).
- Mitigación: (a) limitación de la velocidad en la zona; (b) exigir uso de lonas en camiones de carga; (c) humedecer periódica y constantemente la vía para evitar las emisiones de polvo; (d) exigir a los vehículos que tengan el sistema de escape y motores en buen estado; (e) señalización manual en las comunidades y cruces de carreteras (con "banderistas").

Mejora de la economía local

El desarrollo de proyectos de construcción de obras o de instalación de facilidades productivas, en sentido general, siempre trae dinamismo económico a sus respectivas zonas de influencia. Regularmente, se importa mano de obra especializada si no está disponible en el lugar, lo que ayuda a que el personal no-calificado aprenda de otros con más conocimientos y experiencia en otros oficios más especializados. La misma concepción del programa conlleva procesos de diseño y aprobación, lo que no sólo da trabajo a profesionales (ingeniería, arquitectura, derecho, contabilidad, etc.), sino que crea un flujo de caja adicional para el municipio y el gobierno.

- Valoración: Positivo, alto (3), extenso (3), largo plazo (3), permanente (2), reversible (1), sinérgico (2).
- Mitigación: como este impacto es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

Dinamismo de la economía local

Este impacto es directo y se relaciona con la creación de empleos temporales directos, indirectos, e inducidos. A esto se suma las ventas de las ferreterías, colmados y combustibles, y otros aumentos en la demanda de bienes y servicios (telefonía, comida, ropa, diversión, etc.), y un efecto extendido de bienestar para las personas involucradas, en especial por la densidad poblacional.

- Valoración: Positivo, medio (2), parcial (2), medio plazo (2), temporal (1), reversible (1), sinérgico (2).
- Mitigación: como este impacto es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

Mejora de la calidad de vida

La calidad de vida de la población es positivamente impactada por el desarrollo, construcción e instalación de las intervenciones del programa, tanto en los aspectos económicos como en los sociales y ambientales. Entre los efectos positivos están: el aumento de la demanda de mano de obra, el fortalecimiento del tejido social, y la creación de más y mejor capital humano.

- Valoración: Positivo, medio (2), parcial (2), medio plazo (2), temporal (1), reversible (1), sinérgico (2).
- Mitigación: como este impacto es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

Aumento de la oferta de empleo

La importancia del aumento de la oferta de mano de obra es de vital importancia para cualquier población; ya que genera la oportunidad que más personas puedan disponer de recursos para su sustento y el de sus familias. Un aspecto diferenciador del programa es justamente este, ya que se estima que en la construcción de las intervenciones previstas por el programa podrían trabajar más de 3,300 personas en empleos de calidad. Una gran parte de estos, podría ser permanente.

- Valoración: Positivo, medio (2), parcial (2), medio plazo (2), temporal (1), reversible (1), sinérgico (2).
- Mitigación: como este impacto es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

Mejora de la infraestructura de servicios

Como la infraestructura de servicios de las zonas a intervenir es escasa (y en la mayoría de los

casos es muy precaria), existen muchas oportunidades de mejora en cuanto a ciertos servicios que el programa puede suplir, como la construcción de obras de captación de agua, y la rehabilitación de caminos de acceso, que estarán también al servicio de la comunidad y cualquier otro tercero.

- Valoración: Positivo, alto (3), parcial (2), largo plazo (3), permanente (2), reversible (1), sinérgico (2).
- Mitigación: como este impacto es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

6.2.5 Valoración de los Impactos

Valoración cuantitativa

Con la información de los impactos identificados, se ha completado la siguiente matriz.

Cuadro 16: Matriz de Valoración Cuantitativa de Impactos en la Construcción

Medio	Impacto	Tipo	Magnitud	Alcance	Plazos	Persistencia	Reversibilidad	Sinergia	Importancia
Suelo	Cambios en el perfil topográfico	-	1	1	1	2	2	2	-12
	Impermeabilización de suelos	-	1	1	1	2	2	1	-11
	Pérdida de capa vegetal	-	1	1	1	2	2	2	-12
	Contaminación por hidrocarburos	-	1	1	1	1	1	1	-9
Aire	Producción de polvo furtivo	-	1	1	1	1	1	2	-10
	Emisiones de gases/combustión	-	1	1	1	1	1	2	-10
	Generación de Ruido	-	1	1	1	1	1	2	-10
Agua	Afectación de aguas subterráneas	n/A							
	Afectación de aguas superficiales	n/A							
Flora	Desmonte de vegetación	n/A							
Socio econ	Afectación del tránsito local	-	1	1	1	1	1	1	-9
	Mejora de la economía local	+	3	3	3	2	1	2	23

	Dinamismo de la economía local	+	2	2	2	1	1	2	16
	Mejora de la calidad de vida	+	2	2	2	1	1	2	16
	Aumento de la oferta de empleo	+	2	2	2	1	1	2	16
	Mejora infraestructura servicios	+	3	2	3	2	1	2	21
Impactos Positivos		92							
Impactos Negativos		-83							
Balance de Impactos		5							

Realizado por el equipo del proyecto (noviembre, 2017).

Esta valoración indica que los impactos positivos de las intervenciones del programa son ligeramente superiores a sus efectos negativos, cuando se analizan con un criterio cuantitativo. No obstante, los impactos no incluidos (por no ser significantes o relevantes) son igualmente incluidos en los mecanismos de monitoreo, en caso que existan elementos o efectos no previstos.

Valoración cualitativa

Con la información de los impactos identificados, se ha completado la siguiente matriz.

Cuadro 17: Matriz de Valoración Cualitativa de Impactos en la Construcción

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Ruido	Fauna Personas	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	No	Simple	No	Bajo
Gases Vehiculares	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Simple	No	Bajo
Polvo furtivo	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Acumulativo	No	Bajo

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Pérdida de Capa Vegetal	Suelo Flora	Neg.	Bajo	Puntual	Corto plazo	Permanente	Reversible	Si	Si	Acumulativo	Continuo	Bajo
Residuos	Suelo Agua	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	No	Simple	No	Bajo
Impermeabilización del Suelo	Suelo Agua	Neg.	Bajo	Puntual	Corto plazo	Permanente	Irreversible	No	No	Simple	Continuo	Bajo
Cambios en la Topografía	Suelo	Neg.	Bajo	Puntual	Corto plazo	Permanente	Irreversible	No	Si	Simple	Continuo	Bajo
Desmonte Vegetación	Flora	n/A	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Simple	Continuo	Bajo
Empleos	Personas	Pos.	Alto	Extenso	Corto plazo	Temporal	Corto plazo	Si	Si	Simple	Continuo	Alto
Socioeconómico	Gobierno	Pos.	Alto	Parcial	Corto plazo	Temporal	Corto plazo	No	Si	Acumulativo	Continuo	Alto

Realizado por el equipo del proyecto (noviembre, 2017).

Esta valoración indica que los impactos positivos de las intervenciones del programa son ampliamente superiores a sus potenciales efectos negativos, desde el punto de vida cualitativo. Esto es particularmente importante para establecer una correcta relación proyecto-comunidad.

6.3 Impactos en la Etapa de Operación

6.3.1 Impactos sobre el Suelo

Contaminación de suelos

Durante la etapa de operaciones, se generarán impactos sobre el suelo durante el manejo de los residuos, ya sean los orgánicos (domésticos o de las instalaciones productivas) y los peligrosos y/o de manejo especial (como aceites, baterías, gomas, etc.). En el caso especial de las chatarras y aceites, puede que ocurran derrames que contaminen el suelo.

- Valoración: Negativo, medio (2), puntual (1), medio plazo (2), temporal (1), reversible (1), sinérgico (2).
- Mitigación: (a) control de niveles de tanques de aceites; (b) construcción de cisternas; (c) inspección periódica de las áreas para determinar presencia de hidrocarburos; (d) capacitación al personal en seguridad y salud ante casos de derrames.

6.3.2 Impactos sobre el Aire

Emisiones de polvo furtivo

Las actividades operativas de las facilidades productivas y/o de procesamiento, en especial la carga y descarga de materiales y productos, el efecto del viento sobre estos, y el tránsito por caminos no asfaltados, ocasionan emisiones de polvo que afectan a personas y animales. Este es un impacto relevante.

- Valoración: Negativo, medio (2), puntual (1), corto plazo (1), temporal (1), reversible (1), sinérgico (2).
- Mitigación: (a) rociado de agua en caminos interiores; (b) humidificación de áreas internas; (c) control de horarios de trabajo y de velocidad de circulación; (d) establecimiento de barreras alrededor de las instalaciones; (e) uso de lonas en los camiones que transportan material.

Emisiones de gases contaminantes

En la etapa de operación, las principales afecciones sobre el aire son las producidas por las emisiones de vehículos y maquinarias que operan en las instalaciones y (posiblemente de manera continua) en el bombeo y/o la generación de electricidad. Tanto los vehículos, las plantas y las bombas, generan una contaminación esperada para este tipo de quipos; siendo el programa el responsable de dar los mantenimientos programados a estos. Luego esto lo hará la comunidad.

- Valoración: Negativo, bajo (1), parcial (2), corto plazo (1), temporal (1), reversible (1), sinérgico (2).
- Mitigación: (a) control de horario y velocidad de circulación; (b) mantenimiento preventivo de la planta, equipos, maquinarias y vehículos; (c) inspección periódica de las instalaciones para verificar condiciones; (d) entrenamiento permanente al personal en manejo de equipos; (e) supervisión y orientación del personal responsable.

Generación de ruidos

En la etapa de operación, las principales afecciones sobre el aire son las producidas por el ruido que provocan los vehículos y maquinarias que operan en las instalaciones (y eventualmente de manera continua) en el bombeo y/o en la generación de electricidad. Tanto los vehículos, como las bombas y las plantas, generan ruido a los niveles esperados para este tipo de quipos; siendo el programa responsable de dar los mantenimientos programados para estos, y luego transferirá esta responsabilidad a las respectivas comunidades de forma que estas aseguren la sostenibilidad.

- Valoración: Negativo, bajo (1), local (2), corto plazo (1), temporal (1), reversible (1), sinérgico (2).
- Mitigación: (a) control de horario y velocidad de circulación; (b) mantenimiento preventivo de las plantas, equipos, bombas, máquinas y vehículos; (c) inspección periódica y sistemática de las instalaciones para verificar sus condiciones; (d) entrenamiento permanente al personal en manejo de equipos; (e) confinamiento de la planta eléctrica y las bombas en casetas acústicas.

Los ruidos propios de cada instalación no deberán exceder los 65 dB fuera de los linderos. Las plantas eléctricas estarán casetas con aislamiento acústico, al igual que los equipos de bombeo.

6.3.3 Impactos sobre el Agua

Presión sobre el medio hídrico

Sobre el agua pueden ocurrir dos impactos importantes: mayor presión hídrica, es decir, mayor demanda del líquido (la cual será uno de los aspectos principales del programa); y potencial contaminación, por derrames, malas prácticas, o tratamiento deficiente.

- Valoración: Negativo, bajo (1), puntual (1), corto plazo (1), temporal (1), reversible (1), sinérgico (2).
- Mitigación: (a) revisión periódica de equipos sanitarios y de bombeo para detectar fugas o ineficiencias; (b) mantenimiento programado de obras de agua (reservorios, tanques, plantas de tratamiento, etc.) e instalaciones sanitarias (aguas de baños, trampas de grasa, cisternas,

etc.); (c) capacitación del personal en prácticas de ahorro y conservación; (d) implementar buenas prácticas de reúso y/o reciclaje de agua.

6.3.4 Impactos sobre la Biota

Recuperación de vegetación

En general, las intervenciones del programa no implican la afectación de la flora de los sitios. En los aspectos de re-aforestación y/o en los esquemas para asegurar la integridad de las cuencas y sus ecosistemas, se trabajará junto al Ministerio de Medio Ambiente, máxima autoridad nacional en el tema. En el caso de desarrollo de nuevas plantaciones en la parte alta de las cuencas, se trabajará con variedades y procesos que puedan ser manejados de forma sostenible y rentable.

- Valoración: Positivo, medio (2), puntual (1), corto plazo (3), permanente (2), reversible (1), sinérgico (2).
- Mitigación: (a) la reforestación y recuperación de áreas, así como la jardinería y ornato, son -en sí mismas- medidas de mitigación dentro de las intervenciones del programa.

6.3.5 Impactos Socioeconómicos

Afectación del tránsito

En la etapa de operación, es posible se ocurra un aumento significativo del tránsito de la zona con relación al ya existente, derivado del incremento de las actividades productivas y de aumentar la resiliencia de los medios de subsistencia. En este sentido, las intervenciones relativas a facilidades productivas y/o de procesamiento agregan un riesgo adicional, asociado al manejo de vehículos cambiones que cargarán y descargarán materiales y productos en el lugar.

- Valoración: Negativo, bajo (1), local (1), corto plazo (1), permanente (2), reversible (1), sinérgico (2).
- Mitigación: (a) limitar la velocidad de circulación dentro de la instalación; (b) disponer de personas para señalizar (los llamados "banderistas") en la comunidad por donde se transita; (c) capacitar al personal en seguridad vehicular y primera atención; (d) disponer de equipo y personal que pueda auxiliar en casos de fallas mecánicas y/o eléctricas de vehículos.

Impacto sobre la economía local

La operación del proyecto generará un impacto positivo en las comunidades beneficiarias y en las zonas aledaños (que podría ir más allá de San Cristóbal) ya que creará empleos directos e indirectos. En el mediano plazo, se necesitará más personal según sean ampliadas las operaciones,

así como para ventas, limpieza y seguridad, entre otros; los cuales -a su vez- demandarán más y mejores bienes y servicios en el entorno, según aumente su calidad de vida. Estos factores contribuirán positivamente a la economía de la zona.

- Valoración: Positivo, medio (2), parcial (2), corto plazo (3), permanente (2), reversible (1), sinérgico (2).
- Mitigación: como este impacto no es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

Mejora de la calidad de vida

La operación y sostenibilidad del proyecto, introduce un elemento de mejora de calidad de vida a las zonas incluida. Si bien la mejora en la agricultura/ganadería y el desarrollo de las instalaciones productivas y/o de procesamiento, representan oportunidades para los que trabajan allí, también se espera que estos presten servicios a la comunidad mediante educación y asociatividad.

- Valoración: Positivo, medio (2), parcial (2), corto plazo (3), permanente (2), reversible (1), sinérgico (2).
- Mitigación: como este impacto no es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

Generación de empleo

la operación de las facilidades productivas y/o de procesamiento demandarán, tienen la meta de incluir unas 12000 personas en 30 comunidades. Este personal se encargará de labores como operación, ventas, despacho, mantenimiento, reparaciones, seguridad, transporte, educación y otros servicios. Esta empleomanía será mayormente local, disminuyendo el desempleo de las zonas y propiciando que el personal y sus familias tengan seguro médico y seguridad social.

- Valoración: Positivo, medio (2), parcial (2), medio plazo (2), permanente (2), reversible (1), sinérgico (2).
- Mitigación: como este impacto no es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

Impactos visual e inmobiliario

Una vez que el programa esté en operación, este permitirá habilitar los terrenos intervenidos para un nuevo uso productivo (o continuar con el mismo de manera más eficiente), lo que aumentará

su valor inmobiliario (uso de suelo forestal, para citar un ejemplo). Esto no se limita a las facilidades de producción, sino que se extiende a zonas vecinas.

- Valoración: Positivo, medio (2), parcial (2), corto plazo (3), permanente (2), reversible (1), sinérgico (2).
- Mitigación: como este impacto es positivo, no se hace necesaria la implementación de ninguna medida adicional de mitigación.

6.3.6 Valoración de los Impactos

Valoración cuantitativa

Con la información de los impactos identificados, se ha completado la siguiente matriz.

Cuadro 18: Matriz de Valoración Cuantitativa de Impactos en la Etapa de Operación

Medio	Impacto	Tipo	Magnitud	Alcance	Plazos	Persistencia	Reversibilidad	Sinergia	Importancia
Suelo	Contaminación de suelos	-	2	1	2	1	1	2	-14
Aire	Producción de polvo furtivo	-	2	1	1	1	1	2	-10
	Emisiones de gases/combustión	-	1	2	1	1	1	2	-12
	Generación de Ruido	-	1	2	1	1	1	2	-12
Agua	Presión sobre el medio hídrico	-	1	1	1	1	1	2	-10
Flora	Recuperación de vegetación	+	2	1	3	2	1	2	16
Socioeconómico	Afectación del tránsito local	-	1	1	1	2	1	2	-11
	Mejora de la economía local	+	2	2	3	2	1	2	18
	Mejora de la calidad de vida	+	2	2	3	2	1	2	18
	Aumento de la oferta de empleo	+	2	2	2	2	1	2	17

	Mejora visual e inmobiliaria	+	2	2	3	2	1	2	18
Impactos Positivos		+87							
Impactos Negativos		-69							
Balance de Impactos		+18							

Realizado por el equipo del proyecto (noviembre, 2017).

Los efectos positivos en la fase de operación superan los potenciales efectos negativos; en especial porque las intervenciones son relativamente sencillas, se trabajará directamente con y para la comunidad, por los aportes al empleo, dinamización económica, y aumento en el valor de la tierra. Esto es fundamentalmente importante porque demuestra que, a la luz de la información propia de la operación del programa y de data oficial relevante, este se mantiene como una actividad sostenible, generadora de bajos impactos, y que cumple con las leyes y las normas.

Valoración cualitativa

Con la información de los impactos identificados, se ha completado la siguiente matriz.

Cuadro 19: Matriz de Valoración Cualitativa de Impactos en la Operación

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Contaminación de Suelos	Suelo Agua	Neg.	Bajo	Puntual	Corto plazo	Temporal	Corto plazo	Si	Si	Acumulativo	No	Medio
Gases Vehiculares	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	Si	Acumulable	No	Bajo
Generación de Ruido	Aire	Neg.	Bajo	Puntual	Corto plazo	Fugaz	Corto plazo	Si	No	Simple	No	Bajo

Indicador	Elemento	Tipo	Intensidad	Extensión	Momento	Persistencia	Reversibilidad	Recuperabilidad	Sinergia	Acumulación	Periodicidad	Importancia
Presión sobre Medio Hídrico	Agua	Neg.	Bajo	Puntual	Corto plazo	Permanente	Corto plazo	Si	No	Simple	Continuo	Bajo
Contaminación Hídrica	Agua	Neg.	Bajo	Puntual	Corto plazo	Permanente	Corto plazo	Si	No	Simple	Continuo	Media
Recuperación de Vegetación	Flora	Pos.	Medio	Puntual	Corto plazo	Permanente	Reversible	Si	Si	Acumulativo	Continuo	Alta
Generación de Empleos	Personas	Pos.	Alto	Parcial	Largo plazo	Permanente	Corto plazo	n/A	Si	Simple	Continuo	Alto
Socioeconómico	Gobierno	Pos.	Alto	Extenso	Largo plazo	Permanente	Corto plazo	n/A	Si	Acumulativo	Continuo	Alto

Realizado por el equipo del proyecto (noviembre, 2017).

Esta valoración indica que los impactos positivos en las operaciones propuestas del programa son ampliamente superiores a sus efectos negativos, cuando se analizan con un criterio cualitativo.

6.4 Impactos en la Etapa de Clausura

No se ha realizado una evaluación de la clausura de las intervenciones, dado que la mismas son sostenibles a largo plazo. Durante la vida útil del programa, se fortalecerán las capacidades de la comunidad para evaluar, ante el eventual cierre, clausura o abandono de cualquier intervención-los eventuales pasivos ambientales que puedan existir y como establecer estrategias de actuación para evitarlos, mitigarlos, o remediarlos. Eso incluye la planificación de los nuevos usos del suelo

7. Plan de manejo y adecuación ambiental

7.1 Contenido Básico del PMAA

7.1.1 Definición y Objetivos

Objetivos del PMAA

El Programa de Manejo y Adecuación Ambiental (PMAA) tiene como objetivo reducir las acciones a implementar para prevenir, controlar o mitigar los impactos negativos al medio socioeconómico o al medioambiental. Estos impactos, pueden ser la resultante de acciones u omisiones durante la etapa de la construcción, operación, o en la fase de cierre o abandono de las intervenciones del programa; ya sea por causas del hombre o de la naturaleza, o una combinación de ellas.

EL PMAA permite garantizar el cumplimiento de las actuaciones de carácter preventivo y corrector propuestas por el programa y las contenidas en este documento. Esto ayuda a evitar o minimizar los impactos ambientales derivados de la ejecución del programa en todas sus etapas. Además, el PMAA sirve para verificar las previsiones adoptadas y mejorar su efectividad y, si es necesario, identificar aquellas acciones del plan de intervenciones que pudieran generar efectos ambientales o sociales adversos distintos a los previstos, para los que sería necesario aplicar nuevas medidas.

Definiciones básicas

En el contexto del presente PMAA, se adoptarán las siguientes definiciones:

- ***Medidas de adecuación***: son las medidas a tomar para adecuar las operaciones del programa para cumplir con las normas establecidas en el país o según dictan las buenas prácticas.
- ***Acciones preventivas***: son las diferentes actividades a realizar con el fin de evitar o prevenir la ocurrencia de impactos negativos, ya sea por elementos que no cumplan con las normas, o por la ocurrencia de fenómenos eventuales que agregan riesgo.
- ***Monitoreos periódicos***: son el conjunto de actividades periódicas, sistemáticas y objetivas que se realizan para –basado en criterios técnicos y científicos - asegurar que los diferentes elementos (sólidos, líquidos, gaseosos y sónicos) cumplen con las normas.

- ***Alcance del Programa***: en el PMAA se identifican los distintos impactos negativos que se generarán en las distintas etapas del proyecto; identificando las fuentes que los producen y las acciones a tomar para su correcto manejo, remediación, eliminación o compensación.

7.2 Medidas de Prevención y Mitigación

7.2.1 Guía de Desempeño Ambiental

Aspectos generales

A continuación, se detallan las medidas de protección o corrección de los impactos ambientales identificados, atendiendo a la gestión que debe hacer el programa de sus procesos y desempeño ambiental global. Las mismas, se basan en un resumen de buenas prácticas documentadas en distintos proyectos de inversión y cooperación, y que pueden aplicarse al contexto de planificar, desarrollar, construir y operar las intervenciones del programa. Las mismas, son un referente para la implementación del PMAA y asegurar que se realicen según el cronograma y presupuesto.

Del mismo modo, esta guía incluye criterios para considerar las medidas correctoras y protectoras frente a los posibles impactos que la actividad planteada pudiera ocasionar. En sentido general, las medidas a tomar para la buena ordenación, planificación y gestión ambiental de las inversiones del programa, se deben definir diferentes líneas de acción o bloques temáticos.

Todas las líneas de acción deben ser igualmente necesarias y complementarias entre sí. A saber:

- Prevención y minimización de nuevos impactos
- Actitud hacia la restauración y mejora del hábitat
- Cuidado de las poblaciones de fauna silvestre
- Cumplimiento con la regulación del uso del suelo
- Investigación (orientada al desarrollo y la innovación)
- Seguimiento y evaluación

Salvo no exista otro régimen de aplicación, se prestará primero atención al cumplimiento de las medidas dentro del área de influencia de las intervenciones, y luego -dentro de lo técnicamente posible y económicamente viable- se podría expandir hacia afuera para maximizar el impacto.

Principales criterios

Al establecer los criterios de las medidas correctoras/protectoras a establecer, se han considerado todos aquellos criterios que garanticen la integridad ecológica de la zona, tales como:

1. La ubicación de nuevas infraestructuras, facilidades de proceso y conservación de ecosistemas, se realizará respetando el balance ecológico ce cada lugar. Si debieran realizarse, por razones imperiosas de interés público de primer orden, incluidas razones de índole social o económica, el programa tomará cuantas medidas compensatorias sean necesarias para garantizar que la coherencia global entre la calidad ambiental entregada por las intervenciones y la que el ecosistema puede asumir razonablemente. Esta medida será aplicada con especial atención en las áreas críticas identificadas o aquellas declararas de prioridad ambiental o social.

2. Se priorizará la reutilización/ rehabilitación de infraestructuras frente a construir otras nuevas. Esto aplica también para los caminos, los cuales sólo se harán si no existiera la posibilidad de usar caminos existentes. Esto asegura que la agresión hacia el medio y el impacto sea menor.

3. Se evitará construir edificaciones o infraestructuras en áreas cuyo suelo no tenga la capacidad portante adecuada al uso. Esta medida se aplicará con especial atención en las infraestructuras y facilidades, para reducir los costos de construcción y reducir riesgos estructurales.

4. En adición a sus reportes habituales de desempeño, el programa comunicará al Ministerio de Medio Ambiente y Recursos Naturales, con tiempo de antelación o en los Informes de Cumplimiento Ambiental (ICA), los siguientes tópicos:
    a. La modificación del trazado y ampliación de caminos internos o externos.
    b. La implantación de estructuras para manejo de ganado o delimitación de fincas.
    c. La construcción y rehabilitación de edificaciones y/o nuevas infraestructuras.
    d. El acondicionamiento, ensanche y mejora de las obras de agua.
    e. La instalación de infraestructuras eléctricas, agua potable, salud y educación.
    f. La construcción de áreas de acopio, manejo y/o almacenaje de residuos.
    g. La construcción de infraestructura como plantas, viveros, fábricas, etc.

h. El movimiento de tierras, los volúmenes extraídos y el destino del material.

i. Los cambios en el uso del suelo o transformaciones del hábitat natural

j. La realización y/o patrocinio de actividades recreativas y deportivas.

k. Los volúmenes de insumos utilizados y productos comercializados.

7.2.2 Medidas a Adoptar por Impacto

Emisiones de ruido

Las intervenciones del proyecto producirán una serie de ruidos que pueden agruparse como:

- Ruidos de las operaciones de carga, transporte y descarga.
- Ruidos procedentes de los procesos productivos.
- Ruidos producidos por el aumento del tránsito en la vía.

La localización de las comunidades, la mayoría en ubicaciones alejadas o remotas, disminuye de manera significativa el impacto de los ruidos producidos durante la fase de operación. Además de esta externalidad favorable, derivada de la localización de los sitios, se adoptarán otras medidas correctoras concretas para reducir las emisiones de ruido:

- Al final de la vida útil de la maquinaria actual, utilizar otra menos ruidosa.
- Utilización de silenciadores en los escapes de los vehículos y generadores.
- Mantenimiento periódico de los vehículos, equipos y maquinaria.
- Mantenimiento de las instalaciones en general, incluyendo posibles mejoras.

El control de los niveles de ruido se realizará con medidas periódicas, y se recogerá en el PMAA.

Emisiones de polvo

Las acciones contempladas en el programa pueden producir emisiones de polvo que originan contaminación atmosférica y otros impactos sobre la biota. Estas emisiones podrían provenir de:

- Perforaciones y excavaciones.
- Maquinaria pesada y vehículos.

- Maquinaria de carga y transporte.
- Tránsito de vehículos pesados.

Aunque se prevé que los emplazamientos del programa no produzcan emisiones de polvo por encima de los límites admitidos por las normas ambientales, se tomarán las siguientes medidas:

- Riego periódico de accesos y zonas de trabajo
- Control de la velocidad de los vehículos y equipos pesados
- Mantenimiento de las instalaciones de la planta.
- Instalación y mantenimiento de barreras vivas en los perímetros.

La intensidad y dirección de los vientos predominantes dan a la atmósfera una gran capacidad de dispersión de las partículas de polvo hacia el norte-noroeste, dirección esta en que se encuentran ubicados muchos cerros, los cuales se pueden constituir en barreras naturales para el polvo.

Para determinar el grado de eficacia de las medidas para evitar la contaminación por el polvo, se realizarán medidas de los niveles de inmisión periódicas. Los resultados de estos monitoreos serán incluidos en los ICA que regularmente reportará el programa al Ministerio de Medio Ambiente.

Emisión de otros agentes

En relación con posibles agentes contaminantes que sean emitidos como consecuencia de las actividades del programa, fuera de los ya considerados, se prevé que en su mayor parte se tratará de GEI (en especial CO_2) procedentes de la combustión en motores, plantas, maquinaria, vehículos, equipos pesados, bombas, camiones, y por el consumo de electricidad de la red eléctrica.

Mientras que los GEI no son regulados por las normas ambientales locales, se podría crear una buena práctica en este campo. En la medida que el sistema de gestión medioambiental del programa establezca la realización de mantenimientos periódicos de los vehículos y/o equipos en general, se mejoraría de la combustión y, por ende, se genera ría menos de dióxido de carbono.

Aguas superficiales

Para evitar la contaminación de las aguas superficiales, se tomarán las siguientes medidas:

- Habilitación de canaletas (zanjas) y una adecuada red de cunetas en las infraestructuras y facilidades, que protegerán los cuerpos de agua de posibles arrastres incontrolados.
- Mantenimiento de cualquier laguna, reservorio o estanque, en caso que estos recojan aguas con sólidos y que decantarán la materia sólida en suspensión antes de su vertido a las cañadas.

El dimensionamiento de los sistemas de drenaje, así como el de los sistemas de tratamiento de aguas servidas, serán realizados de conformidad con la normativa del Ministerio de Obras Públicas y Comunicaciones y los reglamentos del Ministerio de Medio Ambiente y Recursos Naturales.

Aguas subterráneas

No está prevista la utilización de ningún tipo de componente químico que pueda afectar a la calidad de las aguas subterráneas o superficiales. Además, se tomarán especiales precauciones en las actividades de mantenimiento de la maquinaria (cambio de aceite, engrase, reposición de combustible, etc.), que se llevarán a cabo en zonas protegidas y suficientemente hormigonadas (piso pulido y muro de bloques) para evitar cualquier vertido accidental directo sobre el suelo.

Debido a lo heterogéneas y diversas que pueden ser las zonas de emplazamientos incluidas en el programa (en especial por lo permeable que puedan ser los suelos), siempre existirá el riesgo de contaminación de acuíferos. En todo caso, este riesgo de contaminación se considera mínimo, debido al carácter excepcional de las posibles causas de contaminación:

- Que no funcionen los sistemas de drenaje, decantación o tratamiento.
- Que el agua de escorrentía arrastre sólidos en exceso.
- El agua utilizada en procesos productivos salga con contaminantes.
- Que se provoquen derrames accidentales de combustible o aceites.
- Vertidos accidentales de residuos sólidos a los cuerpos de agua.

Impacto visual

Algunas medidas que el programa puede adoptar para para mitigar el impacto visual son:

- Mantener las obras, infraestructuras e instalaciones en buen estado.
- Limitar el tamaño de las intervenciones al estrictamente necesario.
- Procurar que los esquemas de re-aforestación respeten el entorno.

- Instalar barreras vivas en los perímetros de las obras y facilidades.

Impacto inmobiliario

Medidas que se pueden adoptar para aprovechar el impacto inmobiliario pueden ser:

- Utilizar terrenos cuyo uso no esté en conflicto con otros de mayor plusvalía.
- Valorizar los subproductos y residuos, como el compost y/o la biomasa.
- Motivar a los comunitarios y dueños de terrenos a tasarlos periódicamente.
- Concientizar en futuros usos del suelo para otras actividades económicas.
- Concienciar a los productores y campesinos del nuevo valor de sus tierras.

Conservación de suelos

Con cada movimiento de tierras, siempre ocurre una pérdida de horizontes y de homogeneización de los suelos. Las acciones que potencialmente causan la pérdida de suelo son:

- El retiro intencionado de tierra vegetal previa construcción y acondicionamiento de obras, drenajes, reservorios, etc.
- La retirada intencionada de tierra vegetal conforme se abren instalaciones productivas, y los suelos que se pierden por erosión.

Por lo anterior, y a pesar de que las áreas que el programa afectará serán las mínimas necesarias, evitar la pérdida del suelo será una actividad importante. Con la adopción de medidas preventivas y correctoras, este el impacto global podría mantener en un nivel muy bajo. Como medidas correctoras, se puede hacer acopio de materia vegetal en escombreras, la cual se puede utilizar en otros lugares, o en el proceso de restauración ambiental de la misma área afectada.

Residuos sólidos no-peligrosos

Los residuos no peligrosos que se generen (tales como papel, cartón, envases metálicos y de plástico no contaminados, basura orgánica, madera, etc), serán dispuestos adecuadamente. El programa deberá establecer procedimientos para el acopio y gestión de estos residuos, así como procedimientos para la formación e información del personal en estas tareas. Como norma, los residuos serán entregados a gestores autorizados que puedan valorizarlos económicamente.

Otros residuos no peligrosos que se generarán durante la operación del proyecto son lodos de fosas sépticas y de trampas de grasas, y lodos de plantas de tratamiento de agua y reservorios. Los primeros se retirarán periódicamente para evitar su infiltración al terreno, y los segundos se retirarán periódicamente, y puestos a secar al sol, para ser usados en la restauración y otros usos.

Residuos sólidos peligrosos

En este grupo se incluyen los paños con grasa, absorbentes contaminados, aceite usado, filtros, residuos de envases contaminados, chatarras, neumáticos, baterías, pinturas, etc. Estos residuos serán entregados a los talleres locales que realicen el mantenimiento de vehículos y equipos, previa justificación de que la gestión de los mismos es la correcta por su parte. En caso que esto no sea viable, los residuos serán segregados en el origen, almacenados en lugares destinados a ese uso (pisos pulidos, bajo techo, etc.), y entregados a gestores autorizados para disponerlos.

Además, para evitar impactos derivados de posibles derrames, todo almacenamiento de aceites, combustibles y líquidos similares se realizará cumpliendo con los requerimientos de la normativa ambiental, y se dispondrá de sistemas de absorción de derrames necesarios (como camas de serrín o bancos de arena, por ejemplo.) que serán gestionados como residuos peligrosos también.

7.3 Estructura Básica del PMAA

7.3.1 Programas y Subprogramas

Programas a implementar

Los programas a implementar en el PMAA serán:

1. Medio Físico y Biótico
    a. Calidad de aire
    b. Calidad de agua
    c. Flora y Fauna
2. Medio Físico y Abiótico
    a. Suelo
3. Medio Social y Cultural
    a. Gestión Social

b. Desarrollo Social

c. Participación comunitaria

d. Tejido Social

4. Otros programas

a. Ecosistema

b. Paisaje

c. Uso del suelo

Fichas de subprogramas: Construcción

FASE DE CONSTRUCCIÓN	**1**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AIRE**
IMPACTO	○ Afectación a la fauna de la zona por el ruido por los trabajos de construcción; ○ Afectación a la salud de los trabajadores debido a los ruidos de los trabajos;
OBJETIVO	Cumplir con las normas ambientales sobre ruido.
ACTIVIDADES IMPACTANTES	○ Tránsito de vehículos pesados, livianos y motores; ○ Operación de mezcladoras, taladros y sierras; ○ Operación de martillos, retroexcavadoras y grúas; ○ Operación de compactadores y motoniveladoras;
MEDIDAS DE PREVENCIÓN	○ Realizar mantenimiento periódico a equipos, maquinarias y vehículos usados en el proyecto; ○ Exigir el uso de silenciadores en los equipos y vehículos que operan en el proyecto; ○ Mantenimiento de cercas perimetrales y barreras arbóreas en los linderos de las intervenciones; ○ Limitación de horario de operaciones de los equipos pesados al día solar, respetando horas de descanso, fines de semana y días feriados;

MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de los niveles de ruido; ○ Llevar un libro con el registro de las mediciones;
MEDIDAS DE MITIGACIÓN	○ Realizar el mantenimiento periódico de los equipos eléctricos, electrónicos y mecánicos; ○ Siembra de barreras vivas como elementos disipadores del ruido;
PARAMETROS A MONITOREAR	○ Decibeles producidos en las operaciones;
LUGARES DE MUESTREO	○ Zonas de operación y límites de la propiedad;
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Mitigación de impactos negativos relativos a la generación de ruido; ○ No crear perturbaciones a las comunidades cercanas ni a sus habitantes; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	150,000.00

FASE DE CONSTRUCCIÓN	**2**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AIRE**
IMPACTO	○ Contaminación del aire por emisiones de polvo en la construcción y por el movimiento de vehículos; ○ Incremento de los niveles de material particulado (polvo) debido al tránsito vehicular;
OBJETIVO	Cumplir con las normas ambientales sobre PM_{10} y $PM_{2.5}$
ACTIVIDADES IMPACTANTES	○ Operación de mezcladoras, taladros y sierras; ○ Operación de martillos, retroexcavadoras y grúas; ○ Operación de compactadores y motoniveladoras;

	○ Apertura de fundas de cemento y demoliciones;
MEDIDAS DE PREVENCIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Mantenimiento de cercas perimetrales y barreras arbóreas en los linderos de las intervenciones; ○ Limitación de horario de operaciones de los equipos pesados al día solar, respetando horas de descanso, fines de semana y días feriados; ○ Limitar las actividades a lo estrictamente establecido en los planos aprobados del proyecto;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de emisión de particulado; ○ Llevar un libro con el registro de las mediciones;
MEDIDAS DE MITIGACIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Mantenimiento de una cerca perimetral y una barrera arbórea en los linderos del solar; ○ Colocación de lonas en las camas de los camiones; ○ Barrido de las camas de los camiones tras la descarga;
PARAMETROS A MONITOREAR	○ PM_{10} y $PM_{2.5}$;
LUGARES DE MUESTREO	○ Zona de influencia: 1 km alrededor del sitio de la intervención;
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Mitigación de impactos negativos causados por la emisión de particulado; ○ No crear perturbaciones a las comunidades cercanas ni a sus habitantes; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	218,000.00

FASE DE CONSTRUCCIÓN	**3**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	

SUBPROGRAMA	CALIDAD DE AIRE
IMPACTO	○ Emisiones de gases contaminantes provenientes de los vehículos y equipos que operan en el área del proyecto;
OBJETIVO	Minimizar la producción de gases de combustión producto de la operación de los vehículos y equipos de motor, principalmente los que utilizan diésel como combustible.
ACTIVIDADES IMPACTANTES	○ Tránsito de vehículos pesados, livianos y motores; ○ Operación de mezcladoras, taladros y sierras; ○ Operación de martillos, retroexcavadoras y grúas; ○ Operación de compactadores y motoniveladoras;
MEDIDAS DE PREVENCIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Realizar los mantenimientos preventivos de los vehículos y equipos de motor; ○ Utilizar combustibles con bajo contenido de azufre, si es económicamente viable;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de emisiones e inmisiones de los vehículos y equipos; ○ Llevar un libro con el registro de las mediciones;
MEDIDAS DE MITIGACIÓN	○ Limitar la velocidad de circulación de los vehículos ○ Mantenimiento de una barrera arbórea en los linderos del solar;
PARAMETROS A MONITOREAR	○ CO, NO_x NO_2 y SO_2;
LUGARES DE MUESTREO	○ En las zonas donde laboran los equipos en obra;
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Mitigación de los impactos negativos causados por la emisión de gases contaminantes; ○ No crear perturbaciones a las comunidades cercanas ni a sus habitantes; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	120,000.00

FASE DE CONSTRUCCIÓN	4
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AGUA**
IMPACTO	○ Contaminación de aguas subterráneas por derrame de combustible o aceites de vehículos, equipos y maquinarias; ○ Contaminación por excretas humanas;
OBJETIVO	Evitar la contaminación de las fuentes de agua subterránea por hidrocarburos, aceites o excretas humanas.
ACTIVIDADES IMPACTANTES	○ Necesidades fisiologías de empleados, trabajadores, y terceros en el sitio (transportistas, contratistas, etc.); ○ Operación de equipos, maquinarias y vehículos;
MEDIDAS DE PREVENCIÓN	○ Alquiler de baños portátiles; ○ Mantenimiento y limpieza periódica del baño; ○ Instruir al personal y trabajadores en el uso del baño; ○ Disponer de equipos de contención de derrames;
MEDIDAS DE CONTROL	○ Colocación de baños; ○ Comprobante de alquiler y mantenimiento del baño;
MEDIDAS DE MITIGACIÓN	○ Colocación y mantenimiento de baños;
PARAMETROS A MONITOREAR	○ n/A
LUGARES DE MUESTREO	○ n/A
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ No contaminación del recurso agua; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	147,000.00

FASE DE CONSTRUCCIÓN	5
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AGUA**
IMPACTO	○ Limitación en la recarga del acuífero por una disminución de la infiltración de agua debido a la impermeabilización del suelo; ○ Variación del régimen de escurrimiento superficial por modificación del relieve;
OBJETIVO	Minimizar el impacto sobre la recarga de los acuíferos producto de la impermeabilización del suelo. Evitar el arrastre de sedimentos que afecten los cuerpos de agua.
ACTIVIDADES IMPACTANTES	○ Operación y tránsito de vehículos y equipos pesados; ○ Colocación de pavimento rígido o hidráulico sobre el suelo; ○ Construcción de edificaciones
MEDIDAS DE PREVENCIÓN	○ Limitar la velocidad y circulación de los vehículos y equipos a lo estrictamente necesario dentro de las áreas de trabajo; ○ Mantener los drenajes naturales del terreno; ○ Solo pavimentar las áreas estrictamente necesarias para la operación de la infraestructuras e instalaciones;
MEDIDAS DE CONTROL	○ Planos de drenajes del proyecto;
MEDIDAS DE MITIGACIÓN	○ Disponer colectores de aguas de escorrentía y conducirlas al terreno natural o hasta el sistema de drenaje natural de la zona;
PARAMETROS A MONITOREAR	○ Trampas de grasa construidas; ○ Longitud, extensión y pendientes del pavimento;
LUGARES DE MUESTREO	○ Área de la instalación;
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Mitigación de los impactos negativos causados por la impermeabilización del suelo;

	○ Garantizar la permanencia del recurso hídrico subterráneo de cada zona; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	147,000.00 (asociado a ciertas actividades de la construcción)

FASE DE CONSTRUCCIÓN	**6**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Flora y Fauna
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**MANEJO DE FLORA Y FAUNA**
IMPACTO	○ Perdida de cobertura vegetal por limpieza de terrenos;
OBJETIVO	Minimizar el efecto del desmonte de vegetación en las zonas de intervención del programa.
ACTIVIDADES IMPACTANTES	○ Remoción de capa vegetal; ○ Desmonte de vegetación;
MEDIDAS DE PREVENCIÓN	○ Limitar los cortes de suelo a las áreas estrictamente necesarias; ○ Establecer escombreras como bancos para préstamos futuros de material; ○ Limitar la remoción de vegetación a las áreas estrictamente necesarias;
MEDIDAS DE CONTROL	○ Concienciar y capacitar al personal en cuanto a proteger las especies sembradas;
MEDIDAS DE MITIGACIÓN	○ Siembra de especies de la zona; ○ Siembra de árboles de sombra en la zona perimetral;
PARAMETROS A MONITOREAR	○ Especies y cantidad de vegetación removida; ○ Especies y cantidad de árboles sembrados/conservados;
LUGARES DE MUESTREO	○ Zona de intervención del programa;
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;

RESULTADOS ESPERADOS	○ Mitigación de los impactos negativos causados por el corte y remoción de vegetación; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	282,500.00

FASE DE CONSTRUCCIÓN	**7**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Flora y Fauna
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**MANEJO DE FLORA Y FAUNA**
IMPACTO	○ Afectación de la fauna de la zona debido al ruido generado por los equipos e construcción; ○ Pérdida de cobertura vegetal por limpieza del terreno;
OBJETIVO	Minimizar la emigración de especies como resultado de la construcción de infraestructuras e instalaciones.
ACTIVIDADES IMPACTANTES	○ Circulación de vehículos pesados, livianos y motores; ○ Operación de equipos pesados y maquinarias; ○ Corte de vegetación y remoción de capa vegetal;
MEDIDAS DE PREVENCIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Limitación de horario de operaciones de los equipos, vehículos y maquinarias al mínimo necesario; ○ Limitar al mínimo el desmonte de vegetación y la remoción de capa vegetal;
MEDIDAS DE CONTROL	○ Levantamiento inicial de especies de aves, anfibios y reptiles en el terreno;
MEDIDAS DE MITIGACIÓN	○ Limitar los trabajos a lo estipulado en la programación de la obra; ○ Mantenimiento de barreras arbóreas en los linderos de los sitios de intervenciones;
PARAMETROS A MONITOREAR	○ Especies y cantidad de vegetación y animales;
LUGARES DE MUESTREO	○ Zona del proyecto;

RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Mitigación de los impactos negativos causados por el corte de vegetación y remoción de capa vegetal; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	n/A

FASE DE CONSTRUCCIÓN	**8**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Suelo
PROGRAMA MEDIO FÍSICO Y ABIÓTICO	
SUBPROGRAMA	**SUELOS**
IMPACTO	○ Cambios en la topografía; ○ Pérdida de capa vegetal; ○ Generación de residuos;
OBJETIVO	Minimizar las afectaciones al suelo.
ACTIVIDADES IMPACTANTES	○ Corte de suelo y remoción de capa vegetal; ○ Operación y tránsito de vehículos y equipos pesados; ○ Cambios en el perfil topográfico; ○ Impermeabilización de suelos y pavimentación;
MEDIDAS DE PREVENCIÓN	○ Limitación de horario de operaciones al tiempo mínimo necesario; ○ Limitar las labores a las áreas estrictamente necesarias;
MEDIDAS DE CONTROL	○ Buenas prácticas en el manejo de residuos; ○ Establecimiento de escombreras para suelo removido;
MEDIDAS DE MITIGACIÓN	○ Limitar los trabajos a lo estipulado en el programa de obras; ○ Re-utilización de la capa vegetal para siembra de árboles y jardinería;
PARAMETROS A MONITOREAR	○ Cantidad de suelo removido (en m^3);

	○ Área de suelo pavimentada (en m^2);
LUGARES DE MUESTREO	○ Zona de intervención del programa;
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Mitigación de los impactos negativos causados por el corte de vegetación y remoción de capa vegetal; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	242,000.00

Fichas de subprogramas: Operación

FASE DE OPERACIONES	**1**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AIRE**
IMPACTO	○ Afectación a la salud de los trabajadores debido a los ruidos que generan las plantas eléctricas, los sistemas de bombeo y los vehículos que circulan por las instalaciones;
OBJETIVO	Cumplir con las normas ambientales sobre ruido.
ACTIVIDADES IMPACTANTES	○ Operación de vehículos pesados, livianos y motores; ○ Operación de plantas de emergencia; ○ Operación de sistemas de bombeo;
MEDIDAS DE PREVENCIÓN	○ Mantenimiento de una barrera arbórea en los linderos del sitio de intervención (barrera viva); ○ Respeto de horario de operaciones del personal, tiempo de descanso, fines de semana y días feriados; ○ Realizar los mantenimientos periódicos a bombas y plantas; ○ Dotar las casetas eléctrica/bombeo de la debida protección aislante-acústica;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales del nivel de ruido; ○ Llevar un libro con el registro de las mediciones;

MEDIDAS DE MITIGACIÓN	○ Realizar los mantenimientos periódicos de los equipos eléctricos, electrónicos y mecánicos;
PARAMETROS A MONITOREAR	○ Decibeles producidos en las operaciones;
LUGARES DE MUESTREO	○ Zona de operación y/o límites del sitio de intervención;
RESPONSABLE	○ Técnico encargado de la instalación/ proceso; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Personal y ejecutivos sin afectaciones de salud; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	110,000.00

FASE DE OPERACIONES	**2**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AIRE**
IMPACTO	○ Emisiones de gases contaminantes, provenientes de los generadores eléctricos, los sistemas de bombeo, y por los procesos productivos; ○ Contaminación del aire por emisiones de olores durante el trasvase de combustible y/o ante derrames;
OBJETIVO	Cumplir con las normas ambientales de calidad de aire.
ACTIVIDADES IMPACTANTES	○ Autogeneración de electricidad; ○ Operaciones de equipos y maquinarias; ○ Carga y descarga de insumos y productos; ○ Posibles derrames de combustibles / aceites;
MEDIDAS DE PREVENCIÓN	○ Utilizar la planta de emergencia solo en momentos que falle el servicio de la empresa distribuidora; ○ Realizar mantenimiento periódico de equipos, plantas y bombas, incluyendo cambios de aceite y filtros; ○ Hacer los ajustes y calibraciones indicados en las especificaciones del equipo y/u otras guías del fabricante;

	○ Colocación de sistemas de escape adecuados, que garanticen una adecuada dispersión de los gases;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de emisiones; ○ Llevar un libro con el registro de las mediciones;
MEDIDAS DE MITIGACIÓN	○ Limitar el uso de la planta eléctrica al tiempo mínimo necesario (transfer automático); ○ Realizar los mantenimientos periódicos de la planta eléctrica, tal y como lo especifica el fabricante; ○ Mantenimiento de una barrera arbórea en el perímetro del sitio de la intervención;
PARAMETROS A MONITOREAR	○ CO, NO_x NO_2 y SO_2;
LUGARES DE MUESTREO	○ Salida de gases de combustión de la planta eléctrica; ○ Límites interiores de la instalación y/o del lugar de la intervención;
RESPONSABLE	○ Técnico encargado de la instalación/ proceso; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	85,000.00

FASE DE OPERACIONES	**3**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AIRE**
IMPACTO	○ Incremento de los niveles de material particulado (polvo) debido al tránsito vehicular;
OBJETIVO	Cumplir con las normas ambientales sobre PM_{10} y $PM_{2.5}$
ACTIVIDADES IMPACTANTES	○ Incremento del flujo vehicular en vías que podría no estar debidamente asfaltadas;
MEDIDAS DE PREVENCIÓN	○ Limitar la velocidad de circulación de los vehículos;

	○ Limitación de horario de operaciones de los equipos pesados al día solar, respetando horas de descanso, fines de semana y días feriados; ○ Limitar las actividades a lo estrictamente establecido en los planos aprobados del proyecto;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de emisión de particulado; ○ Llevar un libro con el registro de las mediciones;
MEDIDAS DE MITIGACIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Colocación de lonas en las camas de los camiones; ○ Barrido de las camas de los camiones tras la descarga;
PARAMETROS A MONITOREAR	○ PM_{10} y $PM_{2.5}$;
LUGARES DE MUESTREO	○ Zona de influencia: 1 km alrededor del sitio de la intervención;
RESPONSABLE	○ Técnico encargado de la obra; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Mitigación de impactos negativos causados por la emisión de particulado; ○ No crear perturbaciones a las comunidades cercanas ni a sus habitantes; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	21,000.00

FASE DE OPERACIONES	**4**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Personas y Biota
PROGRAMA MEDIO FÍSICO Y BIÓTICO	
SUBPROGRAMA	**CALIDAD DE AGUA**
IMPACTO	○ Contaminación de aguas subterráneas por efecto de las aguas residuales;
OBJETIVO	Evitar la contaminación de las fuentes subterráneas de agua por descargas domésticas y/o de proceso.

ACTIVIDADES IMPACTANTES	○ Necesidades fisiológicas de los empleados y clientes; ○ Lavado y limpieza de instalaciones, vehículos, áreas de servicio y otras similares;
MEDIDAS DE PREVENCIÓN	○ Instalación de baños para empleados, clientes y el público en general; ○ Sistema de tratamiento de aguas residuales domésticas, incluyendo séptico y filtrante; ○ Sistema de tratamiento de aguas de lavado, incluyendo trampa de grasas y sólidos disueltos; ○ Construcción de canaletas, colectores y trampas para las aguas de lavado;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de descargas; ○ Llevar un libro con el registro de las mediciones;
MEDIDAS DE MITIGACIÓN	○ Limpieza periódica de las cámaras sépticas; ○ Limpieza periódica de las trampas de grasas;
PARAMETROS A MONITOREAR	○ DBO, DQO, ST, SSD, pH, aceites y grasas
LUGARES DE MUESTREO	○ A la entrada del filtrante;
RESPONSABLE	○ Técnico encargado de la instalación/ proceso; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	50,000.00

FASE DE OPERACIONES	**5**
Sistema: Físico Natural	
Subsistema: Medio físico y biótico	**Componente**: Suelo
PROGRAMA MEDIO FÍSICO Y ABIÓTICO	
SUBPROGRAMA	**SUELO**
IMPACTO	○ Contaminación del suelo por posibles de combustibles o aceites durante las operaciones de las instalaciones, y/ o durante la carga y descarga de insumos y productos;

	○ Contaminación del suelo por derrame de hidrocarburos durante mantenimientos de maquinaria y equipos que no sean bien realizados o bien manejados;
OBJETIVO	Proteger el suelo de la contaminación con hidrocarburos y residuos sólidos.
ACTIVIDADES IMPACTANTES	○ Llenado de depósitos/tanques de combustible; ○ Vertido de aceite (“liqueo”) en vehículos o equipos; ○ Mantenimiento / cambio de aceite de la planta; ○ Limpieza de la trampas de grasa y lavado de áreas;
MEDIDAS DE PREVENCIÓN	○ Existencia de canaletas y colectores de conducción del agua de lavado hacia la trampa de grasa; ○ Pruebas de manejo de aceites usados; ○ Disponer de quipos de control y limpieza de derrames; ○ Arena limpia y/o aserrín para limpieza y control; ○ Acuerdo con un gestor de manejo de aceites residuales y trampas de grasa, registrada en el Ministerio de Medio Ambiente y Recursos Naturales;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de aguas residuales; ○ Vigilar y controlar cualquier derrame de aceites, sustancias orgánicas liquidas, o hidrocarburos;
MEDIDAS DE MITIGACIÓN	○ Pavimentación de áreas expuestas; ○ Trampas de grasas; ○ Programa de mantenimiento; ○ Entrenamiento y concienciación del personal; ○ Sensibilización de los clientes; ○ Letreros y señalizaciones;
PARAMETROS A MONITOREAR	○ Cantidad de aceite cambiado; ○ Recipientes para almacenamiento de aceites usados en lugares techados e impermeabilizados; ○ Prueba de entrega de aceites usados y limpieza de trampas de grasa; ○ Reporte de incidentes / accidentes;
LUGARES DE MUESTREO	○ A la entrada del filtrante;
RESPONSABLE	○ Técnico encargado de la instalación/ proceso; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;

RESULTADOS ESPERADOS	○ Cumplimiento cabal de la norma ambiental relevante; ○ No contaminación del recurso agua; ○ Mantener la higiene y el aspecto visual de la instalación; ○ Mantener la calidad del suelo;
COSTO ESTIMADO (RD$)	21,000.00

FASE DE OPERACIONES	**6**
Sistema: Comunidad	
Subsistema: Salud y Seguridad	**Componente**: Personas
PROGRAMA MEDIO SOCIAL Y CULTURAL	
SUBPROGRAMA	**GESTIÓN SOCIAL**
IMPACTO	○ Afectación a la salud por emisiones de polvo y por ruido en la comunidad por el movimiento de vehículos;
OBJETIVO	Preservar la salud y seguridad de las comunidades.
ACTIVIDADES IMPACTANTES	○ Tránsito de vehículos y camiones por las comunidades;
MEDIDAS DE PREVENCIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Limitación de horario de trabajo al día solar, respetar horas de descanso, fines de semana y días feriados; ○ Limitar las actividades a lo estrictamente establecido en los planes de trabajo del programa;
MEDIDAS DE CONTROL	○ Realizar mediciones semestrales de emisión de particulado; ○ Llevar un libro con el registro de las actividades;
MEDIDAS DE MITIGACIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Colocación de lonas en las camas de los camiones; ○ Barrido de las camas de los camiones tras la descarga;
PARAMETROS A MONITOREAR	○ PM_{10} y $PM_{2.5}$; decibeles medidos durante el día;
LUGARES DE MUESTREO	○ Puntos aleatorios de la comunidad;
RESPONSABLE	○ Técnico encargado de la instalación/ proceso; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;

RESULTADOS ESPERADOS	○ Mitigación de los impactos negativos causados por la emisión de particulado; ○ No crear perturbaciones a la comunidad; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	77,000.00

FASE DE OPERACIONES	**7**
Sistema: Comunidad	
Subsistema: Salud y Seguridad	**Componente**: Personas
PROGRAMA MEDIO SOCIAL Y CULTURAL	
SUBPROGRAMA	**GESTIÓN SOCIAL**
IMPACTO	○ Ocurrencia de accidentes de tránsito en la comunidad por el movimiento de vehículos;
OBJETIVO	Preservar la salud y seguridad de las comunidades.
ACTIVIDADES IMPACTANTES	○ Tránsito de vehículos y camiones por las comunidades;
MEDIDAS DE PREVENCIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Limitación de horario de trabajo al día solar, respetar horas de descanso, fines de semana y días feriados; ○ Limitar las actividades a lo estrictamente establecido en los planes de trabajo del programa; ○ Contratar “banderistas” de la comunidad para que avisen a las personas de la entrada y salidas de vehículos;
MEDIDAS DE CONTROL	○ Realizar mantenimiento del tránsito; ○ Llevar un libro con el registro de las actividades;
MEDIDAS DE MITIGACIÓN	○ Limitar la velocidad de circulación de los vehículos; ○ Contratar y/o exigir pólizas de seguro a los camiones;
PARAMETROS A MONITOREAR	○ Ocurrencia de accidentes;
LUGARES DE MUESTREO	○ Puntos aleatorios de la comunidad;
RESPONSABLE	○ Técnico encargado de la instalación/ proceso; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;

RESULTADOS ESPERADOS	○ El programa tiene y mantiene buenas relaciones con la comunidad; ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	32,000.00

FASE DE OPERACIONES	**8**
Sistema: Laboral	
Subsistema: Salud y Seguridad	**Componente**: Personas
PROGRAMA MEDIO SOCIAL Y CULTURAL	
SUBPROGRAMA	**GESTIÓN SOCIAL**
IMPACTO	○ Afectación a la salud y/o a la higiene de los trabajadores por emisiones de polvo y ruido;
OBJETIVO	Preservar la salud y seguridad del personal del programa.
ACTIVIDADES IMPACTANTES	○ Emisiones de polvo y ocurrencia de ruido; ○ Exposición a riesgos laborales y/o de seguridad;
MEDIDAS DE PREVENCIÓN	○ Hacer jornadas de salud para el personal y sus familias; ○ Establecer chequeos médicos periódicos para el personal; ○ Uso de implementos de seguridad según la labor que se realiza y sus riesgos;
MEDIDAS DE CONTROL	○ Establecer un comité de salud y seguridad; ○ Llevar un libro con el registro de las actividades;
MEDIDAS DE MITIGACIÓN	○ Establecer un comité de salud y seguridad; ○ Llevar un libro con el registro de las actividades;
PARAMETROS A MONITOREAR	○ Ocurrencia de accidentes; ○ Enfermedades laborales;
LUGARES DE MUESTREO	○ La totalidad del personal en cada intervención;
RESPONSABLE	○ Técnico encargado de la instalación/ proceso; ○ Representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales;
RESULTADOS ESPERADOS	○ El personal disfruta de un buen estado de salud y bienestar;

	○ No crear perturbaciones entre el personal; ○ Cumplimiento cabal de la norma laboral relevante ○ Cumplimiento cabal de la norma ambiental relevante;
COSTO ESTIMADO (RD$)	77,000.00

Fichas de subprogramas: Clausura

Aunque las intervenciones del programa están diseñadas para ser sostenibles en el largo plazo, se debe entender, razonablemente, la condición finita de las operaciones. Las intervenciones del proyecto no escapan a esta realidad, ya que las condiciones físicas, de ordenamiento territorial, el crecimiento y movilidad de la población, el cambio de tecnología, la aparición de nuevas reglamentaciones, entre otros factores; pueden hacer obsoletas las intervenciones del programa.

Si una de esta situación ocurriera, las instalaciones y/o infraestructuras han de ser desmanteladas y los restos de las estructuras y cimientos deben ser retirados. Se deberá poner principal atención en cualquier contaminante producido en los años de operación, que deberán ser limpiados y se dejará el área lo más limpia y libre de remanentes que sea posible. Esto garantiza que los terrenos queden hábiles para otros usos, como emprendimientos de servicios, industriales, o recreativos.

7.3.2 Presupuesto y Cronograma

Resumen de presupuesto

A continuación, se resume el costo anual del PMAA en la etapa de construcción.

Cuadro 20: Resumen de Costos del PMAA para la Fase de Construcción (en RD$)

Medio	Impacto	Valor	Total Anual
Calidad de Aire	Polvo/ Polvillo	210,000.00	**530,000.00**
	Gases contaminantes	120,000.00	
	Generación de ruido	200,000.00	
Suelo	Pérdida de suelo	242,000.00	**270,500.00**
	Residuos peligrosos	28,500.00	
Calidad de Agua	Descargas al subsuelo	147,000.00	**294,000.00**
	Variación del drenaje	147,000.00	
Flora y Fauna	Pérdida de cobertura	282,500.00	**282,500.00**

	Migración de especies	-	
Ecosistema y Paisaje	Cambio del paisaje	72,000.00	**72,000.00**
Comunidad	Polvo/ Ruido	70,500.00	**121,000.00**
	Accidentes de tránsito	38,000.00	
	Empleo local	12,500.00	
Responsabilidad	Seguridad e higiene laboral	150,000.00	**230,000.00**
	Prevención de riesgos	80,000.00	
Otros Aspectos	Donaciones / Contingencias	200,000.00	**200,000.00**
TOTAL PMAA			**2,000,000.00**

Elaborado por el equipo del proyecto. Noviembre del 2017.

De modo similar, se ha estimado el costo anual del PMAA en la etapa de operaciones.

Cuadro 21: Resumen de Costos del PMAA para la Fase de Operaciones (en RD$)

Medio	Impacto	Valor	Total Anual
Calidad de Aire	Polvo/ Polvillo	21,000.00	**221,000.00**
	Gases contaminantes	85,000.00	
	Generación de ruido	115,000.00	
Suelo	Residuos peligrosos	21,000.00	**21,000.00**
Calidad de Agua	Descargas al subsuelo	50,000.00	**50,000.00**
Flora y Fauna	Afectación de la biota	70,000.00	**70,000.00**
Ecosistema y Paisaje	Afectación del ecosistema	59,000.00	**59,000.00**
Comunidad	Polvo/ Ruido	35,000.00	**97,000.00**
	Accidentes de tránsito	32,000.00	
	Empleo local	30,000.00	
Responsabilidad	Seguridad e higiene laboral	77,000.00	**132,000.00**
	Prevención de riesgos	55,000.00	
TOTAL PMAA			**650,000.00**

Elaborado por el equipo del proyecto. Noviembre del 2017.

Debido al tamaño económico de las inversiones del programa, ambos presupuestos de gastos del PMAA se presentan razonables. En general, tanto el PMAA de la construcción (único) como el PMAA de las operaciones no deberían sobrepasar el 0.5% del presupuesto total de la actividad.

Resumen de cronograma

El PMMA será implementado de manera continua y durante todo el período de ejecución del programa. Además, se fortalecerán las capacidades de comunidades e instituciones relevantes para que puedan cumplir, monitorear y actualizar el PMAA más allá de la vida útil del programa.

7.3.3 Matriz-Resumen del PMAA

En los anexos a este documento, se incluye la matriz-resumen del PMAA. La misma incluye los elementos como: componente y elemento del medio, impactos identificados, actividades para su control y mitigación; los parámetros a monitorear y los indicadores para ello. Se indican, además, los responsables por actividad, los costos asociados y los documentos que deben generarse.

7.4 Plan de Monitoreo/ Seguimiento

7.4.1 Descripción y Objetivos

Importancia del monitoreo

Una buena gestión ambiental se basa en el cumplimiento del plan de monitoreo, y en la adopción de medidas de prevención y control en la fase de desarrollo, construcción, operación y clausura, y está relacionado con el control de la calidad de los principales elementos del medio afectado (agua, aire, suelo, paisaje, ecosistema y comunidad), así como con el seguimiento de las prácticas restauradoras. En la fase de cierre, el PMAA tiene por objeto analizar y controlar las acciones para la remediación de los pasivos ambientales, y en el aprovechamiento futuro de los activos.

Objetivos del plan de monitoreo

El plan de monitoreo tiene los siguientes objetivos fundamentales:

- Controlar el cumplimiento de las medidas preventivas y correctoras previstas en las fases de desarrollo, de construcción, de operación y de clausura.
- Comprobar que los impactos producidos en la construcción y la operación no exceden los previstos y/o que puedan ser razonablemente manejados.
- Cuantificar la incidencia sobre el entorno y optimizar y corregir las medidas preventivas y correctoras propuestas.

- Detectar otros impactos, no considerados en el estudio o sobre otros elementos ambientales a tener en cuenta, y poner en marcha las medidas oportunas.
- Reflejar la situación del programa respecto a los límites y niveles de referencia establecidos por la legislación medioambiental aplicable.
- Cumplir los estándares de calidad aplicables a los procesos, insumos, materiales y productos, de forma que se logre la integridad ambiental.
- Analizar la evolución de las intervenciones realizadas y, en caso de no obtener los resultados previstos, investigar las causas y establecer las medidas necesarias a adoptar.
- Proporcionar información acerca de la metodología de evaluación empleada, así como de la calidad y oportunidad de las medidas correctoras adoptadas.

Condiciones de aplicabilidad

El plan de manejo podrá ser objeto de modificaciones en lo que respecta a los parámetros que deben ser medidos, periodicidad de las medidas y límites entre los que deben encontrarse dichos parámetros. Todo ello es válido, y al efecto debe revisarse, cuando así lo aconseje la entrada en vigor de nuevos conocimientos significativos sobre la estructura y funcionamiento del sistema.

Para la presentación de las mediciones y resultados obtenidos durante el desarrollo del plan de manejo y adecuación ambiental, se propone la elaboración de un informe de periodicidad semestral, que será remitido puntualmente al Ministerio de Medio Ambiente y Recursos Naturales.

7.4.2 Plan para Impactos Significativos

Puntos críticos

Dadas las características del programa y los elementos ambientales a tener en cuenta, los puntos en los que debe hacerse mayor hincapié son los siguientes:

- Comprobación y seguimiento de la extensión superficial afectada por las intervenciones del programa a lo largo de todas sus fases, e inspección de posibles afecciones.
- Control de emisiones a la atmósfera.
- Control de la calidad del medio hídrico, afección de aguas superficiales y subterráneas.
- Control de los residuos generados durante las fases de construcción y operación.
- Previsión de eventuales afectaciones a la flora y la fauna, y monitoreo periódico.

- Control de los elementos del programa en cuanto su papel como soporte de la adaptación al cambio climático de las comunidades beneficiarias.

Calidad atmosférica: polvo

Los parámetros atmosféricos que deben controlarse durante la fase de construcción y operación de las intervenciones son el polvo y el nivel sonoro.

Objetivo: El objetivo del PMAA, respecto a la calidad del aire, es proteger la salud de los trabajadores y la comunidad, así como proteger las condiciones naturales de plantas y animales.

Respecto a los primeros, los trabajadores, los controles se realizarán de acuerdo con lo establecido en el Plan de Seguridad y Salud Laboral del programa. Respecto al ambiente del entorno, se proponen las siguientes actuaciones:

- Comprobaciones periódicas del buen funcionamiento de las medidas de lucha contra el polvo (conjuntamente con las de ruido e inmisiones).
- Cuantificación de los niveles de inmisión de polvo y de ruido con objeto de verificar que se cumplen los estándares indicados por la norma ambiental.
- Mantenimiento de la maquinaria para evitar las emisiones de partículas y gases de una mala combustión de los motores y equipos de bombeo.

Indicadores y Límites: para partículas sedimentables, 300 mg/m^2 de concentración media en 24 horas. Se tomará como nivel de alarma el 95% del valor mayor valor de los indicadores definidos.

Periodicidad y Puntos de Muestreo: Se usará el método gravimétrico para la determinación de las partículas sedimentables (>10µm). Las medidas en cada punto se harán cada 6 meses. Teniendo en cuenta los vientos dominantes, las restricciones topográficas de cada zona, los puntos y períodos de mayor emisión dentro de estas, la red de medición tendrá al menos tres puntos.

Control: En la normativa dominicana no se especifican métodos para toma de muestra y análisis de contaminación en emisión, por lo que el control de emisiones de polvo se basa en la vigilancia del desarrollo de las medidas preventivas y correctoras propuestas en el programa y en el PMAA.

Medidas Correctoras: Las principales medidas correctoras que deben ser controladas en este sentido serán las siguientes:

- Riego de caminos, acopios y zonas de carga/descarga
- Lavado de vehículos, equipos y maquinaria
- Empleo de lona para cubrir los camiones
- Limpieza periódica de superficies de transporte y de acopios
- Mantenimiento periódico de instalaciones productivas

Informe generado: se realizará un informe de la medición con sus recomendaciones.

Calidad atmosférica: ruido

Objetivo: El objetivo del control de ruidos es garantizar la protección de las condiciones de sosiego, de manera que queden registradas las medidas sonoras ambientales y se compruebe la inexistencia de molestias (≤ 70 dBA). También, dadas las características del medio, se persigue garantizar que el nivel sonoro no afecte de forma significativa a las personas o a la fauna.

Indicadores y Límites: El indicador utilizado será el nivel equivalente diurno (NED) que se refiere al Leq medido entre las 7:00h y las 22:00h. En el interior de la intervención (infraestructuras e instalaciones), el nivel de ruido máximo será de 80 dB(A), y de preferencia será de 65 dB(A).

Periodicidad y Puntos de Muestreo: Según sean más o menos poblado el entorno donde se ubica la intervención, el control de ruidos se realizará inicialmente cada 6 meses en al menos 4 puntos. Si los niveles medidos están por debajo de los niveles permitidos, el periodo de toma puede distanciarse hasta los 12 meses. En cualquier caso, siempre se tomarán medidas de control para aquellas actividades que, por su diseño y/u operación pudieran causar sonidos de más intensidad.

Medidas Correctoras: Las principales medidas correctoras que deben ser controladas en este sentido serán las siguientes:

- Mantenimiento de equipos, maquinaria y vehículos
- Aislamiento de plantas y bombas en casetas cerradas
- Mantenimiento periódico de instalaciones productivas
- Implementación de barreras vivas

Informe generado: se realizará un informe de la medición con sus recomendaciones.

Calidad de aguas: superficiales y subterráneas

Objetivo: El programa de vigilancia ambiental, respecto al sistema hídrico intervenido, debe servir para asegurar que se realizan las medidas preventivas y correctoras propuestas en este estudio y que se cumplen los estándares de calidad de las aguas, según la normativa ambiental vigente.

Indicadores y Límites: La forma más extendida de determinar la calidad del agua consiste en efectuar análisis físico-químicos y microbiológicos, y comparar los resultados obtenidos contra los siguientes patrones:

- Sólidos en suspensión
- pH
- Conductividad
- Aceites y grasas
- DBO
- DQO

El nivel de alarma es el 96% del valor máximo de dichos indicadores.

Periodicidad y Puntos de Muestreo: Los análisis de control de calidad de agua deberán realizarse periódicamente, cada 6 meses. Los muestreos de aguas superficiales se realizarán en el punto de vertido de la laguna de decantación al cuerpo receptor más cercano. Y en dicho cuerpo receptos, 100 metros aguas arriba y aguas abajo del sitio de vertido. En relación con las aguas subterráneas, no se tiene previsto realizar sondeos. En caso de que se interceptase el nivel freático, se tomarán muestras de agua en este punto con la misma periodicidad semestral (en el mismo proceso).

Medidas Correctoras: Las principales medidas correctoras que deben ser controladas en este sentido serán las siguientes:

- Mantenimiento de drenajes
- Monitoreo de los sistemas de tratamiento
- Disponer adecuadamente los residuos

Informe generado: se realizará un informe de la medición con sus recomendaciones.

Afecciones al medio biótico y paisajístico

Vegetación: el control de los efectos sobre la vegetación, se refiere a la inspección visual de las especies del entorno de las intervenciones. Así será posible determinar si las acciones del programa causan algún tipo de afectación o pérdida superior a las previstas. A fin de no afectar una superficie mayor a la requerida para el desarrollo de las intervenciones, se promoverán las actividades de re-aforestación y de conservación de árboles y plantas. Esta revisará anualmente.

Suelo: el plan de seguimiento y control ambiental vigilará que los métodos de trabajo se realicen según los criterios expuestos en este informe, para evitar o no incrementar (dentro de los impactos previstos) riesgos como erosión o inestabilidad. Se realizarán inspecciones visuales alrededor de las intervenciones, a fin de detectar posibles puntos de riesgo de caída de rocas o deslizamiento de suelos. Se observarán posibles síntomas de erosión: acumulación de finos, regueros visibles, etc.; y se vigilarán las cunetas perimetrales y la eficiencia de los sistemas de tratamiento.

Paisaje: para realizar un seguimiento correcto de la evolución de los impactos estéticos, visuales y paisajísticos, se llevará un itinerario fotográfico constituido por cuatro puntos, desde los cuales se tomarán fotografías anualmente. Esta supervisión de las afecciones paisajísticas se llevará a cabo a lo largo de la vida útil del programa, y posiblemente en los años posteriores a su cierre (si lo asume la comunidad). Los puntos de foto serán al Norte, Sur, Este y Oeste de cada intervención.

Actividades de re-aforestación

Objetivo: las actividades de conservación de agua del programa incluyen esquemas de re-aforestación. El plan de seguimiento y control de las labores de re-aforestación es conocer las técnicas empleadas como medidas correctoras de los impactos. Además, permite evaluar el grado de efectividad de las fases de intervención de microcuencas, reforestación, riberas y actividades económicas (manejo de forestales, frutales, etc.) y la medida en que esto contribuye a una correcta adaptación. Este plan consistirá en un programa de inspecciones visuales periódicas con el fin de:

- Controlar que los materiales necesarios para llevar a cabo las labores de re-aforestación cumplen los requisitos de calidad requeridos, definidos en el programa.
- Verificar que las operaciones de modelado, preparación del terreno e implantación de la vegetación se realizan según lo indicado en el plan de manejo.
- Efectuar visitas periódicas a las zonas intervenidas para conocer la evolución de las siembras y plantaciones realizadas y detectar cualquier problema.
- Recoger de forma periódica (cada vez que se efectúa algún tipo de laboreo y/o implantación) muestras de suelos para su análisis físico-químico.

- De esta manera es posible detectar carencias en elementos esenciales para el desarrollo adecuado de las especies instauradas.

En caso de que se observen resultados diferentes a los esperados o si son de carácter adverso, el plan de vigilancia también debe prever los cambios oportunos necesarios para que se puedan alcanzar los objetivos marcados en relación a esta actividad. La comunidad es clave en este tema.

Los aspectos de la vegetación que deben ser anotados de forma sistemática en cada una de las visitas que se efectúen son:

- Tiempo que tardan en aparecer las primeras plántulas.
- Tasa de germinación de la siembra.
- Grado de cubierta total y parcial, por especies sembradas.
- Composición específica.
- Índice de presencia de especies sembradas.
- Presencia de enfermedades.
- Distribución de las especies.
- Presencia de otras especies no sembradas o plantadas.
- Presencia de síntomas de erosión: regueros, erosión, etc.
- Malformación de los ejemplares plantados.
- Crecimiento lento o decaimiento de la vegetación.

En todos los casos, se repondrán las plantas que no sean viables y se llevarán a cabo labores de mantenimiento de la vegetación implantada. En las pantallas vegetales, estas labores se llevarán a cabo durante la vida útil del programa. En las plantaciones propias de la restauración del terreno, el mantenimiento se prolongará hasta los dos primeros años según se vaya realizando la tarea.

En estas visitas sistemáticas también se analizará y documentará el grado de cumplimiento y de avance de la actividad forestal, según lo previsto por el programa y en el plan de manejo forestal, respectivamente. Si se detectan variaciones entre lo logrado y lo previsto, se indicarán las causas.

Las inspecciones serán más frecuentes en las primeras fases de la actividad (cada 4 meses), ya que el objetivo es conocer la eficacia o no de los materiales y de las técnicas empleadas, ya que los

resultados definitivos podrían verse después de concluir el programa. No obstante lo anterior, las observaciones diarias que se realicen pueden aportar información sobre incidencias y resultados.

Cuando el desarrollo de la vegetación se corresponda al previsto, y si no existieran inconvenientes, se efectuará un único análisis edáfico, el cual deberá coincidir con la época de mayor necesidad nutritiva para las plantas. En caso contrario, será necesario realizar estudios más detallados para detectar la causa de los problemas y poner en práctica medidas oportunas para paliarlos.

Anualmente se realizará un seguimiento de las labores de revegetación contempladas en el plan de manejo, información que se llevará a un plano topográfico. Además, también anualmente se realizará un levantamiento de las zonas intervenidas con emplazamientos forestales. Estos levantamientos topográficos periódicos, permitirán controlar el avance real y efectivo de la tarea.

Gestión de residuos

Los residuos se gestionarán adecuadamente durante todas las fases del programa, tanto durante el desarrollo, como en la construcción y operación de las infraestructuras e instalaciones. Una vez finalizadas las diferentes actividades, y en todo momento, se vigilarán las labores de limpieza.

Durante todo el programa, se tendrá especial atención con aquellos residuos calificados como peligrosos (incluidos los envases que los hayan contenido). En general, este tipo de residuos son neumáticos, chatarras, aceites, baterías, etc. Existen más, por lo que, ante una duda al respecto, el responsable de la instalación/ proceso solicitará la información necesaria al gestor ambiental del proyecto, a la municipalidad o al Ministerio de Medio Ambiente y Recursos Naturales.

Las principales acciones del proyecto susceptibles de generar residuos son:

- Infraestructuras: en la que se generan residuos de materiales (como fundas de cemento, latas de pintura, etc.), de comida, empaques, etc.
- Instalaciones: en las que pueden ocurrir derrames (aceites, combustibles, detergentes) de las actividades de mantenimiento y reparación. También se generan aguas de lavado, biomasa, restos de comida, restos de poda, etc.
- Sanitarias. las instalaciones sanitarias (baños, cocina, etc.) para el personal y clientes, también supone la generación de aguas residuales.

En general, los residuos generados por las intervenciones ocasionan una problemática diversa para su tratamiento, esto se afrontará comenzando con una separación en origen. En general,

para gestionar adecuadamente los residuos, se llevará a cabo una evaluación cuantitativa de los residuos producidos y una clasificación de los mismos en: metales, suelos, tierras, lubricantes y aceites, basura, biomasa, baterías, reutilizables, reciclables, etc. Cada elemento clasificado se tratará en función de su inclusión en las normativas de residuos domésticos o de peligrosos.

Se vigilará que se hagan acuerdos con gestores autorizados por el Ministerio de Medio Ambiente y Recursos Naturales, para gestionar la retirada y correcta destrucción de los residuos peligrosos. Para el resto de residuos, se atenderá a las normativas aplicables y, en concreto, a la entrega en un lugar donde los recoja la municipalidad. La posible valorización será para bien de la comunidad.

7.4.3 Integridad Ambiental

El proyecto cumplirá con los siguientes indicadores ambientales:

Cuadro 22: Parámetros Ambientales del Programa

Elemento	Límites	Unidad
Descarga de aguas residuales domésticas		
DBO_5	50	mg/m^3
DQO	160	mg/m^3
pH	6.0 – 8.5	
Solidos suspendidos	50	mg/l
Sólidos totales	1000	NMP/100 ml
Descarga de aguas residuales industriales		
pH	6.0 – 9.0	
SST	50	ppm
Grasas y Aceites	10	ppm
Hg	3.5	mg/m^3
Metales totales	10	ppm
Niveles de ruido		
Ruido exterior		
Ruido diurno (07:00 a 21:00)	70	dB
Ruido nocturno (21:00 a 07:00)		dB
Emisiones atmosféricas		
Partículas sólidas 24h	150	μ/m^3

Partículas sólidas	250	mg/m^3
NO_2		
SO_2	2,600	mg/m^3
CO	1,150	mg/m^3
Estándares de calidad de aire		
OST	80	μ/Nm^3
Emisiones		
Partículas sólidas	100	mg/Nm^3

Elaborado basado en las normas ambientales vigentes.

7.4.4 Instrumentos de Registro de Informaciones

Sistema documental

El desarrollo del PMAA debe estar soportado por un sistema de documentación capaz de reflejar en cada momento la situación de la actividad realizada respecto de la norma ambiental aplicable, y que contenga los registros de mediciones e incidencias con sentido histórico, que permitan una trazabilidad viable de toda la actividad desarrollada en el programa. El sistema tiene tres objetivos:

1. Registrar las mediciones y observaciones definidas en el PMAA para su posterior consulta, verificación y análisis.
2. Recoger e identificar la legislación ambiental aplicable al proyecto.
3. Mantener ordenado y archivado el conjunto documental compuesto por estudios, datos del proyecto, tramitaciones, comunicaciones e incidentes, reclamaciones, etc.

Elementos del sistema

Para cumplir sus objetivos, el sistema documental estará formado por tres partes: Una primera, que consistirá en un registro de las mediciones y observaciones del PMAA. La segunda parte del sistema, incluirá un archivo de la legislación y normativa ambiental aplicable a las intervenciones. Este archivo, tendrá un listado de normas ordenadas según los aspectos ambientales del proyecto.

Por último, se mantendrá un archivo actualizado con los informes y estudios del medio físico-natural, y el medio social-cultural, promovidos por el programa. También se incluirán es este archivo, los estudios y mediciones realizados por terceros en el entorno, en relación a los aspectos ambientales del programa, y a los que se pueda tener acceso o estén públicamente disponibles. Este archivo se podrá incluir, dentro de los Informes de Cumplimiento Ambiental (ICA).

Cuadro 23: Estructura del Sistema de Documentación Ambiental del Programa

Tipo de Informe	Data Relevante	Frecuencia
Calidad Ambiental	- Ruido - Polvo - Residuos - Descargas	Semestral
Inspecciones Realizadas	- Procesos - Estructuras - Recuperación	Trimestral
Reforestación		Trimestral y Anual
Socioeconómico	- Empleo directo - Empleo indirecto	Semestral
Adaptación Climática	- Agricultura - Medios de subsistencia - Gestión hídrica	Anual

Elaborado por el equipo del proyecto. Noviembre del 2017.

Esta estructura sugerida, debe ser complementaria a la que disponga el Fondo de Adaptación para el monitoreo de los proyectos, y nunca deberá ser considerado como sustituta de esta.

7.4.5 Presupuesto y Cronograma

Para la ejecución del monitoreo, se plantean los siguientes cronograma y presupuesto:

Cuadro 24: Cronograma y Presupuesto del Monitoreo Ambiental

Concepto	Periodicidad	Costo RD$	Total RD$
Calidad de agua			
Aguas residuales	semestral	12,000	24,000
Aguas de lavado	semestral	10,000	20,000
Calidad de aire			
Polvillo	semestral	15,000	30,000

Gases contaminantes	semestral	18,000	36,000
Ruido	semestral	10,000	20,000
Medición y Reporte			
Inspecciones	Mensual	12,000	144,000
ICAs	Semestral	5,500	11,000
Restauración de áreas			
Mediciones de Avance	Anual	40,000	40,000
TOTAL (RD$)			**325,000**

Elaborado por el equipo del proyecto. Noviembre del 2017.

7.4.6 Necesidades de Capacitación

Capacitación en el programa

Todo el personal involucrado en el programa ha de ser capacitado en la implementación del PMAA, según la fase del proyecto en que participe. Esto puede ser extensivo a la comunidad y a los socios. En este proceso, deben documentarse registros de asistencia, materiales entregados, los temas abordados y las lecciones aprendidas. Se prefiere que esto se auxilie de foto y video.

Las capacitaciones en el PMAA las debe realizar el personal que tenga conocimiento y experiencia, de acuerdo a la temática de cada charla y las expectativas de los asistentes y participantes. Las jornadas de capacitación, se deben realizar de forma periódica, acorde a la evolución o avance del programa. A su vez, se puede evaluar de acuerdo a un indicador específico relacionado:

$$IPC = \frac{PC}{PT} x\ 100$$

Donde:

IPC = Índice de Personal Capacitado

PC = Personal capacitado

PT = Cantidad total de personal (referido al contexto del programa, actividad o comunidad)

Además, pueden establecerse mecanismos de fomento, como visibilizar los capacitados que se han destacado, incentivos o bonificaciones por capacitación, utilizarlos en vocería, etc.

Seguimiento al programa

La implementación de los programas y sub-programas incluidos en el PMAA, debe ser realizada, dirigida y supervisada por un personal capacitado según el tema. Esto ayuda a tener un mejor monitoreo y control de los procesos y se evitan daños al ambiente.

La persona encargada de la ejecución del PMAA tendrá el siguiente perfil:

- Puesto: Encargado de salud, calidad, higiene y medio ambiente.
- Funciones: Velar por el cumplimiento del PMAA y otros relacionados.
- Formación: Ing. Civil / Industrial, Arquitecto, Químico, Físico o Biólogo.
- Competencias: Estudios de maestría preferiblemente, ingles es un plus.
- Productos: Informe de cumplimiento ambiental cada 6 meses (y otros).
- Otros: revisar y proponer cambios al PMAA, contacto con el MARN.

Este profesional podría desempeñar otras tareas en el contexto del programa, como la realización de mediciones sobre la adaptación al cambio climático, vigilar el cumplimiento de las políticas sociales y ambientales, o ser el representante del programa ante el Ministerio de Medio Ambiente y Recursos Naturales. En adición, podría ser un punto de contacto entre programa y comunidad.

8. Plan de gestión de riesgos

8.1 Plan de Gestión de Riesgos

8.1.1 Análisis de riesgos

Conceptos básicos

El riesgo se encuentra definido por dos conceptos básicos: amenaza y vulnerabilidad. AMENAZA es el peligro asociado a un fenómeno físico de origen natural o humano que puede presentarse en un sitio específico y en un tiempo determinado, produciendo efectos adversos en las personas, los bienes y/o el ambiente. En otras palabras, la amenaza significa la potencialidad de ocurrencia de un evento con un cierto grado de severidad. VULNERABILIDAD, en cambio, es la predisposición intrínseca de un sujeto o elemento expuesto de sufrir daño por el desarrollo del programa.

A estos efectos, el RIESGO se define entonces como la probabilidad de ocurrencia de un evento que genere un daño a los elementos expuestos. Dicho en palabras más sencillas, el riesgo es la probabilidad de que la amenaza se convierta en un desastre. Esto se expresa como:

$$R = A \times V$$

Donde:

R = Riesgo; A = Amenaza; V = Vulnerabilidad

En el marco del programa, se ha realizado una identificación de riesgos, que incluye una descripción de los posibles eventos que tiene probabilidad de ocurrencia durante la planeación o ejecución de las intervenciones, y como deberían manejarse en caso de ocurrir. La prevención, mitigación o remediación de los riesgos se incluirán dentro de la gestión del proyecto, en el PMAA.

Objetivos

Un análisis de riesgo busca identificar los peligros o la probabilidad de ocurrencia de un evento no deseado, para poder juzgar sus consecuencias y por ende su aceptabilidad. Esta evaluación demanda identificar amenazas naturales asociadas a los componentes ambientales y las amenazas

tecnológicas asociadas a las actividades del programa, tanto constructivas como operativas. A través de la caracterización o análisis de la línea de base ambiental, se pueden tener los elementos necesarios para evaluar la vulnerabilidad del entorno en relación a las amenazas identificadas.

Metodología

En la realización del análisis de riesgo, se han agotado las siguientes etapas:

- Identificación de los peligros latentes y las características del medio donde puedan ocurrir. Esto implica que el análisis se realiza a partir de las actividades, acciones y situaciones del programa (y sus intervenciones) que conformen cualquier escenario de riesgo.
- Identificación de las amenazas, ya sean de tipo natural o antrópico, asociadas a las distintas etapas del proyecto como al desarrollo, construcción, operación, desmantelamiento.
- Estimación de los efectos y consecuencias de evento indeseado.
- Identificación, implementación y monitoreo de las medidas remediales seleccionadas para reducir la probabilidad o controlar las consecuencias de los eventos indeseados.

En base a esta información se diseñan los planes de contingencia o de prevención y atención de desastres, cuyo objetivo general es establecer los mecanismos generales de manejo de estos eventos, responsabilidades y procedimientos de actuación. Esto es parte integral del programa.

8.1.2 Amenazas Naturales Generales

Para el proyecto se han considerado los siguientes elementos de riesgo:

- Riesgo a inundaciones
- Riesgo a erosión
- Riesgo a deslizamientos
- Riesgo a terremotos
- Riesgo a huracanes

Estos riesgos, han sido evaluados en función de la información provista por el Ministerio de Medio Ambiente y Recursos Naturales, a través del más reciente altas de recursos naturales disponible.

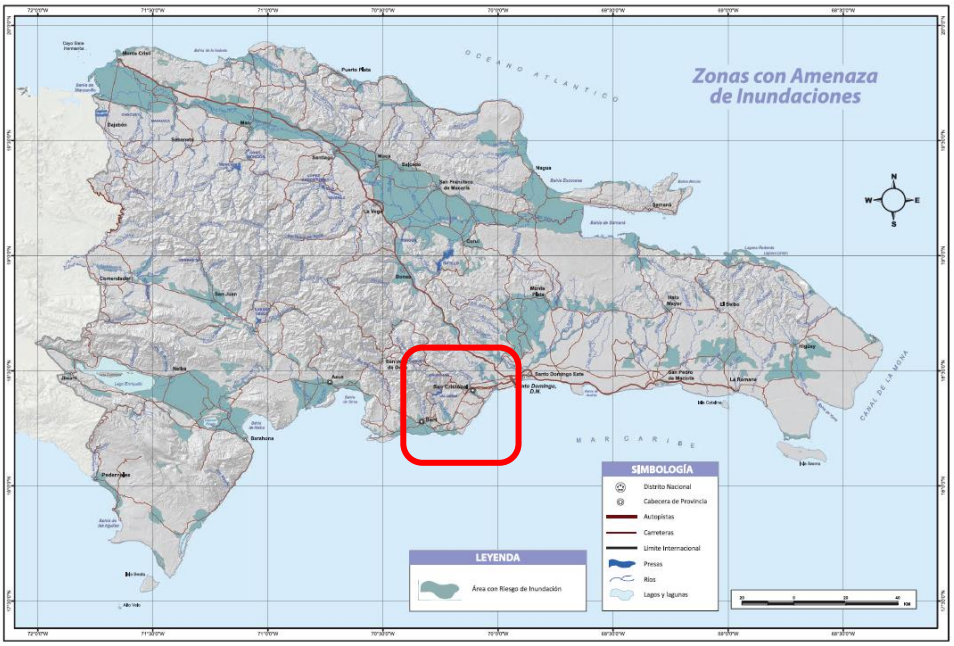

Figura 23: Mapa de Zonas con Amenazadas de Inundaciones
Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

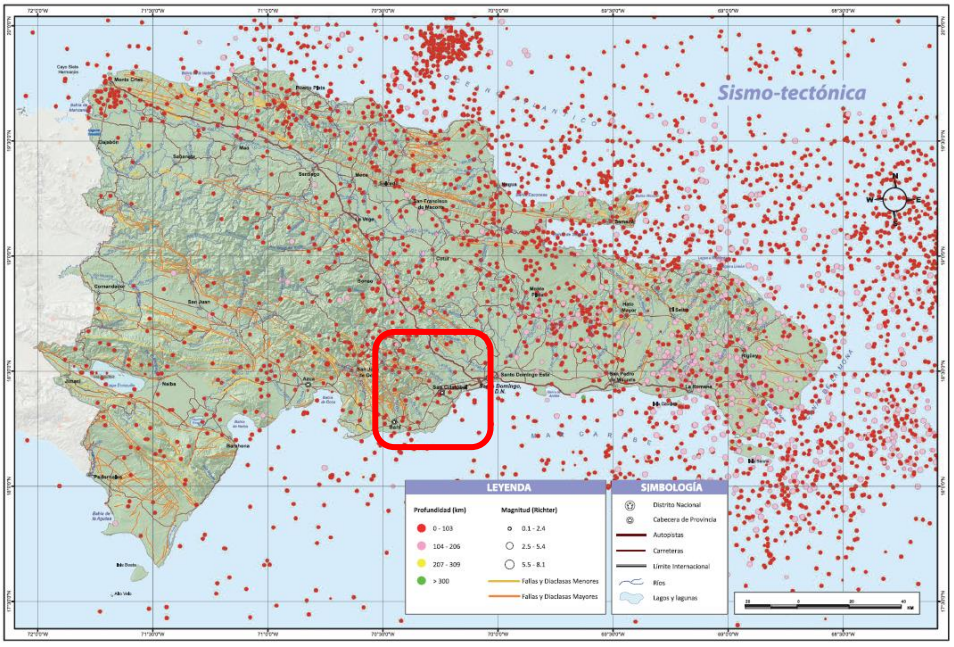

Figura 24: Mapa de Ocurrencia de Fenómenos Sísmicos
Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

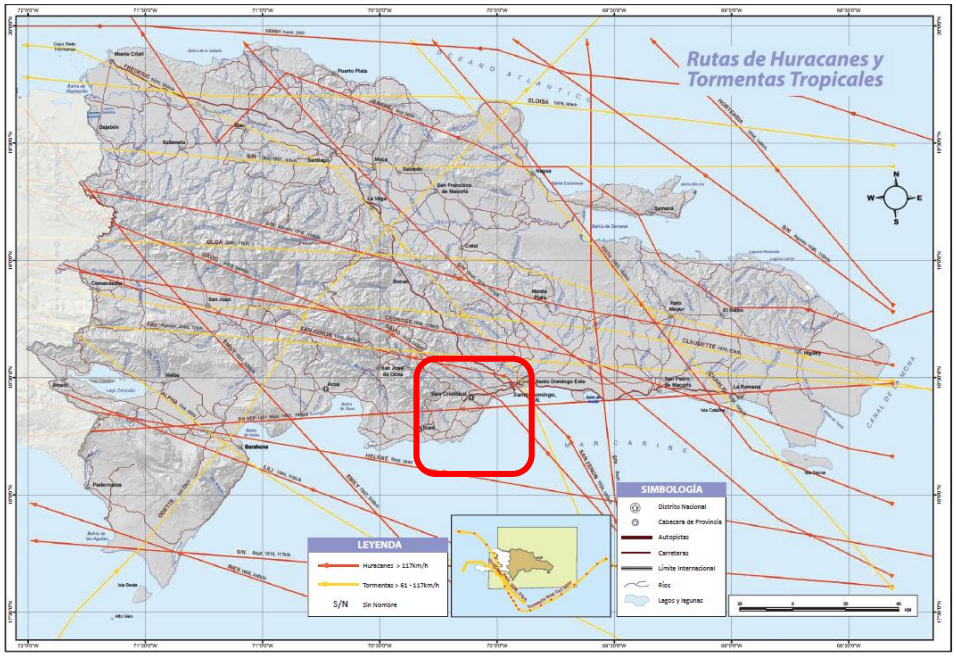

Figura 25: Mapa de Rutas de Tormentas y Huracanes
Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

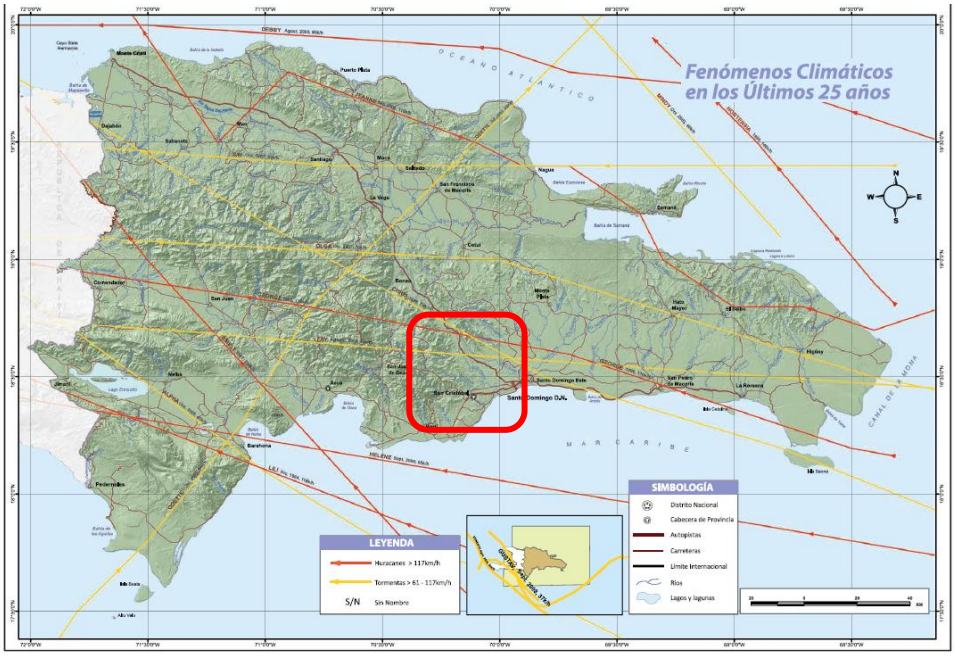

Figura 26: Mapa de Ocurrencia de Fenómenos Hidrometeorológicos
Fuente: Atlas de Recursos Naturales de la República Dominicana, 2012.

Estos elementos de riesgo se han analizado de manera independiente y de manera sinérgica.

8.1.3 Amenazas Naturales Específicas

Sismicidad

La zona de intervención del programa, según la distribución sismotectónica propuesta en el marco de desarrollo del proyecto SYSMIN (1999), se encuentra ubicada en la zona Beata Ridge (zona 5) la cual presenta la influencia sísmica de las formaciones Bonao, San José-Restauración y Hatillo. Registros históricos muestran una sismicidad discreta del territorio, lo que amerita su monitoreo.

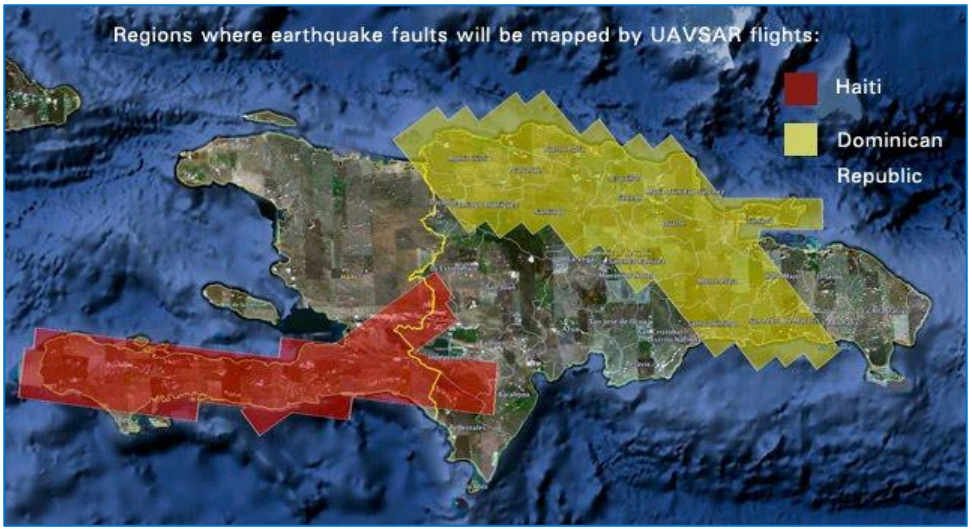

Figura 27: Herramienta de Monitoreo y Predicción de Sismos
Fuente: Servicio Geológico de Estados Unidos (consultado el 15.nov.2017)

Con estos precedentes, las infraestructuras a implementar en el contexto del programa, deberán estar adecuadas al riesgo de sismicidad de la zona, el cual ha de cumplir con los criterios y normas relevantes del Ministerio de Obras Públicas y Comunicaciones. En adición, se deberá atender al monitoreo regular de la actividad sísmica y/o a los reportes oficiales de las autoridades relevantes

Desertificación

La desertificación es un proceso de degradación ecológica en el que un suelo pierde total o parcialmente su potencial de producción. En general, la desertificación ocurre como resultado de deforestación, la destrucción de la capa vegetal y subsiguiente erosión del suelo, sobreexplotación de acuíferos, la sobreirrigación y consecuente la salinización de las tierras o la falta de agua.

Aunque las áreas de intervención del programa no son zonas de alto riesgo de desertificación (los sitios más críticos del país son los de la línea noroeste y la zona fronteriza), la misma debe ser observada con el paso del tiempo. Las áreas incluidas no están bajo riesgo de desertificación, ya que, como parte de las acciones del programa para diversificar el ingreso, se puede abordar la producción abono orgánico ("compost") además de las actividades previstas de re-aforestación, control de la erosión, y cualquier otra mejora en la práctica agrícola para hacerlas más sostenible.

Cambio climático

El cambio climático es el cambio en la distribución estadística de los patrones meteorológicos durante periodos prolongados de tiempo (dese décadas a miles de años). Este puede referirse a un cambio en las condiciones promedio del tiempo, o en la variación temporal meteorológica de las condiciones promedio a largo plazo (i.e., más o menos fenómenos meteorológicos extremos). Está causado por factores como procesos bióticos, variaciones en la radiación solar, tectónica de placas y erupciones volcánicas. Las actividades humanas se identifican como causa principal del cambio climático reciente, relacionado con el efecto invernadero y el calentamiento global.

En sentido general, las zonas de intervención presentan las siguientes vulnerabilidades climáticas:

Cuadro 25: Factores de Vulnerabilidad al Cambio Climático de las Áreas a Intervenir

Factor	Vulnerabilidad	Exposición
Agricultura	Muy Alta	Alta
Agua Potable	Muy Alta	Alta
Energía	Muy Alta	Baja
Áreas Protegidas	Alta	Media
Asentamientos Humanos	Alta	Media
Turismo	Media	Baja

Fuente: Informe Final Puntos Críticos para la Vulnerabilidad a la Variabilidad y Cambio Climático en la República Dominicana y su Adaptación al mismo, USAID, 2011.

Como resultado general del programa, se espera que este contribuya a disminuir la vulnerabilidad climática y aumentar la capacidad adaptativa en las zonas intervenidas. En la implementación de las actividades previstas, se podrían identificar o aprovechar otras sinergias o externalidades positivas para atacar la vulnerabilidad en otros sectores más allá del agua y la agricultura.

Resumen

En base a la información obtenida, para a zona específica del proyecto, utilizando una Metodología para evaluación multifactorial de riesgos (Yenjs-Kiroshwa, 2012), se han obtenido los siguientes índices de vulnerabilidad para las zonas a intervenir dentro del programa.

Cuadro 26: Factores de Vulnerabilidad a Desastres Naturales

Riesgo	Exposición	Vulnerabilidad	Comentario
Inundaciones	Baja	Baja	Por la pendiente del terreno y sus patrones de drenaje, este riesgo es despreciable.
Huracanes	Alta	Media	La frecuencia de estos eventos se incrementa y su intensidad por el cambio climático.
Tormentas	Alta	Media	La frecuencia de estos eventos se incrementa y su intensidad por el cambio climático.
Deslizamientos	Baja	Baja	Despreciables por el grado es estabilidad obtenido para el suelo.
Erosión	Baja	Baja	Depende básicamente de las operaciones del proyecto y que este ejecute el PMAA.
Terremotos	Alta	Media	No existen en el proyecto estructuras de alto peso ni de alta envergadura.

Nota: no se incluyen riesgo de naturaleza social (como huelgas, golpes de estado, etc.).

Cabe resaltar que estos análisis han de verificarse en una base de ubicación por ubicación, ya que estos resultados son una aproximación base y, por ende, podrían existir variaciones significativas en alguno de los sitios. Está pendiente realizar una evaluación adicional de los drenajes naturales de los terrenos, ya que los mismos podrían ser afectados por la acción humana en algunas zonas (en especial en lugares donde existen sistemas de suministro de agua potable y/o para riego).

8.1.4 Amenazas Antrópicas

Amenazas identificadas

Las amenazas antrópicas, son causados por intervención directa o indirecta por del desarrollo, construcción, instalación, establecimiento y operación de las intervenciones contempladas por el programa. Dentro de éstas, se pueden citar las fallas en la construcción y operación, incendios, inestabilidad de suelo, problemas en la operación de maquinaria, etc. Muchas veces, estos riesgos negativos ocurren por desconocimiento o negligencias que el personal vinculado al programa pueda cometer. El análisis de riesgos del programa incluye las siguientes situaciones:

- Estabilidad de taludes: Debido a una mala conformación de los taludes de trabajo en los sitios de intervención, se pueden generar movimientos de tierra muy localizados que pueden poner en riesgo a los colaboradores y equipos del proyecto.
- Obstrucción de drenajes: En caso de ocurrencia de fuertes lluvias, faltas de mantenimiento o de rehabilitación de estas obras puede generar caos, problemas de inundación dentro del predio, inestabilidad de taludes, reducir la producción, entre otros.
- Operación de equipos: durante la construcción de obras y el establecimiento de facilidades se pueden presentar accidentes, los de mayor probabilidad de ocurrencia son los accidentes de trabajo del personal vinculado al programa, para los cuales se deberá implementar y cumplir todas las normas legales vigentes. Como norma general, se verá garantizar una adecuada y oportuna prevención de accidentes de trabajo, así como de cualquier otra enfermedad laboral.
- Circulación de vehículos: Si los conductores de los vehículos que transportan el material o productos no cumplen con las normas mínimas (i.e., conducir a velocidad reducida, estar al pendiente de cualquier imprevisto, o ser entrenados para tener una correcta y rápida reacción en caso de presentarse algún tipo de inconveniente), este riesgo puede ser alto.
- Incendios y fuegos: El incendio puede definirse como una oxidación rápida con evolución de calor y luz. Las causas de un incendio pueden ser muy variadas, pero su origen se restringe a un agente químico, físico, mecánico, biológico, eléctrico o térmico. Igualmente, veranos muy severos pueden generar las condiciones propicias para el inicio de incendios.
- Volcamiento de vehículos: esta amenaza siempre está presente en las instalaciones y las comunidades, debido al uso de vehículos de carga para operaciones de transporte, ya sean internas o externas. Por lo general este se produce por fallas en la conducción de los vehículos o por falta de mantenimiento de los mismos, la condición de los caminos también influye.
- Derrame de combustible: Los volúmenes de combustibles a manejar en la zona son muy pequeños, pues el mantenimiento de la maquinaria e instalaciones no será complejo. Como el combustible que se manejará sólo será el utilizado por los equipos cuyo desplazamiento hasta los centros de servicio sea dispendioso o no sea posible (generadores, bombas, etc.).
- Colapso de los sistemas de tratamiento de aguas residuales: el programa contará con sistemas propios para el tratamiento de aguas residuales y efluentes, que deberá recibir mantenimiento periódico para evitar que llegue a colapsar y generar contaminación de aguas y suelos.

Manejo de amenazas

Las amenazas de origen antrópico identificadas, tanto en la etapa de construcción como en la de operación, se manejarán con las medidas incluidas en el PMAA. En caso de ocurrencia de amenazas no previstas, se tomarán las medidas indicadas por las normas y las buenas prácticas.

8.1.5 Análisis de Vulnerabilidad

Base de análisis

El análisis de vulnerabilidad es un proceso mediante el cual se determina el nivel de exposición y la predisposición a la pérdida de un elemento o grupo de elementos ante una amenaza específica, contribuyendo al conocimiento del riesgo a través de interacciones de dichos elementos con el ambiente peligroso. En el caso del programa, los elementos bajo riesgo son el contexto social y material representado por las personas y por los recursos y servicios que pueden ser afectados por la ocurrencia de un evento. Esto implica: las actividades humanas, sistemas realizados por el hombre (edificaciones, infraestructura, centros de producción, servicios) y la gente que los utiliza.

Para el programa se establecen las siguientes prioridades de protección, o elementos que podrían llegar a sufrir daño en caso de la materialización de alguna amenaza citada:

- Las vidas humanas de las personas que laboran y operan en el área del programa, así como de las personas que transitan dentro del área de influencia de las intervenciones.
- Infraestructura local propia del programa e infraestructura comunitaria, tales como: vías de acceso principalmente, obras de arte, obras de toma de agua, y líneas eléctricas.
- Ecosistema circundante, definido por la interacción del medio físico-natural y social-cultural incluido dentro del área de influencia de cada intervención (1 km) y su extensión (3 km).

Línea de base

Actualmente, las condiciones de exposición y afectación de las comunidades objeto ante riesgos, son incluidas en los censos nacionales de población y vivienda. Estas, se indican a continuación.

Cuadro 27: Exposición de Viviendas a Riesgos Naturales

Tipo de Riesgo	Viviendas	%
Derrumbe o deslizamiento de tierra	25,339	15.1
Hundimiento de tierra	8,804	5.2
Desprendimiento de rocas	8,503	5.1
Incendios forestales	15,120	9.0

Fuente: IX Censo Nacional de Población y Vivienda 2010 (ONE, 2014).

Cuadro 28: Viviendas Afectadas por Desastres Naturales

Tipo de Desastre	Viviendas	%
Huracán	107,189	63.8
Tornado	10,713	6.4
Tormenta	117,901	70.2
Inundación	34,923	20.8
Lluvias torrenciales	78,998	47.0
Frio excesivo	11,814	7.0
Calor excesivo	40,156	23.9
Maremoto	2,552	1.5
Sequía	50,342	30.0
Derrumbe	15,166	9.0
Hundimiento	6,775	4.0
Incendio	12,984	7.7
Terremoto	10,797	6.4
Otros	9,945	5.9

Fuente: IX Censo Nacional de Población y Vivienda 2010 (ONE, 2014).

En relación a lo anterior, el programa tiene oportunidad de crear otros impactos positivos, con la construcción de drenajes artificiales (zanjas) y otras estructuras de control de avenidas (presas).

8.2 Planes de Contingencias

8.2.1 Gestión de la Prevención

Plan de contingencia

Los planes de contingencias son las acciones a tomar y/o a realizar sistemáticamente por el programa para enfrentar, controlar o mitigar cualquier emergencia. Entre los objetivos específicos del plan de contingencias están:

1. Conformar un equipo de contingencias que preparen, actualicen y mejoren, los planes de evacuación y acciones a realizar en casos de emergencias.
2. Empoderar al equipo de contingencias para que pueda inspeccionar de manera rápida y apropiada las emergencias que puedan presentarse.

3. Evaluar los riesgos y desafíos de cada intervención, así como diseñar y aplicar las medidas de limpieza, cuidado, remediación y mitigación de impactos.
4. Establecer sistemas de protección e integridad de las infraestructura e instalaciones, e igual monitorear la eficacia de los mismos.
5. Establecer los sistemas y rutas de evacuación para casos de emergencia, y capacitar al resto del personal en la prevención y actuación.

Estrategia de prevención

En sentido general, para reducir los riesgos y daños al programa (ya sea por fenómenos causados por la acción humana o de la naturaleza), se debe partir de la seguridad que ha sido considerada desde la planificación del sistema de gestión ambiental del programa. Esto implica contar con personal bien entrenado, y establecer normas claras y precisas. Toda información que se coloque en forma de letreros, deberá socializarse a todo el personal, comentarse y explicarse, disponerse en sitios visibles, y deberá ser sometida a un proceso de inspección periódica.

8.2.2 Etapa de Construcción

Riesgos laborales

Los riesgos laborales en la etapa de construcción (referida a la construcción de infraestructuras e instalaciones), se concentran en áreas como equipos pesados, manipulación de materiales y herramientas, uso y abuso de objetos cortantes o punzantes, etc. Estos riesgos son de origen humano. En caso de ocurrencia, las actividades y trabajos deberán ser suspendidas hasta que no existan más riesgos sobre las personas, los bienes y/o materiales, o la propiedad. Igualmente, en estas estructuras se deben establecer acciones para casos de terremotos o deslizamientos.

Derrame de hidrocarburos

La operación de equipos pesados para el movimiento de tierras, excavaciones, montaje de piezas, etc., implica utilizar combustibles y aceites, que luego de cierto uso deben ser cambiados. Aunque se ha establecido que los mantenimientos programados y preventivos se harán en condiciones apropiadas para tales fines, siempre existe la probabilidad de derrames (falla en la retenedora de aceite, rotura de una manguera de combustible, o fisura de una manguera hidráulica, etc.). Estos fallos, pueden provocar derrames que contaminan el suelo, la napa freática y los cuerpos de agua.

Medidas de contingencia:

A. Utilización obligatoria de equipos e implementos de seguridad, como cascos, guantes, lentes, mascarillas, audífonos, chalecos, zapatos de seguridad, etc.

B. Asegurar que los vehículos estén en buen estado de funcionamiento mecánico, eléctrico, de luces y de frenos; y que se les dé el mantenimiento debidamente.

C. Contratación de personal calificado, con experiencia, que aporte a la seguridad e higiene a las obras, y que también pueda transmitirlo al resto del personal.

D. Contar con equipos adecuados para control y limpieza de derrames (i.e., bandejas de aceites, tanques plásticos, estopas de limpieza, extintores de fuego, etc.).

E. Tener a mano equipos de comunicación (radio-teléfonos, celulares, etc.) con los números de emergencia más próximos al sitio del proyecto.

Accidentes de tránsito

Todo proceso constructivo que conlleve utilizar quipos pesados y trasladar materiales, reviste la potencialidad de la ocurrencia de accidentes de tránsito, principalmente por índole humana. Estos accidentes se presentan usualmente por no observar medidas lógicas de manejo y de seguridad, y pueden degenerar en daños a la vida, la propiedad y el desenvolvimiento del programa.

Medidas de contingencia:

A. Limitar la velocidad de circulación dentro del proyecto y en zonas pobladas.

B. Colocación de personal con banderolas en el paso por la comunidad.

C. Colocación de letreros y otras señales de aviso de operación de equipos pesados.

D. Evitar la entrada de personal o vehículos no autorizados al proyecto.

8.2.3 Etapa de Operaciones

Riesgos operacionales

La operación del proyecto conlleva, al igual que cualquier otra intervención de obras e instalaciones productivas, riesgos naturales y humanos. En este caso, los riesgos antropogénicos, por el tipo de operación y los elementos que entran en el proceso, son los de mayor importancia.

Entre los factores de riesgo naturales presentes en la etapa de operación están:

- Riesgos de ocurrencia huracanes.
- Riesgos por terremotos.
- Riesgos por tormentas eléctricas.

Los factores de riesgo de origen humano considerados en la etapa de operación son:

- Ocurrencia de accidentes de tránsito.
- Ocurrencia de incendios / explosiones.
- Accidentes laborales por malas prácticas.
- Accidentes por fallas de los equipos.
- Riesgos de enfermedades.

Ocurrencia de huracanes

La República Dominicana está situada en la ruta de los huracanes que azotan la región de junio a diciembre. Esto crea un riesgo natural permanente que obliga a los promotores a considerar que las estructuras estén preparadas para resistir los vientos y lluvias característicos de estos fenómenos. Aun así, ante estos eventos siempre ocurren destrozos, y las estructuras y los caminos sufren muchos daños. También, con el paso de estos fenómenos se produce una temporada de fuertes lluvias y tormentas eléctricas que puedan dar afectar todo o parte de las intervenciones.

Medidas de contingencia:

A. Elaborar rutas de escape y puntos de refugio para los empleados que se queden en las instalaciones.
B. Elaborar un plan de preparación pre-huracán y un plan de acción pos-huracán.

Ocurrencia de terremotos

Los terremotos son fenómenos no predecibles. Aunque la ingeniería moderna diseña estructuras "anti-sísmicas"; lo que realmente hace es simular las fuerzas y condiciones de un sismo con cierta probabilidad de ocurrencia, y sus efectos sobre las estructuras. No obstante, estas condiciones pueden variar según el lugar, terreno, distancia, etc.

Medidas de contingencia:

A. Incluir el diseño sísmico en el diseño de las estructuras e instalaciones y velar que estas disposiciones se cumplan en la construcción.

B. Capacitar al personal en protocolos de actuación ante un terremoto, incluyendo hacer simulacros. Observar personas que podrían ser presas del pánico.

C. Contar con un buen plan de acción pos-sismo, en el cual se establezca la revisión de la estabilidad e integridad de las estructuras, revisión de los sistemas eléctricos, condición de tuberías, drenajes, maquinaria, producción, acopios, etc.

Siniestros: incendios/ explosiones

A. Disponer, en el sitio, de extintores de incendio y manguera anti-incendios en las zonas de tanques de combustibles.

B. Evacuar a todas las personas fuera de las instalaciones, y alejarlas lo más posible.

C. Cerrar todas las válvulas o tuberías que transporten combustible.

D. Dar aviso al Cuerpo de Bomberos, la Defensa Civil, y al Ministerio de Ambiente.

E. Contribuir para que el lugar esté despejado a la llegada de los bomberos.

Los bomberos y el personal, en todo caso, deben observar las siguientes medidas:

- Combatir los incendios a la mayor distancia posible, o usar boquillas monitoras o soportes de mangueras automáticos.
- Enfriar los recipientes inundándolos con grandes cantidades de agua o arena, incluso mucho después de que se haya extinguido el incendio.
- No arrojar agua a la fuente del escape o a los dispositivos de seguridad, ya que puede presentarse incrementarse.
- Abandonar el área de inmediato, salvaguardar las personas en vez de los bienes.
- Documentar la situación, activación, daños y lecciones aprendidas. Incluir la experiencia en las futuras capacitaciones.

Derrames de combustible

A. Evacuar a todas las personas fuera del área afectada, y alejarlas de las zonas de peligro.

B. Cerrar todas las válvulas de tuberías que conduzcan combustibles.
C. Dar aviso al Cuerpo de Bomberos, la Defensa Civil, y al Ministerio de Ambiente.
D. Contribuir para que el lugar esté despejado a la llegada de los bomberos.
E. Usar siempre implementos de seguridad (cascos, mascarillas, guantes, etc.).
F. Documentar la situación, activación, daños y lecciones aprendidas.
G. Abordar mecanismos para la remediación de suelos contaminados.

8.2.4 Planes de Capacitación

Capacitación al personal

Todo el personal del programa deberá estar capacitado, en una base anual en:

- Primeros auxilios básicos
- Primeros auxilios avanzados
- Prevención de incendios
- Prevención de derrames
- Separación de residuos y reciclaje
- Seguridad e higiene laboral

Capacitación a terceros

Todos los que suplen bienes o servicios a las intervenciones deberán demostrar conocer de:

- Respeto por las medidas de seguridad.
- Seguridad vial y prevención de accidentes.
- Evacuación ante emergencias.
- Primeros auxilios básicos.
- Uso de implementos personales.

8.2.5 Áreas y Actividades Críticas

Focos de riesgos

Las intervenciones del programa, de no ser manejadas con los debidos criterios de seguridad y por un personal capacitado, son susceptibles a la ocurrencia de accidentes; tanto por factores exógenos como endógenos, y por causas de origen natural como antrópico.

Entre los factores de origen antropogénico se pueden mencionar los errores humanos, la falta de previsión y supervisión, errores de diseño de las instalaciones, falta de señalización, sabotaje, robo de equipos de seguridad, falta de mantenimiento y estallidos sociales (i.e., huelgas, insurgencias, terrorismo, acción bélica, etc.). Entre los factores de origen natural están los huracanes, sequias, inundaciones, terremotos, etc. Estos, pueden causar daños y pueden propiciar más accidentes.

Para los factores de origen natural, se debe capacitar a todo el personal (incluyendo ejecutivos y administrativos) en los planes de acción que les permitan enfrentar los fenómenos mencionados, el cual debe preverse desde el diseño mismo de la instalación. Este plan de acción debe tener en cuenta la magnitud y frecuencia de estos eventos, y deberá preparar a todos los involucrados.

En cuanto a los fenómenos que ocurren por acción humana, la principal medida es tener personal bien entrenado, establecer normas de operación claras y precisas, colocar las señalizaciones y otras informaciones de modo visible; y realizar inspecciones periódicas obedeciendo a un plan pre-establecido. En última instancia, la gerencia puede utilizar capacitación adicional y simulacros.

Un plan eficaz contra eventuales situaciones de alto peligro incluirá las tres áreas clave de cada intervención: zonas de obras, áreas de procesamiento, y las edificaciones.

Zonas de trabajo

En esta zona interactúan diferentes factores, vehículos en movimiento y estacionados, y las áreas de carga/descarga y acopio de material. Los vehículos y equipos agregan riesgos adicionales, que pueden ser considerados de carácter exógeno, ya que la condición de funcionamiento de los vehículos son responsabilidad de sus propietarios y/o de sus conductores. Esto implica también, que no es posible tener control total de la operación de los vehículos que ingresan a los lugares de las intervenciones, por lo que el personal debe tenerse instrucciones claras al respecto.

Entre las medidas de prevención de accidentes, prescritas para esta zona, están:

- Delimitar la velocidad de acceso y circulación dentro de las obras e instalaciones. Esto reduce los daños en caso de colisiones o choques.
- Dotar las áreas de avisos de no fumar con el fin de evitar que existan elementos de ignición que puedan generar incendios o explosiones.
- Dotar los equipos y maquinarias con dispositivos de alarma automáticas para casos de condiciones anómalas, como fugas o de exceso de presión.
- Poseer un teléfono disponible las 24 horas del día con una lista de los números de teléfonos de emergencia (bomberos, defensa civil, etc.) al lado del teléfono.
- Hacer un simulacro de derrame/ incendio al menos una vez al año. En el simulacro debe participar todo el personal que labora en el programa.

Área de procesamiento

Esta área deberá ser revisada rigurosamente durante cada inspección que se realice, e incluso siempre antes de iniciar las operaciones. En adición, se deberá observa que:

- Asegurar que tuberías y conexiones se instalan correctamente, y que las mismas cuentan con los dispositivos de seguridad apropiados.
- Colocar sistemas de rociado o antiincendios, orientado hacia dichas zonas, los cuales deberán mantener un caudal y una presión adecuada.
- Mantener un banco de arena en la instalación., para poder sofocar cualquier incendio menor, si no existiera riesgo de explosión.

En sentido general, la seguridad de esta área se debe reforzar cuando se hacen las operaciones de logística de carga y descarga de materiales, combustibles o productos. Como estas acciones son de carácter crítico en cuanto a seguridad e higiene laboral, se debe observar que:

- Esta zona esté despejada por vehículos y personas en todo momento. Esto reduce el riesgo de exposición y de trabas de acceso.
- Se realicen inspecciones previas a los procesos de carga y descarga, para asegurar que los vehículos no encontrarán inconvenientes al llegar.
- Hacer un simulacro de incendio y/o explosión, al menos una vez al año. En este, debe participar todo el personal que labora en las instalaciones.

Es una buena práctica, inspeccionar diariamente la instalación, a fin de prever y/o evidenciar cualquier tipo de falla en los sistemas o infraestructuras. Estas medidas deben extenderse a las instalaciones que albergan las plantas eléctricas, sistema de bombeo, y equipos complementarios.

Área de edificios

Se refiere las zonas donde funcionan oficinas, comedor, plantas, talleres, despacho, etc. También esto incluye los lugares donde se ubiquen las casetas y los baños. Los riesgos asociados a estas edificaciones son comunes a otras edificaciones similares. Para estas, se prevén las siguientes:

- Incluir una ruta de evacuación, que permita a todas las personas puedan salir del recinto en el menor tiempo posible. Esta ruta debe estar claramente señalizada.
- Hacer un simulacro de terremoto o incendio, al menos una vez al año. En este debe participar todo el personal que labora en las instalaciones.
- Capacitar al personal administrativo en control de incendios, primeros auxilios, accidentes laborales comunes en la instalación, y el protocolo de comunicación.
- Se deben indicar claramente las áreas en las que exista riesgo peligro: asfixia/sofocación, alto voltaje o electrocución, acceso restringido, no pasar, etc.

En adición a estas medidas, el programa deberá contratar una póliza de seguros contra incendios, explosiones y desastres naturales. Este seguro, deberá cubrir cualquier eventual daño a la propiedad o a la instalación, y debe incluir cobertura de responsabilidad civil ante terceros.

8.3 Guía para Intervenciones Forestales

8.3.1 Elección de Especies

Criterios básicos

Para la selección de especies a utilizar, se deben tener en cuenta las características climáticas y edáficas de la zona donde se realizará el emplazamiento (microcuenca, comunidad, fincas, etc.). Además de los criterios enunciados a continuación/ Las especies a emplear en la re-aforestación han de seleccionarse según una serie de criterios, que satisfagan los objetivos propuestos y que aseguren el éxito del programa en esa dirección. Entre dichos criterios se incluyen:

- Capacidad de supervivencia; además del tipo de clima de la zona, estas deben poder soportar sequedad, temperaturas y el suelo en que se realizan las operaciones.

- Integración en el paisaje; tienen primacía las especies preexistentes en el entorno, pues son muestra de su capacidad de desarrollo en esas condiciones.
- Facilidad de germinación y asiento; necesario en cuanto la necesidad de consolidar los taludes y como previo paso a la formación de una base vegetal.
- Disponibilidad local; se debe tener la previsión de asegurarse que no faltará lo requerido en el momento que se precise; así como que el precio que sea accesible.
- Mantenimiento mínimo; para que no dependa su persistencia de él. En este sentido, tiene mucho valor el mejoramiento genético e introducir de variedades más resilientes

A nivel de plantas menores, se pueden usar arbustos y frutales menores. Como base, se puede usar una cubierta vegetal y leguminosa, que produzca nutrientes nitrogenados. Estos, nutrientes, son utilizados por muchas otras plantas para su desarrollo y también enriquecen los suelos.

Dado el carácter del programa, para la elección de especies se debe dar preferencia a variedades pertenecientes a la vegetación de la zona y/o pre-existentes en el sitio. Otras de las condiciones que se deben enero cuenta son la rusticidad de las distintas especies, necesaria en aquellas zonas en que las condiciones de dureza son importantes, así como el rápido crecimiento.

Plantaciones en general

Se prevé la plantación de especies arbóreas y arbustivas, reservando superficies para la creación de pastizales en las zonas en que ello sea ambiental y económicamente viable. Para la selección definitiva de las especies a utilizar es necesario considerar la orografía del terreno a intervenir. La distribución y diversidad de especies han de ser especies probadas en la región y/o en la zona.

La correcta selección las especies arbóreas y arbustivas, es decir aquellas que pueden prosperar en terrenos no necesariamente acondicionados, de escasa profundidad, sin perfiles edáficos definidos, y con tolerancia al estrés de hídrico y térmico. Dichas especies deben ser de crecimiento rápido, tolerar desbalances hídricos y que demanden el mínimo mantenimiento posterior.

8.3.2 Métodos de Re-Aforestación

El método de implantación de la vegetación que se va a utilizar debe ser manual. Para preparar adecuadamente el terreno se deberá extender una capa adecuada de tierra vegetal, que deberá ser vez mezclada con abono. El paso previo a la plantación es la apertura de hoyos, que se realizará

manualmente. Esta operación implica la remoción del suelo, sin la extracción de la tierra, en un volumen de forma prismática mediante la acción de la cuchara que esta disponga al efecto.

- Equipamiento: en lo posible, se utilizará equipo forestal sencillo (coa, azada, punzón, machete, etc.). Esto será usado tanto como para abrir hoyos, sembrar y cubrir las plántulas.
- Método operativo: tras el marcado previo de hoyos, la siembra avanzará en línea de máxima pendiente y hacia arriba. De esta forma, sería más eficiente el rendimiento del sembrador.
- Sistematización: al realizar la plantación, se asegurará que la plántula está cubierta debidamente (y abonada si ello aplicara). Esto se repetiría en todas las áreas.
- Condiciones de aplicación: el procedimiento de preparación del suelo ha de ser puntual, sin inversión de horizontes, y nunca será mecanizado.
- Efectos deseados: el efecto hidrológico con la formación de microcuencas es favorable a la reducción de escorrentía. El efecto paisajístico es apreciable pero no desfavorable.
- Rendimiento esperado: podrá ser variable, según la pendiente, el espaciamiento y la mano de obra disponible. Esto será definido en el plan de manejo.

8.3.3 Proceso de Plantación

Acciones de la siembra

La plantación se iniciará una vez preparado el terreno. Conviene dejar a la intemperie los hoyos durante 1-2 semanas antes de empezar a plantar, con el fin de permitir la meteorización del suelo removido. Las rocas y demás obstrucciones del subsuelo deben retirarse conforme sea necesario.

El tamaño de la planta afecta directamente al tamaño del hoyo por la extensión del sistema radical o las dimensiones del bolsón de tierra que le acompaña. Las dimensiones de los hoyos variarán según el tamaño de la especie seleccionada, por ello se debe distinguir para arbóreas o arbustivas

El depósito consistirá en colocar las plantas en una zanja u hoyo, y en cubrir las raíces con una capa de tierra, distribuida de modo que no haya intersticios en su interior, para protegerlas de la desecación o las lluvias hasta el momento de su plantación definitiva. Sólo cuando no sea posible tomar las precauciones antes señaladas, se colocarán las plantas en un lugar cubierto, tapando las raíces con un material como hojas, tela, papel, etc. que las aísle del contacto con el aire.

La plantación deberá realizarse durante el periodo de reposo vegetativo, y evitando días de sequía o de temperaturas extremas. Si las plantas se reciben en uno de esos días deberán depositarse en una zona protegida hasta que cesen las condiciones adversas. Cuando la permeabilidad del suelo no sea suficientemente alta, se colocará una capa filtrante en el fondo de los hoyos o zanjas.

En definitiva, se tratará de preparar un medio idóneo para la planta permitiendo el buen arraigue y desarrollo del sistema radical, y que sea costo-efectivo. Una vez acabado el ahoyado y habiendo esperado a que el terreno tuviera buen tempero se procederá a la plantación.

Los elementos para proyectar las plantaciones son los siguientes:

- Disposición de hoyos.
- Marco de plantación.
- Distancia entre filas.
- Distancia entre hoyos.

En el supuesto de que no se disponga de planta en envase se optará por planta repicada en su primera savia. La planta procederá preferentemente de variedades producidas localmente y solo se utilizarán variedades de otros lugares en los casos de que no se disponga de la primera.

Hidrosiembra

La hidrosiembra es una técnica utilizada en jardinería y restauración ambiental que consiste en la proyección de una mezcla de semillas y otros elementos sobre el terreno. Esta técnica se usa para conseguir una siembra más fácil y rápida, ya que sus condiciones aseguran mayor germinación y por consiguiente más posibilidades de revegetación del terreno. En el contexto del programa, este método se utilizará sólo con cuando se trate de herbáceas, y si es económicamente viable.

La hidrosiembra implica depositar en el terreno, preparado previamente, la cantidad adecuada de semillas de las especies seleccionadas para realizar la revegetación. El objetivo que se pretende alcanzar mediante la hidrosiembra es frenar procesos erosivos de forma rápida, crear una cubierta vegetal capaz de proteger el suelo mejorando así las condiciones para la instalación posterior de la vegetación arbórea y arbustiva, y aumentar la integración paisajística del área a re-aforestar.

Las operaciones de hidrosiembra implican los siguientes pasos:

- Preparación del terreno.
- Siembra.
- Tapado.
- Cuidados posteriores a la siembra.
- Inspección periódica.

La siembra y el tapado se deberán realizar en la misma jornada, previendo que no caigan lluvias en las 24-48 horas siguientes a su realización para evitar el arrastre de la cubierta. Esto implica que se deberá trabajar manejando una previsión meteorológica fiable en pro del mayor éxito. En la siembra se utilizará una mezcla de semillas, mulch de fibra corta (absorbe el agua y facilita su infiltración en el suelo), y estabilizador (fija las partículas al terreno y da consistencia a la mezcla).

Para aumentar la eficacia de la hidrosiembra se efectuará una segunda pasada de tal manera que las semillas que hayan quedado en superficie sean tapadas y protegidas permitiendo una germinación más adecuada. El tapado posterior se realiza con mulch, estabilizador y agua. Al final de este proceso, se debe inspecciona que semilla queda protegida de las condiciones del medio.

8.3.4 Actuaciones Complementarias

Irrigación

Además del riego de plantación e hidrosiembra, será conveniente mantener la humedad del suelo por encima de unos niveles mínimos durante los meses posteriores a la plantación e hidrosiembra (en especial el mes siguiente a ésta y el primer verano siguiente). Se realizará con cuidado de no producir arrastres de tierra o semillas y de manera que el agua llegue a las plantaciones realizadas. La frecuencia de los riegos estará en función de las condiciones hídricas de los suelos y la zona.

Fertilización

Se deberán realizar chequeos anuales para asegurarse que la vegetación instaurada no presenta síntomas de deficiencias nutricionales. En caso de que aparecieran, habrá que proceder a fertilizar el terreno. El tipo de fertilizante a emplear dependerá de las deficiencias nutricionales que se hayan presentado, del sustrato, del pH, de la presencia o no de especies competidoras, etc., pero

básicamente estarán formados por nitrógeno, fósforo y potasio (fertilizante complejo del tipo N-P-K de liberación lenta). El fertilizante orgánico y/o producido localmente tendrá preferencia.

Reposición y Repetición

Se repondrán todas las plantas muertas (marras) durante los años siguientes a la ejecución de la plantación. Si pasados dos meses después de afectada la siembra no se observa ningún brote de vegetación o existen zonas en las que no se ha producido completamente el nacimiento de ella, será necesario repetir la operación de nuevo. Se efectuará con las mismas especificaciones.

9. Participación e información pública

9.1 Procesos Abordados

9.1.1 Análisis de Interesados

De conformidad con lo establecido en los términos de referencia sobre los que se basa el presente estudio, se ha realizado un proceso de análisis de interesados. Esto incluyo reuniones, revisión de documentación y socialización con instituciones locales de base. Los resultados de dicho proceso estas que dichas organizaciones apoyan al programa, y están dispuestas a participar en el mismo.


Figura 28: Actividades de Consulta con la Comunidad (Dic.2017)

Un resumen del proceso realizado se incluye como uno de los anexos de este documento.

9.1.2 Consultas Púbicas

De conformidad con lo establecido en la normativa ambiental vigente, se ha realizado un proceso de consulta pública. El mismo ha incluido talleres de socialización y realización de encuestas en la comunidad cercana. Los resultados de dicho proceso indican que las comunidades y sus organizaciones no se oponen de ninguna manera al programa, y muy por el contrario lo apoyan.


Figura 29: Actividades de Consulta con Instituciones de Base (Dic.2017)

Un resumen del proceso realizado se incluye como uno de los anexos de este documento.

9.1.3 Avisos y Letreros

Según con lo dispuesto por el Ministerio de Medio Ambiente y Recursos Naturales, se han diseñado los letreros informativos del programa. Estos se instalarán en todas las intervenciones.

Dichos letreros incluirán información relevante a:

- Nombre del proyecto.
- Código (asignado por el Ministerio de Medio Ambiente y Recursos Naturales).
- Promotor del proyecto (IDDI).
- Teléfonos y correo electrónico.
- Descripción de la intervención.

En adición, se pondrá –a disposición de los interesados y comunitarios- los números de contacto del: Viceministerio de Gestión Ambiental y/o la Dirección de Participación Social del Ministerio de Medio Ambiente y Recursos Naturales. El teléfono disponible es 809-567-4300, ext.6220 y 6160.

10. Marco legal aplicable

10.1 Legislación Relevante

El programa propuesto, está y estará sujeto a las leyes nacionales vigentes, y de manera muy particular, con la siguiente legislación:

- Ley 1-12, Estrategia Nacional de Desarrollo 2030, que establece un marco de planificación para que República Dominicana sea un país próspero, donde las personas viven dignamente, apegadas a valores éticos y en el marco de una democracia participativa que garantiza el Estado social y democrático de derecho y promueve la equidad, la igualdad de oportunidades, la justicia social, que gestiona y aprovecha sus recursos para desarrollarse de forma innovadora, sostenible y equilibrada y se inserta competitivamente en la economía global.
- Ley 64-00 que crea el Ministerio de Medio Ambiente y Recursos Naturales, que tiene por objeto establecer las normas para la conservación, protección, mejoramiento y restauración del medio ambiente y 1os recursos naturales, asegurando su uso sostenible. Esta ley, regula que las interacciones de los sectores productivos hagan un uso racional de los recursos, que se proteja el ambiente, y que se respete la participación de la comunidad en los proyectos.
- Ley General de Salud, 42-01, que tiene por objeto la regulación de todas las acciones que permitan al Estado hacer efectivo el derecho a la salud de la población, reconocido en la Constitución de la Republica Dominicana.
- Ley 202-04, Ley Sectorial de Áreas Protegidas (y sus modificaciones).
- Ley 176-07 del Distrito Nacional y los Municipios, que tiene por objeto normar la organización, competencia, funciones y recursos de las alcaldías de los municipios y del Distrito Nacional, asegurándoles que puedan ejercer, dentro del marco de la autonomía que los caracteriza, las competencias, atribuciones y los servicios que les son inherentes; promover el desarrollo y la integración de su territorio, el mejoramiento sociocultural de sus habitantes y la participación efectiva de las comunidades en el manejo de los asuntos públicos locales, a los fines de obtener como resultado mejorar la calidad de vida, preservando el medio ambiente, el patrimonio histórico y cultural, así como la protección de los espacios públicos.
- Código de Trabajo (Ley 16-92) y sus normas y reglamentos complementarios.
- Ley 150-97 que establece un arancel de aduanas único (de tasa 0%) para los insumos, equipos y maquinarias agropecuarias en la República Dominicana.

En el futuro, otras legislaciones podrían ser utilizadas en el programa (tanto para maximizar su función social como sus impactos). Según sea el caso del que se trate, la aplicación de dichas leyes se realizará en el marco de lo que las leyes así prevén, se trabajará con transparencia y buena fe, y se utilizarán profesionales competentes según el área y/o campo del conocimiento que se trate.

10.2 Normativa Complementarios

Entre las normas y reglamentos a cumplir por el programa, se incluyen las siguientes:

- Normas Ambientales de Calidad del Aire y Control de Emisiones.
- Reglamento para el funcionamiento de la industria forestal que procesa madera en República Dominicana.
- Norma para la Gestión Ambiental de Residuos Sólidos No-peligrosos.
- Reglamento para baterías, chatarras y neumáticos fuera de uso.
- Norma Ambiental para la Protección Contra Ruidos.
- Norma Ambiental Sobre Calidad de Agua y Control de Descargas.
- Reglamento para el manejo ambiental de granjas porcinas.
- Reglamento para la calidad de descargas de aguas subterráneas.

11. Conclusiones y Recomendaciones

11.1 Conclusiones

1. El proyecto presenta un grado razonable de información relevante a sus objetivos y actividades previstas, en especial las relacionadas a los impactos ambientales, gestión de riesgos, identificación de actores involucrados y al involucramiento de la comunidad.
2. El uso del suelo de las zonas de intervención del programa terreno tiene una vocación agrícola, y no entra en conflicto con otros potenciales usos ni a las intervenciones previstas por el programa, por lo deprimida que está la actividad en dichas zonas.
3. Los parámetros ambientales clave para la construcción operación del proyecto, como calidad de aire, gestión de residuos, creación de empleo, prevención de accidentes, y control de descargas, son adecuados a lo que prevé la normativa para las intervenciones planeadas.
4. Los impactos positivos esperados para el programa, superan ampliamente sus potenciales efectos negativos, por lo que este resulta ser viable desde el punto de vista económico, social y ambiental. Esto se refleja en la evaluación cualitativa y en la cuantitativa.
5. Las intervenciones objeto del programa están alienadas con los criterios básicos establecidos en la Política Social y Ambiental del Fondo de Adaptación, así como en su Política de Género.

11.2 Recomendaciones

1. Tan pronto el programa reciba los recursos para su implementación, se debe establecer el equipo responsable por el medio ambiente, seguridad e higiene, y apoyo a la comunidad.
2. Durante la vida útil del programa, se debe capacitar a la comunidad para aprovechamiento del suelo con otros usos, como el forestal o el ganadero, que sean climáticamente resilientes.
3. Los estudios socioeconómicos y medioambientales del programa, deben revisarse al menos una vez al año, para evaluar condiciones y parámetros clave y tomar medidas en consecuencia.
4. El sistema de documentación ambiental del programa debe ser compatible con el monitoreo que hace el donante, de forma que los reportes de avances e impactos sean comparables.
5. Dado el apoyo que las comunidades e instituciones han manifestado para el programa, se sugiere que las políticas del fondo de adaptación sean transversales a las comunidades.

Fuentes de información

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[3] *Procedimiento para la Tramitación de Permisos Ambientales de Instalaciones Existentes*. Secretaría de Estado de Medio Ambiente y Recursos Naturales. Santo Domingo, 2002.

[4] *Reglamento y Procedimiento para la Consulta Pública en el Proceso de Evaluación Ambiental*. Ministerio de Medio Ambiente y Recursos Naturales. Santo Domingo, 2002.

[5] *Importancia de las plantas nativas y endémicas en la reforestación*. García, R., M. Mejía y F. Jiménez. Santo Domingo, 1997. Editora Corripio. 86 pp.

[6] *Reglamento para la Gestión Integral de Aceites Usados*. Secretaría de Estado de Medio Ambiente y Recursos Naturales. Santo Domingo, 2002.

[7] *Norma Ambiental sobre la Calidad de Aguas Subterráneas y Control de Descargas al Subsuelo*. Secretaría de Estado de Medio Ambiente y Recursos Naturales. Santo Domingo, 2004.

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[9] *XI Censo Nacional de Población y Vivienda 2010*. Oficina Nacional de Estadísticas. Santo Domingo, 2014.

[10] *Diccionario Botánico de Nombres Vulgares de la española* (2da edición). Jardín Botánico Nacional Dr. Rafael Ma. Moscoso. Santo Domingo, 2000. Editora Corripio. 598 pp.

[11] *Normas Ambientales para la Protección contra Ruidos*. Secretaría de Estado de Medio Ambiente y Recursos Naturales. Santo Domingo, 2003.

[12] *Guía para La Realización de Las Evaluaciones de Impacto Social (EIS)*. Secretaría de Estado de Medio Ambiente y Recursos Naturales. Santo Domingo, 2004.

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[14] *Investigación de Mercados* (6ta. Edición). William G. Zikmund. 1998. Prentice-Hall Hispanoamericana, S.A.

[15] Caracterización ambiental provincial: Caso de estudio: Provincia Elías Piñas. GIZ, 2010.

[16] Ley 64-00 de Medio Ambiente y Recursos Naturales. Secretaría de Estado de Medio Ambiente y Recursos Naturales. Santo Domingo, 2000.

[17] *Curso Manejo de Sustancias Peligrosas*. José A. Negrón. Santo Domingo, Nov. 2008.

[18] *Descripción de Impactos Ambientales, PMAA y Diagnósticos Ambientales de Mega Proyectos*. Universidad Nacional Pedro Henríquez Ureña (UNPHU). Santo Domingo, 2006.

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[20] *Gestión Integral de Recursos Hídricos*. Instituto de Innovación en Biotecnología e Industria (IIBI). Santo Domingo, 2007.

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Anexos

Anexo 1: Términos de Referencia

Santo Domingo, D. N., 30 de octubre del 2017

Señores,
Instituto Dominicano de Desarrollo Integral – IDDI
Calle H No.17, Esquina Diagonal Zona Industrial de Herrera
Santo Domingo Oeste, República Dominicana
Tel.: (809) 534-1077. Correo: info@iddi.org
Ciudad. -

Distinguidos señores,

Anexo a la presente, encontrarán una Propuesta de Términos de Referencia para realizar el estudio ambiental del proyecto "**Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural (ClimaComunidad)**", los cuales son una guía para evaluar los impactos de dicho proyecto.

Dado que estos Términos de Referencia (TDRs) han sido elaborado en base a las condiciones generales e información limitada en cuanto al proyecto y el entorno, si es requerido o necesario, se puede ampliar su alcance para incluir otros aspectos y factores ambientales no contemplados inicialmente. Los componentes de estos TDRS se abordan sin exclusión alguna, incluso para explicar y/o justificar cualquier aspecto del proyecto para el que no se dispone de información.

Tal y como se establece en la Nota Conceptual, el principal objetivo de esta iniciativa es aumentar la resiliencia y la capacidad adaptativa de los medios de subsistencia rurales a los impactos climáticos y los riesgos sobre los recursos hídricos en la Provincia de San Cristóbal. Este objetivo se logrará a través de acciones concretas enfocadas en mejorar el acceso al agua, aumentar la capacidad institucional y comunitaria, y la coordinación para la gestión integrada del agua que incluya otros usos de los recursos hídricos, especialmente para la diversificación de los medios de vida de las comunidades. En las comunidades meta, el programa implementará medidas de adaptación inmediatas y a largo plazo, en forma de programas, proyectos y otras intervenciones.

Según la información disponible, el programa se enfocará en comunidades pobres de la Provincia San Cristóbal. Dichas comunidades se localizan en las municipalidades Los Cacaos, Medina, Cambita Garabitos, La Cuchilla, Cambita (el Pueblecito), Hato Damas, Villa Altagracia y San José del Puerto. Otras comunidades podrían ser incluidas en el futuro, según se disponga de recursos.

Para la realización del estudio ambiental, se dispondrá de un equipo de consultores ambiéntales (según la especialidad técnica requerida), que será responsable de elaborar el estudio usando como guía estos TDRs. El informe a entregar y las especificaciones establecidas, se comunicarán debidamente al IDDI, que los remitirá al Ministerio de Medio Ambiente y Recursos Naturales.

En general, los TDRs de ninguna manera representan o implican una autorización para iniciar y/o ejecutar el proyecto, tampoco implica que sus intervenciones serán obligatoriamente autorizadas. La autorización ambiental que aplique a cada caso, se podrá establecer en función de los hallazgos de la(s) visita(s) de campo, las condiciones de ubicación, las exigencias legales, y la evaluación del Estudio Ambiental que realice el Ministerio de Medio Ambiente. No obstante, se espera que con el estudio ambiental a realizar en base a estos TDRs sea suficientemente robusto para ello.

Damos fe que estos TDRs cumplen lo estipulado en la Ley 64-00 sobre Medio Ambiente y Recursos Naturales, así como sus normas y reglamentos complementarios, así como con las directrices emanadas por el Ministerio de Medio Ambiente y Recursos Naturales. Los mismos, se basan en los estándares de la IFC (International Finance Corporation, del Banco Mundial), y están alineados con lo establecido en la *Política Social y Ambiental* del Fondo de Adaptación.

Atentamente, le saluda

Rafael Berigüete; Eng., MA

Proyectista

1. TDR GUÍA DE EVALUACIÓN AMBIENTAL PARA LAS ACTIVIDADES DE LOS PROYECTOS Y PLAN DE MANEJO Y ADECUACIÓN AMBIENTAL

ALCANCE DEL PROYECTO	
El alcance del informe estará concentrado en la mitigación de los impactos que se reconoce se producirán con el proyecto. Se requerirá de una descripción general del proyecto y la indicación de la zona de vida alrededor del área. La consulta de las partes interesadas se limitará a la información del proyecto y sus características a la población.	
Objetivos generales del proyecto	
- Evaluar las actividades a realizar en el proyecto a fin de prevenir y minimizar los impactos ambientales potenciales característicos de la fase de construcción y operación del mismo, tomando en cuenta la necesidad de agilizar el proceso sin menoscabo del rol de la evaluación a realizar. - Suministrar los criterios básicos e imprescindibles para evaluar el proyecto en su fase de construcción, operación y abandono del proyecto y sus obras de infraestructura. - Proveer instrumentos de evaluación y seguimiento para los servicios. - Establecer las líneas de acción estratégica que debe seguir el proyecto. En cumplimiento con la ley 64-00 y las normas ambientales.	
Impactos ambientales potenciales	
IMPACTO/ CAUSAS	- Contaminación del agua por mal manejo de las aguas residuales y residuos sólidos peligrosos y no peligrosos. - Contaminación del suelo y subsuelo por efecto de mal manejo de las aguas residuales y residuos sólidos peligrosos y no peligrosos - Contaminación atmosférica por emisiones de ruido, emisiones de partículas y generadores eléctricos. - Impacto social/Riesgo físico y a la salud del personal que labora en el proyecto. - Impacto al paisaje/ocupación y transformación del espacio por las estructuras del proyecto. - Impacto social positivo por dinamización de la economía.
EFECTO/ POTENCIAL	Disminución de la disponibilidad del agua/ Contaminación de las aguas y el suelo/ Afectación de la salud humana/ Impacto al paisaje/ Ocupación y transformación del espacio por las estructuras de la zona.

Estudios a Realizar 1

1. INFORME

1.1. Descripción del proyecto

- Localización del proyecto con un mapa topográfico escala 1:50,000.
- Georrefenciación del sitio y/o del terreno del proyecto.
- Ubicación del proyecto indicando dirección: paraje, sección, municipio y provincia.
- Presentación del proyecto, objetivos y justificación del mismo.
- Descripción del proyecto con todas y cada una de sus componentes. Cada una de las diferentes actividades o procesos que conlleva cada fase (construcción/ adecuación y operación).
- Costo de inversión total y cronograma de ejecución del mismo.
- Número estimado de empleos que se generarán en la fase construcción.
- Estimar para la fase de construcción/ adecuación y operación, el consumo de los servicios básicos (agua potable, energía eléctrica y otros); Además, especificar el volumen estimado a generar de aguas residuales, de residuos sólidos, tratamiento de los mismos y disposición final.
- Indicar, para la fase de construcción, la cantidad de material a remover y su disposición final.
- La descripción ambiental se limitará a incluir un mapa de uso de suelo, indicando la proximidad del proyecto a zonas protegidas o naturales y de infraestructuras importantes. Se incluirán: ríos, humedales, cañadas, zonas marinas, bosques, aeropuertos, hospitales, hoteles, parques, etc.

1.2. Autorizaciones y Permisos

- Cartas de aval o endorso
- Promesa de financiación
- Permisos y autorizaciones

1.3. Participación e información pública

Llevar a cabo una Consulta Pública o un Análisis de Interesados en el área de influencia del proyecto, y sectores más próximos a la zona donde se localizará proyecto y donde el mismo tendrá influencia directa e indirecta. Se especificará la metodología de dicho análisis, tanto para levantamiento de la información, como para el procesamiento de la misma. Además, se

incluirán los instrumentos usados para recabar la información, y cómo las consultas y observaciones han sido respondidas.

En este análisis se determinará la percepción comunal sobre:

(a) Descripción del proyecto.

(b) Impactos del proyecto.

(c) Influencia del proyecto sobre la comunidad desde el punto de vista económico y social.

(d) Percepción de riesgos.

(e) Mecanismos de comunicación.

La intención de ejecución del proyecto deberá presentarse a las partes interesadas a través de un medio de comunicación adecuado. Se considerarán partes interesadas, la población del municipio y/o del distrito municipal y la participación pública, a fin de que las actividades de construcción y operación del proyecto se discutan y se lleguen a acuerdos de colaboración o de no objeción.

Se propondrá un modelo de letrero no menor de 1 x 1.5 metros en el lugar donde se pretenda llevar a cabo las intervenciones el proyecto. Este debe contener las siguientes informaciones.

(a) Nombre del proyecto.

(b) Nombre del promotor del proyecto.

(c) Breve descripción del proyecto.

(d) Indicará el estado del proyecto.

(e) Números telefónicos del responsable.

En el informe debe aparecer una ~~foto~~ o esquema del letrero finalmente diseñado.

1.4. Plan de Manejo Ambiental

- Medidas de prevención para mantener la fluidez del tránsito vehicular.
- Plan de contingencia contra incendios, sismos, huracanes, evacuación, entre otros.
- Actividades de seguridad e higiene laboral en las fases de construcción y operación
- Costo total de Plan de Manejo y Adecuación Ambiental (PMAA).
- Condiciones de seguridad, protección de la infraestructura y personal operativo.

- Suministro de medios de protección y seguridad, para su personal.

1.5. Certificación de aceptación

Presentar el informe certificado por el representante del promotor del proyecto.

Incluir una Declaración Jurada debidamente firmada por el promotor ~~y notariada~~ en donde se comprometa a cumplir con cada uno de los componentes del informe tanto en la fase de desarrollo, construcción, operación y abandono del proyecto (al menos durante el período de implementación).

1.6. Formato de presentación del informe

El informe Ambiental y las informaciones complementarias se entregarán con una comunicación escrita firmada por el promotor. La entrega cumplirá con las siguientes especificaciones:

- Copias del documento ambiental completado tal y como se explica aquí, especificando acciones a desarrollar para mitigar los impactos generados por el proyecto y especificando las técnicas y tecnologías a utilizar, además presentar el plan de monitoreo y seguimiento para el mismo.
- El documento final será entregado con el original y una (1) copia fiel e idéntica y una (1) copia en formato electrónico. El original y la copia se entregarán en carpeta perforada de tres hoyos; la impresión se realizará a ambos lados de la hoja, excepción de los mapas, gráficos y tablas.
- Las primeras páginas del informe consistirán en: Hoja de presentación del estudio; lista de técnicos y técnicas participantes (debidamente firmada), contenido del estudio (con la referencia correspondiente del acápite del estudio donde hayan sido cubiertos).
- Hoja de presentación.
- Lista de técnicas y técnicos participantes (debidamente firmada).
- Contenido
- Descripción del proyecto
- Permisos y autorizaciones
- Consulta de las partes interesadas
- Medidas a cumplir
- Informes

En el lomo de cada uno de los ejemplares se colocará el nombre del proyecto y sus generales.

2. TDR GUÍA DE EVALUACIÓN AMBIENTAL PARA LAS ACTIVIDADES DE LOS PROYECTOS Y PLAN DE MANEJO PARA AGUAS RESIDUALES DOMÉSTICAS

OBJETIVOS	
Prevenir y minimizar los impactos ambientales generados por las aguas residuales domésticas en todas las etapas de desarrollo del proyecto y sus obras de infraestructura, proveer un sistema de manejo y tratamiento acorde con los volúmenes generados, evitando la contaminación de cuerpos de agua o suelos receptores y la propagación de enfermedades infecto-contagiosas.	
IMPACTOS AMBIENTALES	
CAUSA	Residuos líquidos producidos por la actividad u ocupación humana en: a. adecuación, construcción y operación de instalaciones temporales. b. adecuación, construcción y operación de infraestructura. c. adecuación y construcción de vías y accesos. d. transporte de material y escombros. e. instalación, operación y mantenimiento de maquinaria y equipos; f. disposición temporal o final de material removido.
EFECTO	Alteración de las propiedades físico-químicas de las aguas, afectación de la dinámica de las aguas superficiales y subterráneas, sedimentación de los cuerpos de agua.
ACCIONES A DESARROLLAR	
1. Presentar toda la información correspondiente al sistema de tratamiento de las aguas residuales domésticas en términos de volúmenes, cargas típicas de contaminantes, plano general de redes o de las instalaciones del proyecto. 2. Diseño del sistema de tratamiento, recolector y determinación de los lugares de ubicación de las instalaciones de tratamiento, formas y lugares de disposición. 3. Diseño y construcción de sistemas de tratamiento, con trampas de control de grasas, pozos sépticos, filtros anaerobios, filtro en grava u otro sistema de tratamiento que permita el manejo adecuado de aguas residuales, y evite su proximidad y contaminación con aguas superficiales y subterráneas. 4. El diseño y construcción del sistema de tratamiento se realizará antes de iniciar las actividades constructivas, se deben tener en cuenta las características del lugar en el cual se va a instalar o construir el sistema de tratamiento (geográficas, pendientes, potencial de	

inundación, estructuras existentes, paisaje), la capacidad de asimilación hidráulica y las necesidades de tratamiento de las instalaciones (caudales producidos).	
TÉCNICA/ TECNOLOGÍA UTIIZADA	
1. Solicitud y obtención del (los) permiso(s) correspondientes para realizar la(s) descargas de aguas residuales. 2. Selección del sistema de tratamiento en función de los estándares de calidad del proyecto, el cumplimiento de la normatividad vigente y el grado de eliminación que ofrece cada tipo de tratamiento, respecto a las exigencias de calidad del agua residual para que pueda ser reutilizada o vertida. 3. Mantenimiento periódico (de acuerdo con el manual de operación) del sistema de tratamiento.	
LUGAR DE APLICACIÓN	Localización del sistema de tratamiento en concordancia con la ubicación de las instalaciones, construcción y operación de instalaciones temporales y obras de infraestructura.
SEGUIMIENTO Y MONITOREO	
1. Seguimiento y control del sistema con base en el manual de operación del sistema de tratamiento. 2. Monitoreos de calidad de agua, parámetros de calidad, métodos de muestreo y análisis, periodicidad de los muestreos. 3. Mantenimiento periódico de los elementos que constituyen el sistema de tratamiento. 4. Evaluación periódica de la eficiencia del sistema de tratamiento, y de opciones de cambio tecnológico de mayor eficiencia. 5. **Presentar matriz resumen con los costos y medidas de mitigación en cada una de las fases del programa.**	

3. TDR GUÍA DE EVALUACIÓN AMBIENTAL PARA LAS ACTIVIDADES DE LOS PROYECTOS Y PLAN DE MANEJO PARA EL PARTICULADO Y GASES

OBJETIVOS	
evaluar, prevenir y mitigar las emisiones de material particulado y gases, generados de los trabajos de desarrollo del proyecto.	
IMPACTOS AMBIENTALES	
CAUSA	Emisiones contaminantes producidos por la actividad humana en: a. adecuación, construcción y operación de instalaciones temporales. b. adecuación, construcción y operación de infraestructura. c. adecuación y construcción de vías y accesos. d. transporte de material y escombros. e. instalación, operación y mantenimiento de maquinaria y equipos; f. disposición temporal o final de material removido.
EFECTO	Aumento de la concentración de material particulado (polvo y polvillo) y de gases contaminantes en el entorno de las intervenciones del proyecto.
ACCIONES A DESARROLLAR	
Las principales fuentes de emisión de material particulado y gases en el área de desarrollo de las obras de infraestructura son: el tráfico vehicular, la operación de maquinaria y la acción del viento en áreas abiertas. La evaluación, prevención y mitigación de estos posibles impactos se pueden lograr con medidas sencillas, entre las cuales se destacan 1. Planeación de la ubicación de instalaciones de servicio, patios de acopio y zonas de disposición de estériles, determinando la dirección de los vientos como criterio decisivo. 2. Realización de medidas de prevención y control de emisión de partículas como barreras rompe-vientos, revegetación, humectación y cubrimiento de pilas de material y escombros. 3. Humectación de vías de acceso no pavimentadas. 4. Control de velocidad de circulación de vehículos y maquinarias. 5. Proteger el material proveniente de excavaciones o construcción, en los sitios de almacenamiento temporal. 6. Humectar los materiales expuestos al arrastre del viento 7. Realización de monitoreo permanente de concentraciones de gases. 8. Establecer, si es preciso, estaciones de monitoreo de aire en el área de influencia de la obra. 9. Realizar mantenimiento periódico de maquinaria y vehículos, para el control de la emisión de gases.	

10. Incentivar el uso de equipos de protección personal que garanticen la menor exposición posible a polvos, gases, humos, entre otros.
11. Capacitación a todo el personal de la obra y a contratistas sobre las medidas de prevención y control en la emisión de material particulado.
12. Capacitación relacionada con las medidas de prevención, para evitar inhalaciones de gases nocivos y polvo. Incluyendo protocolos de primeros auxilios.

TÉCNICA/ TECNOLOGÍA UTIIZADA

1. Control de velocidad vehicular y señalización en zonas no pavimentadas.
2. Humectación permanente de zonas no pavimentadas y de los materiales expuestos al arrastre del viento.
3. Realización de mantenimiento preventivo periódico de maquinaria, equipos y vehículos.
4. Dotación a personal expuesto de equipos de seguridad.
5. Implementar medidas educativas y de capacitación al personal del proyecto (residentes, contratistas).

LUGAR DE APLICACIÓN	En cada una de las intervenciones del proyecto.

SEGUIMIENTO Y MONITOREO

1. Verificación de medidas, acciones y tecnologías planteadas de control de emisiones.
2. Control del mantenimiento de maquinaria, equipos y vehículos vinculados al proyecto.
3. Controlar y verificar periódicamente los vehículos vinculados a la operación del proyecto.
4. Seguimiento y control de velocidad de vehículos
5. Monitoreo periódico de gases (incluyendo estaciones de monitoreo si fueran necesarias)
6. Realización de exámenes médicos periódicos al personal de la obra, así como el personal contratista, que permitan la adopción de indicadores de morbilidad encaminados a controlar la efectividad de los programas de higiene ocupacional y riesgos profesionales.
7. **Presentar matriz resumen con los costos y medidas de mitigación en cada una de las fases del programa.**

4. TDR GUÍA DE EVALUACIÓN AMBIENTAL PARA LAS ACTIVIDADES DE LOS PROYECTOS Y PLAN DE MANEJO PARA EL MANEJO DEL RUIDO

OBJETIVOS	
Prevenir, controlar y mitigar los niveles de ruido generados por los trabajos de construcción.	
IMPACTOS AMBIENTALES	
CAUSA	Ruido generado por la actividad u ocupación humana en: a. adecuación, construcción y operación de instalaciones temporales. b. adecuación, construcción y operación de infraestructura. c. adecuación y construcción de vías y accesos. d. transporte de material y escombros. e. instalación, operación y mantenimiento de maquinaria y equipos; f. disposición temporal o final de material removido.
EFECTO	Incremento del nivel de ruido en las zonas cercanas a las intervenciones del proyecto.
ACCIONES A DESARROLLAR	
1. Realización de monitoreos ambientales y ocupacionales, y evaluación de los niveles de ruido que ocasionan las intervenciones del proyecto. 2. Definir la manera más efectiva para el control técnico y la reducción del ruido, de acuerdo con las condiciones y necesidades de operación, entre las cuales se podrían encontrar: modificación de rutas, control de velocidad de circulación, uso de pantallas, y protección o aislamiento del receptor. 3. Realizar, desde la planeación y desarrollo de las intervenciones, el manejo del ruido. 4. Considerar barreras vivas y medios naturales que reducen o redireccionan la propagación del ruido como plantaciones de arbustos. 5. Realizar el mantenimiento adecuado de los equipos y la maquinaria utilizada en los trabajos de construcción, como medida de reducción de los niveles de ruido; así mismo, adecuar los horarios de trabajo para no interferir con las horas nocturnas de descanso de las comunidades y/o de la fauna. 6. Definir medidas de control de ruido en el tráfico vehicular para evitar ruidos producidos por pitos, bocinas, motores desajustados, frenos, entre otros. 7. Respetar las señales y normas de tránsito, a velocidades controladas con el fin de no causar daños a la propiedad privada o pública. 8. Capacitar al personal del proyecto, comunidades y a contratistas, en el manejo del ruido.	

9. Incentivar el uso de equipos de protección personal que garanticen la menor exposición posible al ruido.
TÉCNICA/ TECNOLOGÍA UTIIZADA
1. Utilización de equipos acústicos apropiados como: absorbentes, espumas, películas protectoras y barreras (arborización, materiales de acopio, planchas de zinc, o pantallas). 2. Instalar encerramientos acústicos, tanto en el interior como en el exterior de la obra y los lugares de generación del ruido, mantener ventilación e iluminación adecuadas para el personal. 3. Mantenimiento periódico de maquinaria, equipos y vehículos. 4. Realización de talleres educativos y capacitaciones al personal del proyecto, operadores de vehículos, maquinaria y equipos, a los residentes y a los contratistas. 5. Dotación al personal de implementos de seguridad.

LUGAR DE APLICACIÓN	En cada una de las intervenciones del proyecto.

SEGUIMIENTO Y MONITOREO
1. Mediciones periódicas de control del ruido, ambientales y ocupacionales. 2. Verificación de medidas, acciones y tecnologías planteadas para mediciones de material particulado y control de ruido. 3. Control del mantenimiento de maquinaria, equipos y vehículos vinculados al proyecto. 4. Realización de exámenes médicos periódicos al personal, que permitan la adopción de indicadores de morbilidad que ayuden a aumentar la efectividad de los programas de salud y riesgo ocupacional. 5. Estar atento a cualquier queja, comentario o malestar de la comunidad o del personal para lograr una solución efectiva, que permita, también la mejorar del ambiente de trabajo. 6. **Presentar matriz resumen con los costos y medidas de mitigación en cada una de las fases del programa.**

5. TDR GUÍA DE EVALUACIÓN AMBIENTAL PARA LAS ACTIVIDADES DE LOS PROYECTOS Y PLAN DE MANEJO PARA EL MANEJO DE COMBUSTIBLES

OBJETIVOS	
Prevenir, controlar y mitigar de los impactos ambientales ocasionados por el manejo de combustibles, durante la realización de los trabajos de construcción.	
IMPACTOS AMBIENTALES	
CAUSA	Manipulación, almacenamiento y consumo de combustibles en: a. adecuación, construcción y operación de instalaciones temporales. b. adecuación, construcción y operación de infraestructura. c. adecuación y construcción de vías y accesos. d. transporte de material y escombros. e. instalación, operación y mantenimiento de maquinaria y equipos; f. disposición temporal o final de material removido.
EFECTO	Alteración de las propiedades físico-químicas de las aguas, afectación de la dinámica de las aguas superficiales y subterráneas, sedimentación de los cuerpos de agua, contaminación del suelo.
ACCIONES A DESARROLLAR	
El uso de combustibles con fines energéticos o en la maquinaria, equipos y vehículos empleados durante la realización de las intervenciones del proyecto, debe considerar los siguientes aspectos: 1. Limitar la aplicación y uso de sustancias químicas, derivadas del petróleo, en sectores cercanos a cursos de agua. 2. Asegurar el adecuado manejo, almacenamiento, transporte y disposición de los combustibles. El almacenamiento se hará en lugares confinados y cubiertos que se ubicarán a una distancia no menor a 40 metros de los cursos de agua e instalaciones temporales para evitar que se presenten derrames o fugas que puedan contaminar el suelo, así mismo, requieren la instalación de una trampa de grasas. 3. Para prevenir y controlar derrames durante el transporte y llenado de los tanques de combustibles, usando un sistema adecuado de bombeo y áreas impermeabilizadas. En caso de derrames, evitar su escurrimiento haciendo canaletas alrededor y recogiéndolo con aserrín, tierra o arena. Luego, se debe disponer el material en un sitio apropiado, con alta impermeabilidad y lejos de cursos de agua. 4. En lugares donde se realice el abastecimiento de combustible, se requiere un extintor cerca del sitio y que no haya fuentes de ignición en los alrededores (cigarrillos, llamas, etc.). Se	

debe verificar el correcto acople de mangueras con el propósito de prevenir derrames y mantener elementos para la contención y limpieza de derrames accidentales (paños con grasa, arena, aserrín, trapos). 5. Evitar que los vertimientos de aceites usados, combustibles y sustancias químicas a las redes de aguas lluvias, a cuerpos de agua, o su disposición directamente sobre el suelo. 6. Mantener almacenadas, de acuerdo con las necesidades de operación, cantidades mínimas de combustibles. Limitar la estadía de los camiones tanqueros en el sitio, al tiempo mínimo posible. 7. En caso de derrames accidentales, se aplicarán los procedimientos establecidos del plan de contingencia para el derrame de hidrocarburos. 8. Capacitación y entrenamiento de brigadas contra incendio y de los procedimientos establecidos por el plan de contingencia para el derrame de hidrocarburos que se tenga.
TÉCNICA/ TECNOLOGÍA UTIIZADA
1. Instalación de sistemas de bombeo y áreas impermeabilizadas, para el manejo y abastecimiento de combustibles. 2. Instalación de sistemas para prevenir y detectar fugas y derrames en sitios de almacenamiento, tanques de almacenamiento de combustibles, y sistemas de conducción (tuberías, mangueras, etc.). 3. Diseño de medidas que, en caso de derrames o fugas, eviten el escurrimiento como canaletas, impermeabilización de pisos, muros de contención, etc. 4. Uso de elementos como aserrín, tierra, paños o arena para la contención y limpieza de derrames accidentales, ubicación de polietileno que cubra la totalidad del área donde se realizará la actividad, de forma tal que se evite contaminación del suelo por fugas derrames accidentales. 5. Diseño y construcción de zonas impermeabilizadas, cubiertas o techos en sitios de distribución, para evitar que las aguas lluvias expandan los efectos de los combustibles si ocurren fugas o derrames. 6. Diseño y construcción de diques perimetrales en depósitos de hidrocarburos con pisos pulidos o suelos impermeabilizados, con mayor capacidad que los tanques de almacenamiento. 7. Ubicación efectiva de elementos para la contención y limpieza de derrames accidentales (arena, aserrín, trapos, etc.). 8. Definición de la frecuencia y el tipo de monitoreo de fugas, de acuerdo con la normatividad vigente. 9. Mantener procedimientos, de acuerdo con las necesidades de operación, para la manipulación de combustibles, de residuos sólidos y peligrosos, aceites usados y material utilizado luego de la contención o limpieza de fugas o derrames accidentales.

LUGAR DE APLICACIÓN	Área de intervención del proyecto en la que se ejecuten obras y en zonas en donde se ubiquen vías de acceso vehicular, y en las áreas

	designadas para abastecer de combustible a maquinaria, equipos y vehículos.
SEGUIMIENTO Y MONITOREO	
1. Control periódico de las condiciones ambientales de los lugares dispuestos para el almacenamiento, transporte y disposición de combustibles. 2. Monitoreo periódico de los sistemas instalados para la prevención, y detección de fugas y derrames. 3. Análisis de datos de historial de frecuencias, y el tipo de monitoreo de fugas. 4. Verificación de efectividad de las medidas, acciones y tecnologías planteadas para el manejo de combustibles. 5. Capacitación, incluyendo simulacros si fuere necesario, de los procedimientos definidos en el plan de contingencia para el derrame de hidrocarburos. 6. Control del mantenimiento de maquinaria, equipos y vehículos del proyecto. 7. Capacitación del personal en manejo de combustibles (almacenamiento, fugas y derrames). 8. **Presentar matriz resumen con los costos y medidas de mitigación en cada una de las fases del programa.**	

6. TDR GUÍA DE EVALUACIÓN AMBIENTAL PARA LAS ACTIVIDADES DE LOS PROYECTOS Y PLAN DE MANEJO PARA EL MANEJO DE RESIDUOS SÓLIDOS

OBJETIVOS	
Implementar las medidas preventivas y de control necesarias para el manejo adecuado de los residuos sólidos domésticos, que se generan en el proyecto con el fin de proteger la salud humana y los recursos suelo, aire, agua y paisaje.	
IMPACTOS AMBIENTALES	
CAUSA	Residuos sólidos generados por: a. adecuación, construcción y operación de instalaciones temporales. b. adecuación, construcción y operación de infraestructura. c. adecuación y construcción de vías y accesos. d. transporte de material y escombros. e. instalación, operación y mantenimiento de maquinaria y equipos; f. disposición temporal o final de material removido.
EFECTO	Alteración de las propiedades físico-químicas de las aguas, afectación de la dinámica de las aguas superficiales y subterráneas, sedimentación de los cuerpos de agua, contaminación del suelo, modificación del paisaje.
ACCIONES A DESARROLLAR	
En el desarrollo de los trabajos, se produce una alta heterogeneidad de residuos sólidos, propios o no, de la actividad de desarrollo de la obra que se podrían clasificar en reciclables, reutilizables, desechos orgánicos, materiales tóxicos, entre otros. Las actividades mencionadas a continuación se orientan a la prevención y control que se va a realizar en el adecuado manejo y disposición de los residuos sólidos: 1. Realizar caracterizaciones de los residuos sólidos, que incluyan datos relacionados con el lugar de generación, cantidades producidas y composición. Con base en estos aspectos se definen los equipos y métodos de recolección, frecuencia, rutas, sitios y cuidados de acopio temporal y disposición final. 2. Con base en la caracterización proyectada, determinar el tipo de disposición final de los residuos, considerar alternativas como la utilización del servicio de recolección de basura existente en la región, diseño y construcción de rellenos sanitarios, incineración, utilización de residuos orgánicos para compostaje, comercialización de material reciclable, entre otros. Para ello es deseable establecer un Plan de Manejo de Desechos Sólidos, con metas	

cuantitativas que busquen minimizar los desechos que no se puedan reutilizar, revalorizar o reciclar. Para esto se habrá de presentar un registro.

3. Realizar clasificación y acopio temporal de los residuos sólidos por grupos. Por ejemplo, los residuos sólidos ordinarios, conocidos también como residuos domésticos, incluyen desechos de alimentos (materia orgánica putrescible, material biodegradable y perecedero), papel, cartón, plásticos, textiles, caucho, madera, vidrio, metales, residuos de poda, entre otros. Son los generados en instalaciones temporales, viviendas, comercios, casinos, oficinas y demás instalaciones con ocupación humana. Los desechos de alimentos pueden ser entregados para compostaje o como alimento de animales de la comunidad local, los desechos no perecederos pueden ser reutilizados, revalorizados o reciclados.
4. El lugar de acopio o de almacenamiento temporal de los residuos sólidos requiere disponer de recipientes independientes e identificables claramente, para lograr la separación de los residuos desde su fuente de generación. Tanto el lugar destinado para el acopio temporal como los recipientes, considerarán las características de los residuos que van a contener. Por ejemplo, los recipientes de los residuos sólidos especiales requieren ser impermeables y resistentes a la corrosión, deben estar confinados, y deben ser ubicados separadamente de los demás tipos de residuos.
5. Como actividades de prevención, se considera buscar la minimización en la producción de los residuos sólidos, esto esperado como resultado de la aplicación de planes de educación ambiental y sensibilización dirigidos al personal vinculado al proyecto y a la comunidad misma.
6. Capacitación, sensibilización y educación del personal que labora en el proyecto sobre la importancia del manejo adecuado de los residuos sólidos generados, incluidos aspectos de clasificación, almacenamiento y disposición de los residuos.
7. Evitar la disposición de material sobrante en áreas de importancia ambiental, como humedales, ríos o zonas de productividad agrícola.
8. Antes de iniciar la construcción de instalaciones temporales, el contratista deberá coordinar con la empresa de servicio público correspondiente lo relacionado con las prácticas, sitios de almacenamiento temporal, clasificación y horario de recolección de los residuos sólidos ordinarios.
9. Planificar la disposición final de los desechos provenientes del desmantelamiento. Los materiales reutilizables serán retirados por el contratista y dispuestos, según su interés, en otro sitio u obra que esté adelantando, sin que afecten el funcionamiento normal de los ecosistemas circundantes.
10. Establecer una política de compras que favorezca los productos ambientalmente benignos y que puedan ser utilizados como materiales de construcción, bienes de capital, alimentos y consumibles.
11. Establecer una política de reducción de artículos descartables y consumibles.

TÉCNICA/ TECNOLOGÍA UTIIZADA

De acuerdo con la caracterización de residuos desarrollada se definirán las técnicas o tecnologías por emplear para el manejo de los residuos sólidos generados. Algunas de estas, pueden incluir:

1. Centros de acopio temporal: la correcta disposición de los residuos inicia con un almacenamiento en la fuente de generación, en recipientes reutilizables, combinados con bolsas plásticas desechables para facilitar su manipulación. Se deben separar en la fuente de origen los residuos que puedan ser reciclados de aquellos con características peligrosas e industriales, y disponer de ellos en recipientes identificados (rotulados), como tanques plásticos de 55 galones rotulados y con tapa, para facilitar la separación en la fuente, ubicados de manera que no se mezclen entre sí y puedan reutilizarse, reciclarse o disponerse adecuadamente. Las áreas designadas para el almacenamiento temporal de los residuos sólidos ordinarios y especiales, deben quedar ubicadas en lugares visibles y de fácil identificación por cada una de las personas vinculadas al proyecto. El tiempo de almacenamiento debe ser tal, que los residuos no presenten ningún tipo de descomposición ni acumulación de agua.
2. Reutilización y reciclaje: la reutilización y el reciclaje son métodos mediante los cuales se aprovechan y transforman los residuos sólidos recuperados. Si se desarrollan procesos de reciclaje o reutilización en el proyecto, desde la fuente generadora del residuo se requiere la separación, acopio, reutilización, transformación y comercialización del residuo reciclable o reusable.
3. Compostaje: el compostaje es un proceso biológico, en el que los microorganismos (bacterias, hongos, levaduras), transforman la materia orgánica de los residuos en una materia estable rica en nutrientes, sales minerales y microorganismos beneficiosos para el suelo y el desarrollo de las plantas. Los residuos orgánicos podrán ser utilizados para compostaje o como alimento para animales. Si no existiera un mercado para los mismos, estos productos deberían ser distribuidos entre la comunidad.
4. Incineración: la incineración se considera un procesamiento térmico de los residuos sólidos mediante la oxidación química en exceso de oxígeno. Este proceso podrá ser utilizado por el contratista, siempre cuando se obtengan los permisos de rigor establecidos por la legislación vigente.

LUGAR DE APLICACIÓN	Todas las zonas donde del proyecto en las que se ejecute o desarrollen obras, y zonas en las cuales se generen residuos sólidos producto de las labores desarrolladas en el marco del proyecto.

SEGUIMIENTO Y MONITOREO

1. Verificación del cumplimiento de las actividades de manejo adecuado de los residuos sólidos.
2. Observaciones y control periódico de la eficiencia del sistema de manejo y disposición de residuos.
3. Caracterizaciones periódicas de los residuos sólidos generados por las labores de construcción, que incluyan datos relacionados con el lugar de generación, cantidades

producidas y composición, a fin de llevar estadísticas y análisis de tendencias en la reducción y manejo de los residuos generados.

4. Efectuar observaciones, mediciones y evaluaciones continuas en un sitio y período determinados, con el objeto de identificar los impactos y riesgos potenciales hacia el ambiente y la salud pública y para evaluar la efectividad del sistema de control. Realizar mejoras que puedan ser identificadas.
5. **Presentar matriz resumen con los costos y medidas de mitigación en cada una de las fases del programa.**

7. TDR GUÍA DE EVALUACIÓN AMBIENTAL PARA LAS ACTIVIDADES DE LOS PROYECTOS Y PLAN DE MANEJO PARA LAS ACTIVIDADES FORESTALES

OBJETIVOS	
Implementar las medidas preventivas y de control necesarias para el manejo adecuado de los recursos forestales que se incluyen dentro del contexto del proyecto, con el fin de proteger las cuencas, conservar la biodiversidad, y aumentar los servicios ecosistémicas.	
IMPACTOS AMBIENTALES	
CAUSA	Afectación al balance hídrico de la cuenca por efecto de: a. Pérdida de vegetación existentes y los valores ambientales, sociales y económicos, que esta pueda tener. b. Desbroce de la tierra, compactación del suelo y pérdida de nutrientes. c. Condiciones precedentes en el sitio, técnicas de plantación, especies sembradas y tratamientos aplicados durante la rotación. d. La ocurrencia de incendios forestales. e. Cambios en la infiltración de las lluvias e intercambio de características quimias y bioquímicas del suelo.
EFECTO	Riesgo de alteración del balance hídrico de las cuencas intervenidas, afectación de la dinámica de las aguas superficiales y subterráneas, compactación de suelos, modificación del paisaje.
ACCIONES A DESARROLLAR	
En el desarrollo de los trabajos forestales, se deberá observar que: 1. Las variedades de plantas a utilizar sean compatibles con las condiciones pre-existentes en las zonas, teniendo preferencia la vegetación nativa de cada sitio. 2. No utilizar especies exóticas, salvo no exista evidencia comprobada de su viabilidad en el sitio especifico en que se planean utilizar. 3. Si se incluye plantaciones de árboles, se debe considerar que la siembra sea -en principio- para estabilizar las laderas, controlar la erosión y proteger las orillas de los ríos. 4. Evitar la utilización de fertilizantes, plaguicidas o herbicidas que puedan contaminar el suelo y las aguas debajo de la cuenca. 5. Capacitar a comunitarios y productores en la prevención y combate de incendios forestales.	
LUGAR DE APLICACIÓN	Todas las áreas del proyecto donde se ejecuten actividades forestales.
SEGUIMIENTO Y MONITOREO	

1. Verificación del cumplimiento de las actividades de manejo adecuado de los recursos forestales.
2. Observaciones y control periódico de la eficiencia del sistema de manejo forestal del proyecto.
3. Llevar estadísticas y análisis de tendencias en la reducción y manejo de la cobertura recuperada.
4. **Presentar matriz resumen con los costos y medidas de mitigación en cada una de las fases del programa.**

8. MATRIZ RESUMEN DE IMPACTOS SIGNIFICATIVOS POR FASE DEL PROYECTO

Medio afectado	Factor ambiental	Actividades por fase/ valoración de impactos por significación											
		Exploración			Construcción			Operación			Abandono		
		Actividad 1	…	Actividad n	Actividad 1	…	Actividad n	Actividad 1	…	Actividad n	Actividad 1	…	Actividad n
Físico Químico	Suelo												
	Agua												
	Aire												
Biótico	Flora												
	Fauna												
	Ecosistema												
	Paisaje												
Socio-Económico	Social												
	Económico												
	Cultural												

9. MATRIZ RESUMEN DEL PROGRAMA DE MANEJO Y ADECUACIÓN AMBIENTAL

Medio afectado	Factor ambiental	Impactos Identificados	Actividades a realizar para mitigar los impactos	Parámetros a monitorear	Punto de muestreo	Frecuencia del monitoreo	Responsable	Costo estimado (RD$)	Documentos generados
Físico Químico	Suelo								
	Agua								
	Aire								
Biótico	Flora								
	Fauna								
	Ecosistema								
	Paisaje								
Socio-Económico	Social								
	Económico								
	Cultural								

Anexo 2: Equipo de Proyecto

EQUIPO TÉCNICO DEL ESTUDIO DE IMPACTO AMBIENTAL

NOMBRE	ESPECIALIDAD	COMENTARIO
Rafael Berigüete	Gerencia de Proyectos	Cumplimiento de la política social y ambiental y la política de género del fondo de adaptación.
Lic. Robin Terrero	Economía Ambiental	Revisión de las inversiones previstas y análisis de costos para el plan de manejo y adecuación ambiental.
José Antonio Núñez	Ingeniería Forestal	Esquemas de re-aforestación, conservación de microcuencas, sistemas agropecuarios y siembra de agua.
Elizabeth Paniagua	Ingeniería Civil	Costos y presupuestos, Especificaciones técnicas de las obras hidráulicas y sanitarias.
Ing. Rafal Mieses	Ingeniería Ambiental	Análisis de los estudios de línea base y recomendaciones para el Plan de manejo y adecuación ambiental.

Responsable

Rafael Berigüete; Eng., MA

Proyectista

Anexo 3: Metodología de Evaluación

Metodología para el Estudio de Impactos Medioambientales y Socioeconómicos[1]

1. Metodologías disponibles y su aplicabilidad

La Evaluación de Impacto Ambiental (EIA) es presentada y asumida como: (*i*) un instrumento de política pública, (*ii*) un procedimiento administrativo, y (*iii*) una metodología para la ejecución de los estudios de impacto, los que son componente central de las EIA. Las metodologías para realizar dichas evaluaciones, están orientadas a identificar, predecir y evaluar el impacto de los proyectos.

En general, las evaluaciones y sus resultados deben ser complementadas, en la presentación de los Estudios de Impactos Medioambientales y Socioeconómicos (EIAS), con: (a) la descripción del proyecto en curso de evaluación, (b) el plan de manejo y adecuación ambiental, y (c) el sistema de monitoreo a ser aplicado. Esto también sirve de guía para presentar y/o actualizar la EIA.

¿Cómo seleccionar las metodologías? Las consideraciones previas a la selección de la metodología deben incluir:

1. El marco normativo vigente, incluyendo la existencia de precisiones sobre los EIAS que pudieran estar incluidas en las regulaciones pertinentes.

2. El tipo de proyecto ("*estructural*", "*no estructural*"), la magnitud y complejidad del mismo, y las características del medio social y físico-biótico potencialmente afectable.

3. El objetivo del EIAS (selección de alternativas tecnológicas, de localización, anticipar riesgos y barreras, identificación de impactos).

4. La etapa de desarrollo del proyecto en la cual se aplica la metodología (pre- factibilidad, factibilidad, diseño).

5. La relación entre los requerimientos de datos para cada metodología y la disponibilidad de los mismos.

6. La relación entre los costos económicos y el requerimiento de personal y equipamiento necesarios, con la magnitud y los impactos potenciales esperables del proyecto.

[1] Presentado por el equipo de proyecto para explicar las diferencias entre las disposiciones establecidas por el Ministerio de Medio Ambiente y Recursos Naturales, y la Política Social y Ambiental del Fondo de Adaptación.

7. El aseguramiento de la independencia de los resultados que se obtengan en relación con la percepción de los evaluadores.

De la consideración integral de los factores antes mencionados surge la diversidad de metodologías utilizables y, además, disponibles. De hecho, por estas razones no existe una metodología única y universal. Ello no impide desconocer la necesidad de disponer de metodologías aplicables a la diversidad de actividades a ser evaluadas, a la diversidad de medios y factores ambientales potencialmente afectados, y a la complejidad de las interacciones entre factores y el entorno.

Desde los inicios de los procedimientos de EIAS hasta el presente, las metodologías aplicables se encuentran, en evolución. A nivel internacional, se han generado metodologías de aplicación indistinta a diferentes actividades y tecnologías de aplicación a proyectos específicos. De la misma manera, se han perfeccionado los marcos normativos y la inserción institucional de las EIA, incluyendo el mejoramiento de las capacidades de valoración oficial de los EIAS presentados.

El marco normativo ambiental dominicano, ha fijado la obligatoriedad de presentar un EIAS para aquellas actividades y proyectos susceptibles de afectar al ambiente. En ese sentido, el Ministerio de Medio Ambiente y Recursos Naturales ha podido establecer lineamientos sobre los contenidos de los EIAS. Esta regulación ha establecido también, a través de diferentes instrumentos, Términos de Referencia los cuales determinan los aspectos principales que deben ser analizados y, en general, la forma de acuerdo a la cual deben ser presentados los estudios en contener los EIAS.

En línea con lo anterior, el Ministerio de Medio Ambiente y Recursos Naturales, ofrece cierta flexibilidad con respecto a las metodologías aplicables a los proyectos, siempre que estas puedan: (*i*) aportar las informaciones y análisis necesarios para evaluar los impactos ambientales, (*ii*) que incluyan las medidas de remediación de los impactos, y (*iii*) se ajusten razonablemente a los TDR. Queda entonces a discreción del promotor del proyecto elegir la metodología aplicable, que debe valorar las alternativas en función de las incertidumbres y de los costos asociados a cada una.

Un aspecto importante a resaltar, es que las metodologías son aplicables a distintas etapas o niveles de los EIAS. Mientras que una "valoración cualitativa" incluye una valoración general de efectos, identificación de acciones impactantes, identificación de factores a ser impactados, e identificación de relaciones causa-efecto; en la "valoración cuantitativa" se incluye la predicción de la magnitud del impacto, y su valoración cuantitativa. Las mayores incertidumbres asociadas a algunas de las metodologías pueden ser aceptables en las evaluaciones correspondientes a las etapas iniciales de los proyectos ("valoración cualitativa"), aunque no en la etapa de su "valoración cuantitativa".

En general, podemos agrupar las metodologías disponibles en las siguientes categorías:

1. **Métodos de identificación de impactos**

a. Trabajo de equipos interdisciplinarios (caso: Método Delphi)

b. Listas de chequeo de efectos

c. Flujogramas y redes causales

d. Cartografía ambiental

2. Métodos de valoración de impactos

a. Matriz de Leopold

b. Sistema Batelle

Canter (2003) analiza la aplicabilidad de las diferentes metodologías de EIAS. Un resumen de las condiciones necesarias para aplicar estas metodologías, se encuentran en el Cuadro 1.

Tarea del proceso	Metodología		Utilidad Relativa
Identificación de impactos	Matrices	Simples En etapas	Alta Media
	Diagrama de redes		Alta
	Listas de control	Simples Descriptivas	Media Media
Descripción del medio afectado	Matrices	Simples En etapas	
	Diagrama de redes		
	Listas de control	Simples Descriptivas	Alta
Predicción y evaluación de impactos	Matrices	Simples En etapas	Media Media
	Diagrama de redes		Media
	Listas de control	Descriptivas Escalas, jerarquías	Alta Baja
Selección de la actuación propuesta según valoración de alternativas	Matrices	Simples En etapas	Media Baja
	Listas de control	Escalas, puntos jerarq. Escalas, peso. puntos jerárquicos	Media Alta
Resumen y comunicación	Matrices	Simples En etapas	Alta Baja
	Listas de control	Simples	Media

Fuente: Canter, L. (2003).

2. Métodos para identificación de impactos

2.1. Listas de chequeo de efectos

Es uno de los métodos de mayor utilidad para iniciar el proceso de la EIAS. Su aplicación a los diferentes proyectos supone que el evaluador ordena los enunciados considerando los subsistemas del sistema ambiental (físico, biótico y abiótico, socio-económico), y dentro de cada uno de ellos establecer los recursos a ser impactados y, posteriormente, determinar los impactos principales. Las listas permiten, al equipo evaluador, avanzar rápidamente en: (*i*) la identificación de las acciones que pueden afectar al ambiente y a la población y tener efectos sobre la economía, (*ii*) la determinación de los componentes y factores ambientales que deben ser evaluados, y (*iii*) los posibles impactos medioambientales y socioeconómicos. Adicionalmente, podrían ser referencias.

Categoría	**Comentarios**
Características y usos del suelo	Identificar los usos actuales y describir las características del área. *Usos del suelo* *Topografía, fisiografía y geología* *Suelos* *Riesgos geológicos*
Especies y ecosistemas afectados.	Identificar aquellas especies y ecosistemas que serán *Especies* *Comunidades y asociaciones* *Recursos bióticos únicos y otros*
Consideraciones socio-económicas	
Medio atmosférico	Describir el clima predominante y la calidad y cantidad de recursos atmosféricos e hídricos del área. *Clima* *Hidrología e hidrografía* *Aire, ruido y calidad de agua*
Rasgos singulares valores	Identificar rasgos únicos o singulares del área, incluyendo y sitios históricos, arqueológicos y escénicos.

Fuente: González, Z. (2006).

Las listas, se basan en el listado de los factores ambientales que deben ser estudiados (caso de las "Listas Simples"). Algunos sistemas poseen listas más elaboradas, permitiendo la ponderación de la importancia entre los diferentes factores (caso de las "Listas Descriptivas"). En general, ambas herramientas son de gran utilidad en el momento de planificar las actividades de los EIAS.

La Listas de Control Simples pueden orientarse para ordenar los factores ambientales que serían potencialmente afectados, o las acciones que pueden afectarlos. Por su parte, las Listas de Control Descriptivas pueden basarse en cuestionarios orientados para identificar y definir los impactos para los diferentes componentes del medio o factores afectados, en especial para estudios base.

Se han desarrollado diferentes Listas de Control aplicables a diferentes actividades y proyectos (FLACSO, 2004), las cuales tienen amplia y reconocida aceptación en todo el mundo. Otras listas pueden desarrollarse a base de preguntas guía. A continuación, se aporta un ejemplo de estas listas.

Instrucciones: Responda las preguntas siguientes marcando una X en el sitio apropiado, considere la actividad, la construcción, la explotación, así como los impactos indirectos.

A. MEDIO BIOTICO NATURAL

1. ¿Podría la actividad propuesta afectar algún factor natural o a un recurso hídrico adyacente o próximo a las áreas de actividad? SI----NO----

Si la respuesta es SI, especifique qué factor natural se afecta:

	Directo	Indirecto	Sinérgico	Corto plazo	Largo plazo	reversible	irreversible	severo	moderado	Insignificante
Hidrología superficial	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
Calidad agua sup.	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
Suelo/erosión	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
Geología/ Geotecnia	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
Clima	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

2. ¿Podría afectar la actividad a la vida animal o los peces? SI----NO----

Si la respuesta es SI, especifique qué vida animal o peces se afecta.

Hábitat natural	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
Ecología de peces	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

3. ¿Podría afectar la actividad a la vegetación natural? SI----NO----
Si la respuesta es SI, especifique qué vegetación y en que extensión se le afecta.

B. RIESGOS AMBIENTALES

1. ¿Podría implicar la actividad que se propone el uso, almacenaje, escape de, o eliminación de alguna sustancia potencialmente peligrosa? SI----NO----
Si la respuesta es SI, especifique qué sustancia y su efecto posible.

2. ¿Podría la actividad propuesta provocar un aumento real o probable de los riesgos ambientales? SI----NO----
Si la respuesta es SI, especifique qué tipo

3. ¿Podría la actividad propuesta ser susceptible de sufrir riesgos ambientales debido a su situación? SI----NO----
Si la respuesta es SI, especifique qué tipo.

C. CONSERVACION Y USO DE LOS RECURSOS

1. ¿Podría la actividad propuesta afectar o eliminar tierra adecuada para la producción agraria o maderera? SI----NO----
Si la respuesta es SI, especifique hectáreas y clase de suelos que se verían afectados.

2. ¿Podría la actividad propuesta afectar a la pesca comercial o a los recursos de acuicultura o a su producción? SI----NO----
Si la respuesta es SI, especifique qué tipo se afecta

3. ¿Podría la actividad propuesta afectar al uso potencial o a la extracción de un recurso mineral o energético indispensable o escaso? SI----NO----

D. CALIDAD Y CANTIDAD DE AGUA

1. ¿Podría la actividad propuesta afectar a la calidad de los recursos hídricos que se encuentran dentro, adyacentes o cerca del área de actividad? SI----NO----

Si la respuesta es SI, especifique qué recursos hídricos se afectan y en qué cantidad diaria aproximada.

2. ¿Podría la actividad propuesta provocar un deterioro de la calidad de alguna zona o cuenca del recurso hídrico? SI----NO----

Fuente: FLACSO (2004).

2.2. Utilización de matrices (caso de la matriz interactiva de Leopold)

La matriz de Leopold es, fundamentalmente, una metodología de identificación de impactos. Se trata básicamente de una matriz que presenta, en las columnas, las acciones del proyecto y, en las filas, los componentes del medio y sus características. La matriz presenta una lista de 100 acciones y 90 elementos ambientales; cada acción debe ser considerada sobre cada uno de los componentes del entorno de manera a detectar su interacción, es decir los posibles impactos.

Entre los componentes del medio la matriz establece las siguientes categorías:

A. Categorías físicas y químicas

1. Tierra
2. Agua
3. Atmósfera
4. Proceso

B. Condiciones biológicas

1. Flora
2. Fauna

C. Factores Culturales

1. Uso del suelo
2. Recreo
3. Estética e interés humano
4. Estatus cultural
5. Instalaciones y actividades

D. Relaciones ecológicas

E. Otras

Por su parte se distinguen las siguientes acciones:

A. Modificación del régimen
B. Transformación del suelo y construcción
C. Extracción de recursos
D. Producción
E. Alteración de los terrenos

F. Renovación de recursos
G. Cambios en el tráfico
H. Acumulación y tratamiento de residuos
I. Tratamientos químicos
J. Accidentes
K. Otros

Para cada una de las categorías de elementos, la matriz considera los recursos, las características y los efectos ambientales que pueden ocasionar las acciones. A manera de ejemplo, consideremos la categoría B.1 (B: Componentes biológicos y 1. Flora), y la categoría D. (Relaciones ecológicas).

Categoría	Descripción
B. Condiciones biológicas	
1. Flora	a. Árboles b. Arbustos c. Herbáceas d. Cultivos e. Microflora f. Plantas acuáticas g. Especies en peligro h. Barreras i. Corredores
2. Fauna	a. Aves b. Animales terrestres c. Peces y crustáceos d. Organismos bénticos e. Insectos f. Micro fauna g. Especies en peligro
D. Relaciones ecológicas	a. Salinización de recursos hídricos b. Eutrofización c. Insectos vectores de enfermedades d. Cadenas tróficas e. Salinización de materiales superficiales f. Invasiones de maleza g. Otros

Estos criterios se aplican a cualquier proyecto. Como ejemplo, se indica para una planta industrial.

ACCIONES / MEDIO RECEPTOR				CONSTRUCCIÓN AMPLIACIÓN						OPERACIÓN					
				MOVIMIENTO DE SUELOS	MOVIMIENTO VEHICULAR	ARMADO DE LA PLANTA	USO AGUA	CONSTRUCIÓN ACCESOS Y ZONAS EXTERIORES	MOVIMIENTO VEHICULAR	CARGA Y DESCARGA	OPERACIÓN PLANTA	SERVICIOS AUXILIARES	GENERACION DE ENVASES VACÍOS	MOVIMIENTO Y USO DE SOLVENTES	LIMPIEZA DE TACHOS Y MÁQUINAS
MEDIO NATURAL	AIRE	CALID. DE AIRE	GASES	----	T R	T R	--	--	T R	T R	P R	P R	--	--	--
			MATERIAL PARTICUL.	T R	T R	T R	--	P I	T R	T R	P R	P R	P R	--	--
		RUIDO		T R	T R	T R	--	T R	T R	T R	P R	P R	--	--	--
		MICROCLIMA		P I	--	--	T R	P I	--	--	--	--	--	--	--
	RELIEVE		TOPOGRAF.	P I	T R	T R	--	P I	T R	--	--	--	--	--	--
	SUELOS		CALIDAD	P I	T R	T R	--	P I	T R	--	--	--	--	--	--
	RECURSOS HIDRICOS	SUPERFICIALES	CALIDAD	--	--	--	--	--	--	P R	--	--	--	--	--
			CANTIDAD	--	--	--	--	--	--	P R	--	--	--	--	--
			DRENAJE	P I	--	--	--	P I	--	P R	--	--	--	--	--
		SUBTE-RRAN.	CALIDAD	--	--	--	--	--	--	--	--	--	--	--	P R
			CANTIDAD	--	--	--	P R	--	--	--	--	--	--	--	--
	VEGETACIÓN		TERRESTRE	P I	--	P R	--	P I	--	--	--	--	--	--	--
	FAUNA		TERRESTRE	--	T R	P R	--	--	T R	--	--	--	--	--	--
	ECOSISTEMAS		TERRESTRE	P I	T R	P R	--	--	T R	--	--	--	--	--	--
	PAISAJE		LOCAL	P I	T R	P R	--	P R	T R	mP R	P R	P R	P R	--	--
	PATRIMONIO NATURAL		CONSERVAC	--	--	--	--	--	--	--	--	--	--	--	--
MEDIO SOCIOECONÓMICO	POBLACIÓN			T R	T R	T R	--	--	T R	P R	P R	P R	--	--	--
	PATRIMONIO CULTURAL			--	--	--	--	--	--	--	--	--	--	--	--
	ACTIVIDADES Y USO DEL SUELO			T R	--	--	--	T R	--	P R	--	--	P R	--	--
	SECTORES ECONOMICOS		PRIMARIO	--	--	--	--	--	--	--	--	--	--	--	--
			SECUNDAR.	P R	--	--	--	--	--	--	P R	P R	P R	--	--
			TERCIARIO	--	T R	T R	--	--	T R	--	P R	P R	--	--	--
	INFRAESTRUCTURA			P R	--	P R	--	--	--	P R	P I	P RI	--	--	--
	TRANSITO Y TRANSPORTE			P R	T R	P R	--	P I	T R	P R	P R	P R	P R	--	--

Impacto: permanente (P), temporal (T), reversible (R), irreversible (I)

Impactos positivos en color verde. Impactos negativos en color rojo.

Fuente: Bengoa, G. (2000).

Este ejemplo muestra que es posible seleccionar, en razón de las características y magnitud de la actividad evaluada, los criterios a ser aplicados (de calidad ambiental, de intensidad, de extensión, de temporalidad, de persistencia, de recuperación o reversibilidad, de la relación de causalidad, de interacción). Esto muestra la potencialidad de la matriz de Leopold para realizar las EIA.

La matriz de Leopold, tal como ha sido presentada, es un método que puede ser aplicado en forma expeditiva, es de bajo costo y permite identificar los posibles impactos a partir de una visión del conjunto de las interacciones posibles. Además, las matrices son de utilidad para la comunicación de los impactos detectados. En contrapartida, la metodología no evita la subjetividad en referencia a la cuantificación de los impactos, no permite visualizar las interacciones ni los impactos de un factor afectado sobre otros factores. Estas limitaciones se pueden sortear en base a la experiencia.

Morera y Tomasisni (1994), indican que, en términos generales, es posible aplicar la matriz de Leopold (de una manera eficiente y costo-efectiva) procediendo de la siguiente manera:

a) identificando las acciones que integran el proyecto (columnas) y buscar aquellas interacciones con los componentes o factores del medio (filas) sobre los que pueda producirse un impacto.

b) Los impactos (positivos o negativos) serán identificados con una diagonal.

c) En cada casilla con diagonal (interacciones) se indica la magnitud (M) valorada de 1 a 10, y la extensión (E) también valorada de 1 a 10.

d) Los valores serán precedidos de los signos "+" o "-" según corresponda.

e) La presentación de los valores será: M/E.

Como consecuencia la matriz se representa de la siguiente manera:

Factores	**Acciones**			
	Acción 1	Acción 2	…	Acción *n*
Factor 1	1/5			
Factor 2		3/7		
…				
Factor n				5/3
Totales positivos				
Totales negativos				

2.2.1. Clasificación y valoración de los impactos

La evaluación de los impactos ambientales consiste en la identificación, previsión, interpretación y medición de las consecuencias ambientales y sociales de los proyectos. La evaluación de los impactos debe realizarse en el marco de procedimientos adecuados que, en forma concurrente, permitan identificar las acciones y el medio a ser impactado, establecer las posibles alteraciones y valorar las mismas. Esta última etapa está encaminada a llegar a expresar los impactos en forma cuantitativa y, cuando ello no es posible, cualitativamente; para evaluar la viabilidad de la acción.

La manifestación del efecto de las actividades humanas sobre el ambiente de ser caracterizada a través de la importancia del impacto. De acuerdo con Fernández Vítora (1997), la importancia del impacto se mide:

> *en función, tanto del grado de incidencia o intensidad de la alteración producida, como de la caracterización del efecto, que responde a su vez a una serie de atributos de tipo cualitativo tales como extensión, tipo de efecto plazo de manifestación, persistencia, reversibilidad, recuperabilidad, sinergia, acumulación y periodicidad*.

Esta definición permite asignar atributos de los impactos.

1. **Carácter del impacto o naturaleza.** Los impactos pueden ser beneficiosos o perjudiciales. Los primeros son caracterizados por el signo positivo, los segundos se los expresan como negativos.

2. **Efecto**. El impacto de una acción sobre el medio puede ser "directo" -es decir impactar en forma directa-, o "indirecto" -es decir, se produce como consecuencia del efecto primario el que, por tanto, devendría en causal de segundo orden.

A los efectos de la ponderación del valor se considera:

- Efecto secundario…… 1
- Efecto directo…….. 4

3. **Magnitud/Intensidad.** Representa la incidencia de la acción causal sobre el factor impactado en el área en la que se produce el efecto.

Para ponderar la magnitud, se considera:

- Baja…….. 1
- Media baja……... 2
- Media alta…… 3
- Alta…….. 4
- Muy alta……... 8
- Total……... 12

4. **Extensión.** A veces la incidencia del impacto está circunscrita; en otros casos se extiende disminuyendo sus efectos (contaminación atmosférica e hídrica) hasta que los mismos no

son medibles. En algunos casos, sus efectos pueden manifestarse más allá del área del proyecto y de la zona de localización del mismo. Por caso, los efectos secundarios sobre la atmósfera (por ejemplo, el CO_2 y su incidencia en el efecto invernadero) y los efectos de degradación de humedales o de contaminación de cultivos (disminución de las áreas reproductivas o de alimentación de aves migratorias y la mortandad directa de las aves, y sus efectos en sistemas ecológicos de otros países).

El impacto puede ser localizado (puntual) o extenderse en todo el entorno de la actividad (total).

La extensión se valora de la siguiente manera:

- Impacto Puntual…… 1
- Impacto parcial …… 2
- Impacto extenso…… 4
- Impacto total……. 8

Existen otras consideraciones que deben efectuarse en el momento de valorar la extensión. En efecto, debe considerarse que la extensión se refiere a la zona de influencia de los efectos. Si el lugar del impacto puede ser considerado un "lugar crítico" (alteración del paisaje en zona valorada por su valor escénico, o vertido aguas arriba de una toma de agua), al valor obtenido se le adicionan cuatro (4) unidades. Si en el caso de un impacto "crítico" no se puede realizar medidas correctoras, se deberá cambiar la ubicación de la actividad que, en el marco del proyecto, da lugar al efecto.

5. **Momento**. Se refiere al tiempo transcurrido entre la acción y la aparición del impacto. Para poder evaluar los impactos diferidos en el tiempo se necesita de modelos o de experiencia previa. Por ejemplo, en el caso de los procesos de eutrofización de los cuerpos de agua, es posible disponer de modelos.

La predicción del momento de aparición del impacto, será mejor cuanto menor sea el plazo de aparición del efecto. Además, la predicción es importante en razón de las medidas de corrección de los impactos que deban realizarse.

El momento se valora de la siguiente manera:

- Inmediato……. 4
- Corto plazo (menos de un año) …… 4
- Mediano plazo (1 a 5 años) ……. 2
- Largo plazo (más de 5 años) …… 1

Si el momento de aparición del impacto fuera crítico se debe adicionar cuatro (4) unidades a las correspondientes.

6. **Persistencia.** Se refiere al tiempo que el efecto se manifiesta hasta que se retorne a la situación inicial en forma natural o a través de medidas correctoras. Un efecto considerado permanente puede ser reversible cuando finaliza la acción causal (caso de vertidos de contaminantes) o irreversible (caso de afectar el valor escénico en zonas de importancia turística o urbanas a través de la alteración de geoformas o por la tala de un bosque). En otros casos los efectos pueden ser temporales.

Los impactos se valoran de la siguiente manera:

- Fugaz…… 1
- Temporal (entre 1 y 10 años) …….. 2
- Permanente (duración mayor a 10 años…….. 4

7. **Reversibilidad**. La persistencia y la reversibilidad son independientes. Este atributo está referido a la posibilidad de recuperación del componente del medio o factor afectado por una determinada acción. Se considera únicamente aquella recuperación realizada en forma natural después de que la acción ha finalizado. Cuando un efecto es reversible, después de transcurrido el tiempo de permanencia, el factor retornará a la condición inicial.

Se asignan, a la reversibilidad, los siguientes valores:

- Corto plazo (menos de un año) …… 1
- Mediano plazo (1 a 5 años) ……. 2
- Irreversible (más de 10 años) ……... 4

8. **Recuperabilidad**. Mide la posibilidad de recuperar (total o parcialmente) las condiciones de calidad ambiental iniciales como consecuencia de la aplicación de medidas correctoras.

La recuperabilidad se valora de la siguiente manera:

- Si la recuperación puede ser total e inmediata…… 1
- Si la recuperación puede ser total a mediano plazo… 2
- Si la recuperación puede ser parcial (mitigación)……4
- Si es irrecuperable……8

9. **Sinergia**. Se refiere a que el efecto global de dos o más efectos simples es mayor a la suma de ellos, es decir a cuando los efectos actúan en forma independiente.

Se le otorga los siguientes valores:

- Si la acción no es sinérgica sobre un factor… 1
- Si presenta un sinergismo moderado……. 2
- Si es altamente sinérgico……... 4

Si en lugar de "sinergismo" se produce "debilitamiento", el valor considerado se presenta como negativo.

10. **Acumulación**. Se refiere al aumento del efecto cuando persiste la causa (como el efecto acumulado en el tiempo de las substancias tóxicas).

La asignación de valores se efectúa considerando:

- No existen efectos acumulativos……. 1
- Existen efectos acumulativos……. 4

11. **Periodicidad**. Este atributo hace referencia al ritmo de aparición del impacto.

Se le asigna los siguientes valores:

- Si los efectos son continuos……. 4
- Si los efectos son periódicos…… 2
- Si son discontinuos……. 1

12. **Importancia del Impacto**

La "importancia del impacto" se puede determinar como:

I = ±(3 Importancia + 2 Extensión + Momento + Persistencia + Reversibilidad + Sinergismo + Acumulación + Efecto + Periodicidad + Recuperabilidad)

Los valores de Importancia del Impacto varían entre 13 y 100. Se los clasifica como:

- Irrelevantes (o compatibles) para valores menores a 25.
- Moderados cuando presentan valores entre 25 y 50.
- Severos cuando presentan valores entre 50 y 75.
- Críticos (o incompatibles) si su valor es mayor de 75.

2.3. Diagrama de redes

Los diagramas de redes ayudan a analizar e integrar las causas de los efectos sobre el ambiente y los factores impactados por ellos; considerando en forma sucesiva los efectos primarios, secundarios y terciarios. Si bien, la información que presentan es mínima (Canter, 2000), son de utilidad a la hora de organizar e iniciar el trabajo en equipos interdisciplinarios y, además, de identificar los impactos de los proyectos y las relaciones causales entre acciones e impactos.

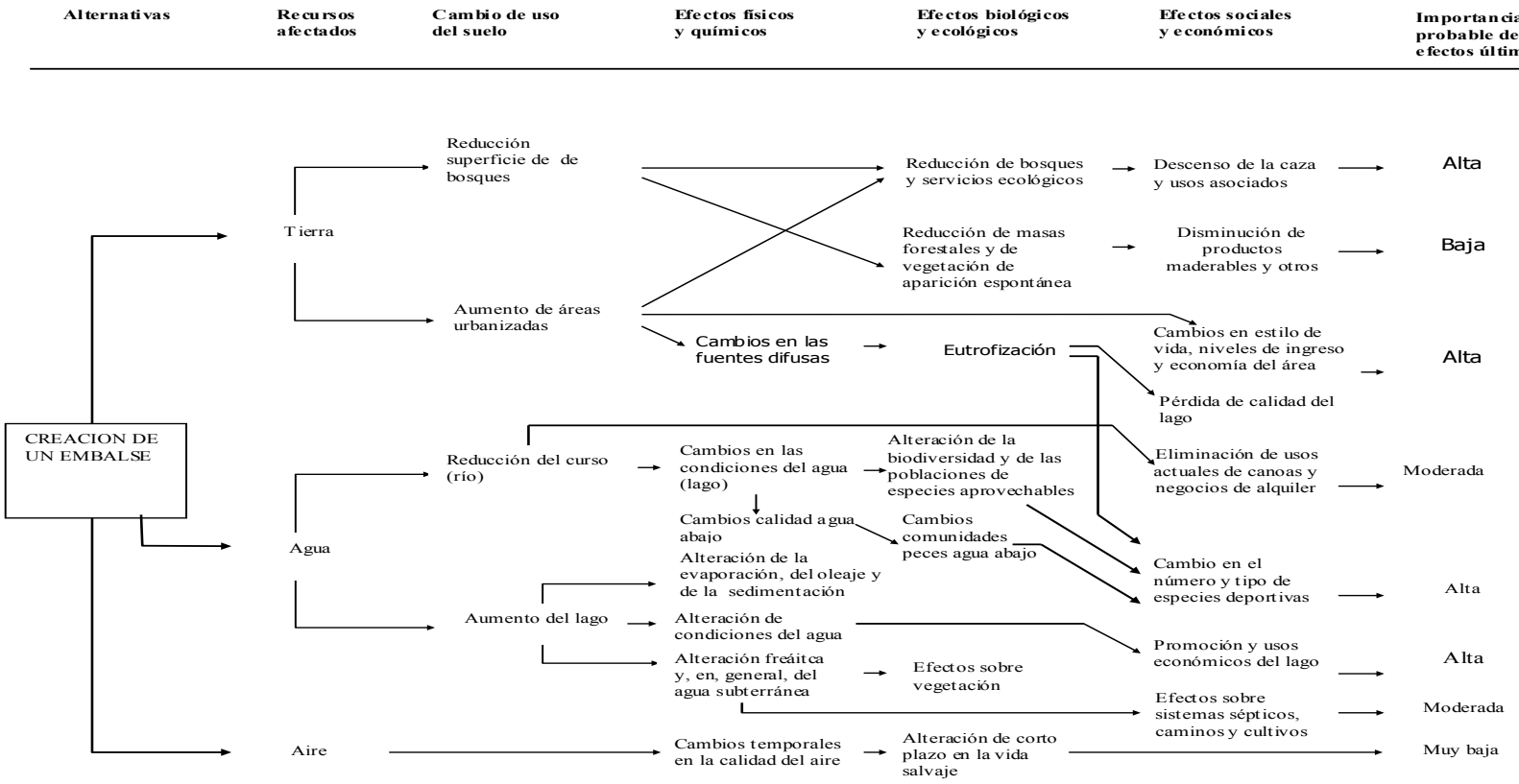


Figura 1: Ejemplo de un Diagrama de Redes

Los diagramas pueden ser realizados en forma genérica para cada tipo de actividad (construcción de acueductos, cambio de uso del suelo, instalaciones de procesamiento, y muchos otros). En este caso, orientan al equipo de trabajo sobre las relaciones causa-efecto sobre las cuales deben poner atención o considerar en forma prioritaria. El equipo evaluador puede modificar el diagrama, adaptándolo a las condiciones particulares (naturales, sociales, económicas) de localización del proyecto y a sus interacciones. Esta actividad, implica ampliar y precisar el conocimiento de las relaciones de causa-efecto, y permite consolidar el equipo evaluador y reconocer, analizar e integrar las visiones conceptuales y disciplinarias de sus miembros. Los diagramas, así también, pueden ser elaborados desde sus inicios por el equipo evaluador para definir la estrategia a seguir.

En el ejemplo del diagrama mostrado, se analizan, en forma sistemática y sucesiva, los siguientes: (*i*) la alternativa del proyecto, (*ii*) los recursos afectados y el cambio de uso del suelo, (*iii*) los efectos sobre el medio natural (físicos y químicos, y biológicos y ecológicos) y socio económico, y (*iv*) la ponderación de la importancia probable de los efectos últimos. El diagrama se refiere a a la construcción de una represa, para mostrar que, en casos particulares debe, también, realizarse otras consideraciones. Por ejemplo, en el caso de que el río tenga importancia en aspectos culturales o que la construcción de la represa afecte la forma de vida de la sociedad local.

2.4. Sistema de Battelle

Es una metodología de evaluación basada en la consideración de indicadores de impacto. El sistema se basa en la identificación de parámetros representativos de la situación ambiental y que permiten valorar los cambios que se producen como consecuencia de la evolución propia del sistema ambiental o de los efectos, sobre el entorno, de las actividades humanas.

En este contexto, se consideran como "indicadores" a las medidas de los factores ambientales o de especies biológicas. Un indicador se selecciona por la importancia del efecto que mide, ya sea porque afecta en forma directa la calidad ambiental o a la salud de las personas, o porque aporta a la aparición de otros efectos negativos. Por su parte, un indicador biológico (vegetal o animal) es seleccionado en razón de la sensibilidad o la tolerancia a situaciones ambientales de estrés o de contaminación. Los "indicadores" son de fundamental importancia en la gestión ambiental; ya que se utilizan para evaluar la situación ambiental de un lugar, establecer la línea base ambiental, para establecer el seguimiento de la evolución ambiental y el de los efectos de las actividades humanas[2].

La metodología emplea un índice que, expresado en unidades de impacto ambiental, debe permitir caracterizar el impacto global del proyecto[3]. El índice empleado proviene de la valoración de los

[2] Entre los indicadores ambientales orientados a valorar el medio físico y biológico, están: emisiones de diferentes gases, grupos de gases causantes de diferentes efectos como los GEIs, volumen de residuos producidos, número de especies amenazadas, etc. Entre los indicadores del medio social y económico, están: uso de energía, producción industrial, crecimiento de la población, ocurrencia de enfermedades relacionadas con factores ambientales y otros.
[3] Los "índices" se establecen en base a diferentes "indicadores", es decir combinando, en forma más o menos lógica, distintos factores que aportan a la calidad ambiental. Son importantes en el momento de definir, en forma integral,

indicadores medidos empleando, para todos ellos, una escala numérica conmensurable, es decir, que hace posible su adición de manera a la obtención de un valor integrador de los efectos ambientales del proyecto. Esto es la base más robusta para la cuantificación de los impactos.

El sistema original identifica cuatro (4) categorías ambientales, 18 componentes y 78 parámetros. Los niveles de información requerida parel desarrollo del sistema aumentan desde categoría a componente y desde este a parámetro. Las categorías consideradas son las siguientes:

ECOLOGÍA

CONTAMINACIÓN

PAISAJE

INTERÉS HUMANO

Por su parte, los 18 componentes ambientales, son los siguientes:

- Especies y poblaciones
- Hábitat y comunidades
- Ecosistemas
- Contaminación del agua
- Contaminación atmosférica
- Contaminación de suelos
- Ruido
- Suelo
- Aire
- Agua
- Biota (flora y fauna)
- Objetos artesanales
- Composición
- Valores educacionales y científicos
- Valores históricos
- Cultura
- Sensaciones

la situación o la evolución ambiental. El seguimiento de un determinado índice puede demostrar el cambio de la tendencia de un indicador que por si solo puede ser importante al momento de prever el futuro posible o probable.

- Estilos de vida

Los parámetros elegidos deben ser adecuados. Y lo serán en la medida que sean representativos de la calidad ambiental del entorno en el cual se realizan las mediciones, que sean identificables y medibles, y que respondan a las necesidades de predicción, interpretación y evaluación del proyecto. Los responsables del EIAS deben seleccionar dichos parámetros basados en el mejor conocimiento documentado del medio, de las características e impactos del proyecto o programa, y de los conocimientos disponibles sobre el particular en el sitio, y de su propia experiencia.

Para su empleo en el sistema, los resultados obtenidos de cada parámetro -medidos en unidades propias a cada uno de ellos y, por tanto, heterogéneas en función del conjunto- deben ser transformados en unidades conmensurables (las llamadas "*Unidades de Impacto Ambiental*"). Para ello se transforman los datos en su equivalencia de índice de impacto ambiental. Posteriormente los índices son ponderados en razón de su importancia en el marco ambiental del entorno.

2.4.1. Transformación de los parámetros en índices de calidad ambiental.

El valor medido de un parámetro varía, siendo posible determinar su valor o nivel "óptimo" y el "pésimo". Entre ambos niveles se producen los valores intermedios representativos de la calidad del ambiente considerado. La relación entre los valores medidos y el índice de calidad ambiental se realiza a través de una función de transformación la que deriva del conocimiento de cada factor y de sus efectos. En general, la función de transformación puede presentarse como:

$$CA_j = f(M_j)$$

Donde CA, es el índice de calidad ambiental de un parámetro y Mj es la magnitud del impacto ocasionado. El índice CA se expresa, por convención, entre 0 y 1, siendo o la situación de peor calidad ambiental del parámetro considerado y 1 el nivel que pueda ser considerado óptimo.

En la figura siguiente se presentan ejemplos de funciones de transformación (según propuso Canter en el 2000, citando un trabajo realizado en 1970, por la Fundación de Sanidad Nacional de los EE.UU). Los índices que se presentan fueron preparados por un panel de expertos para su inclusión en un índice general de calidad de agua, referidos a valores entre 0 y 100. Pueden considerarse orientativos de la materia aquí desarrollada, y que son muy aplicables al caso de la República Dominicana. La zona gris entre las líneas de puntos incluye la totalidad de las respuestas obtenidas del panel; la línea llena representa la "curva media" obtenida de promediar dichas respuestas.

El desarrollo de los índices requiere, como se ha visto en el caso anterior de la participación de un equipo técnico que, además, debe estar familiarizado con el entorno (biótico y abiótico), social y económico del proyecto. La función de transformación puede ser distinta para diferentes entornos.

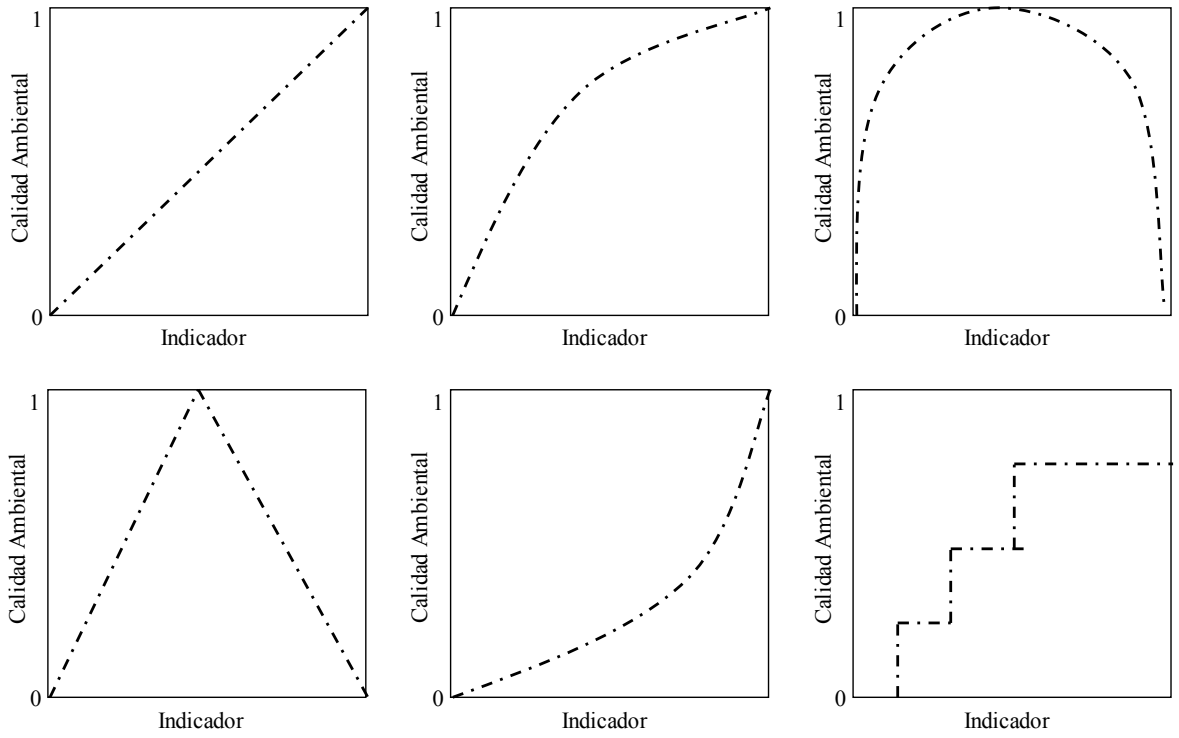


Figura 2: Forma Básicas de las Funciones de Transformación

2.4.2. Ponderación de parámetros

Los parámetros empleados contribuyen en forma diferente a representar la calidad ambiental de un sitio. Por lo tanto, es importante otorgar a cada parámetro un peso o índice ponderal (UIP), el que se expresa en "*unidades de importancia*". En el sistema Batelle se indican las UIP para cada parámetro. Por ello, la expresión de la unidad de impacto ambiental (UIA) de cada parámetro es:

$$UIA = CA \times UIP$$

Finalmente, la evaluación final se realiza considerando cada parámetro en situación de sin proyecto y con proyecto, a saber:

$$UIA_{por\ proyecto} = UIA_{con\ proyecto} - UIA_{\text{sin}\,proyecto}$$

Como las UIA son conmensurables, la evaluación final del impacto ambiental podrá ser obtenida sumando las UIA de cada parámetro. Así también se pueden usar para detectar situaciones críticas.

Anexo 4: Matriz Resumen del PMAA

MATRIZ RESUMEN DEL PROGRAMA DE MANEJO Y ADECUACION AMBIENTAL DEL PROYECTO CLIMACOMUNIDAD

ACTUALIZADO AL 10 DE DICIEMBRE DEL 2017 (FASE DE CONSTRUCCIÓN)

Componentes del medio	Elemento del medio	Indicadores de impactos	Actividades a realizar para evitar, controlar y mitigar los impactos	Parámetros a monitorear	Punto de muestreo	Frecuencia de monitoreo	Responsables	Costos Anual ($RD)	Documentos Generados
FÍSICO-QUÍMICO	AIRE	Contaminación por el polvo que se genera por la extracción de material y el movimiento de equipos y camiones	Humedecer zonas de construcción y caminos de acceso	Verificación que se realiza el humedecimiento según el programa	Viajes a los sitios de intervención, infraestructuras y construcciones	Diario	Encargado de obra	RD$6,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
			Recubrimiento de los materiales en los camiones: Lonas y Compuertas	Verificación de los camiones (lona y compuerta) a la salida de mina, de planta y de obra	Camiones que transportan los materiales, insumos y productos	Cada camión	Encargado de obra	RD$12,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
			Mantenimiento de caminos por donde transitan los camiones	Verificación que el mantenimiento y reparación de los caminos se hace	Caminos por donde transitan los camiones cargados	Semanal	Encargado de obra	RD$192,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
		Contaminación por emisión de gases de combustión de vehículos, equipos pesados y generadores eléctricos	Mantenimiento de maquinarias, equipos, vehículos y generador	Verificación de los mantenimientos de equipos, vehículos y planta	Sobre los vehículos, equipos y generador de electricidad	Mantenimiento regular de los equipos, vehículos y planta eléctrica según programación	Encargado de obra	RD$105,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
			Control de los horarios y la velocidad de circulación	Instrucción y capacitación a los choferes y operarios	Calles de la comunidad por donde circulen los camiones	Semanal	Encargado de obra	RD$15,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
		Contaminación por el ruido debido al funcionamiento de las plantas y bombas, y por el movimiento de equipos pesados y camiones	Control de los horarios y la velocidad de circulación	Instrucción y capacitación a los choferes y operarios	Calles de la comunidad por donde circulen los camiones	Semestral	Encargado de obra	RD$75,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
			Controlar los ruidos en vehículos, equipos y planta eléctrica	Verificación de los mantenimientos de equipos, vehículos y planta	Sobre los vehículos, equipos y generador de electricidad	Mantenimiento regular de los equipos, vehículos y planta eléctrica según programación	Encargado de obra	RD$125,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de los mantenimientos realizados
	SUELO	Perdida de suelo por extracción de material en construcciones e instalaciones y cambios en el relieve	Conformación del relieve	Verificación que las superficies siguen la modelación que tenía originalmente el relieve	Áreas que serán intervenidas	Único	Encargado de obra	RD$48,000.00	Se habilitará un libro con las incidencias del proceso
				Levantamiento topográfico para hacer rectificaciones que logren el drenaje superficial adecuado	Áreas que serán intervenidas	Único	Encargado de obra	RD$194,000.00	Informes de estudios topográficos
		Contaminación de los suelos por acumulación de chatarra y residuos peligrosos (sólidos o líquidos)	Almacenamiento de la chatarra y otras piezas metálicas	Verificación de que la chatarra sea almacenada en el lugar destinado	Área destinada a chatarra	Diario	Encargado de obra	RD$17,000.00	Se habilitará un libro con las incidencias del proceso
			Confinación en tanques sellados de los aceites usados y baterías	Verificación que estos son almacenados correctamente y entregados a gestores ambientales	Área de mantenimiento/ talleres	Diario	Encargado de obra	RD$11,500.00	Registro con el control de los tanques de desechos y entrega a gestores ambientales autorizados
	AGUA	Contaminación de las aguas superficiales por sólidos suspendidos, hidrocarburos, grasas, aceites y contaminación de aguas subterráneas por efluentes del pozo séptico	Mantenimiento de las trampas de grasa y sistemas de tratamiento	Verificación de la realización de la limpieza de las trampas de grasa	Área del taller	Trimestral	Encargado de obra	RD$48,500.00	Se habilitará un libro donde se reflejarán los mantenimientos
			Mantenimiento de protección alrededor de los tanques de almacenamiento de combustible	Verificación de la instalación del muro y el piso de concreto	Área donde esta ubicado el tanque de almacenamiento de combustible	Trimestral	Encargado de obra	RD$12,500.00	Se habilitará un libro de registro donde se reflejarán los resultados de los mantenimientos realizados
			Confinación en tanques sellados de los aceites usados	Verificación que los tanques son almacenados correctamente y entregados a gestores ambientales	Área de mantenimiento	Diario	Encargado de obra	RD$86,000.00	Registro con el control de los tanques de desechos y entrega a gestores ambientales autorizados
		Variación del régimen de escurrimiento superficial por modificación del relieve	Evitar el arrastre de sedimentos que afecten a los cuerpos de agua	Verificación de la realización del estudio hidrológico.	Áreas de intervención	Único	Encargado de obra	RD$113,000.00	Informes de estudios hidrológicos
			Evitar que disminuya la capacidad de recarga de los acuíferos	Verificación que las superficies siguen la modelación que tenía originalmente el relieve	Áreas de intervención	Único	Encargado de obra	RD$34,000.00	Se habilitará un libro con las incidencias del proceso
BIOTICO	FLORA Y FAUNA	Pérdida de la cobertura vegetal por la tala de los árboles y desbroce	Establecer escombreras como bancos/ depósitos para futuros préstamos de material	Verificar la supervivencia re-vegetación realizada	Áreas de intervención	Diario	Encargado de obra	RD$175,000.00	Se habilitará un registraron de la supervivencia de las plantas
		Afectación a la biota de las áreas aledañas por deposición del polvo generado en las construcciones	Humedecer zonas de construcción y caminos de acceso	Verificación que se realiza el humedecimiento según el programa	Viajes a los sitios de intervención, infraestructuras y construcciones	Diario	Encargado de obra	RD$107,500.00	Se habilitará un libro de registros donde se reflejarán las incidencias
		Afectación de hábitats, migración y/o pérdida de reptiles, insectos y otros como resultado de la tala de árboles	Re-vegetación de los linderos de las áreas intervenidas	Verificar la supervivencia de la re-vegetación realizada	Áreas que serán intervenidas y áreas alrededor de los linderos	Diario	Encargado de obra	-	Se habilitará un registraron de la supervivencia de las plantas
			Sembrar especies endémicas y nativas de la zona	Presencia de especies de fauna endémica y nativa	Áreas que serán intervenidas y áreas alrededor de los linderos	Anual	Encargado de obra	-	Se habilitará un registraron de la supervivencia de las plantas
	ECOSISTEMA Y PAISAJE	Cambio del paisaje natural por efecto de las construcciones e instalaciones	Re-vegetación de los linderos de las áreas intervenidas	Verificar la supervivencia de la re-vegetación realizada	Áreas que serán intervenidas y áreas alrededor de los linderos	Diario	Encargado de obra	RD$72,000.00	Se habilitará un registraron de la supervivencia de las plantas
		Perdida de suelo por extracción de material en construcciones e instalaciones y cambios en el relieve	Conformación del relieve	Verificación que las superficies siguen la modelación que tenía originalmente el relieve	Áreas que serán intervenidas	Único	Encargado de obra	-	Se habilitará un libro con las incidencias del proceso
				Levantamiento topográfico para hacer rectificaciones que logren el drenaje superficial adecuado	Áreas que serán intervenidas	Único	Encargado de obra	-	Informes de estudios topográficos

MATRIZ RESUMEN DEL PROGRAMA DE MANEJO Y ADECUACION AMBIENTAL DEL PROYECTO CLIMACOMUNIDAD

ACTUALIZADO AL 10 DE DICIEMBRE DEL 2017 (FASE DE CONSTRUCCIÓN)

Componentes del medio	Elemento del medio	Indicadores de impactos	Actividades a realizar para evitar, controlar y mitigar los impactos	Parámetros a monitorear	Punto de muestreo	Frecuencia de monitoreo	Responsables	Costos Anual ($RD)	Documentos Generados
SOCIOECONÓMICO	POBLACIÓN	Incremento de las afecciones a la salud de los habitantes del pueblo por el ruido y/o el polvo que generan los camiones	Control de horarios y velocidad de circulación de los camiones	Instrucción y capacitación a los choferes y operarios	Calles de la comunidad por donde circulen los camiones	Semanal	Encargado de obra	RD$15,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
			Recubrimiento de los materiales transportados y cierre de las compuertas de los camiones	Verificación de los camiones a la salida de la obra/ mina	Áreas de despacho y/o acopio de material	Cada camión	Encargado de obra	RD$42,000.00	Se habilitará un libro de registro donde se reflejarán las incidencias
			Controlar las actividades de los transportistas de material	Instrucción en el cumplimiento del PMAA en lo relativo a su trabajo	Áreas de despacho y/o acopio de material	Cada camión	Encargado de obra	RD$13,500.00	Se habilitará un libro de registros donde se reflejarán las incidencias
		Incremento de riesgos de accidentes en la comunidad en la ruta que siguen los equipos y camiones	Control de horarios y velocidad de circulación de los camiones	Inspección de la existencia de los policías acostados y señales	Vías de la comunidad por donde circulen los camiones	Semanal	Encargado de obra	RD$21,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
			Controlar las actividades de los transportistas de material	Instrucción en el cumplimiento del PMAA en lo relativo a su trabajo	Áreas de despacho y/o acopio de material	Cada camión	Encargado de obra	RD$17,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
		Disminución del desempleo en la zona, con la contratación del personal local	Contratación de mano de obra local para todas las operaciones	Verificación de la efectividad del programa de contratación de mano de obra para plazas vacantes	Comunidades y poblados cercanos a los sitios de intervención	Continuo	Encargado de obra	RD$12,500.00	Se habilitará un libro de registro con los lugares de procedencia del personal técnico y de los obreros
	RESPONSABILIDAD	Afectación de la salud o higiene de trabajadores por el ruido y el polvo	Establecimiento de chequeos médicos periódicos	Se verificará la realización de chequeos médicos periódicos	Todo el personal	Semestral	Encargado de obra	RD$45,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de los chequeos médicos
			Controlar los ruidos en vehículos, equipos y planta eléctrica	Verificación de los mantenimientos de equipos, vehículos y planta	Sobre los vehículos, equipos y generador de electricidad	Mantenimiento regular de los equipos, vehículos y planta eléctrica según programación	Encargado de obra	RD$105,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de los mantenimientos realizados
		Riesgos de ocurrencia de accidentes laborarles y/o exposición a peligros	Uso de implementos de protección contra ruidos y polvo para los trabajadores y personal expuesto	Inspección visual de la existencia y uso de implementos de seguridad	Todo el personal	Diario	Encargado de obra	RD$15,000.00	Se habilitará un libro de registro donde se reflejarán las incidencias de la inspección visual
			Capacitación al personal en de salud, higiene, riesgos y actuación	Se verificará la realización de charlas y cursos periódicos	Todo el personal	Semestral	Encargado de obra	RD$65,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de las capacitaciones realizadas
		Contribuciones del proyecto para con el bienestar de la comunidad y el país	Aportes en forma de efectivo o en especie, apoyo físico o moral	Monto de las contribuciones del proyecto a terceros del mismo	Gerencia general	Mensual	Encargado de obra	RD$200,000.00	Se habilitará un libro de registro donde se reflejarán los apoyos y donaciones realizadas
								RD$2,000,000.00	

MATRIZ RESUMEN DEL PROGRAMA DE MANEJO Y ADECUACION AMBIENTAL DEL PROYECTO CLIMACOMUNIDAD

ACTUALIZADO AL 10 DE DICIEMBRE DEL 2017 (FASE DE OPERACIÓN)

Componentes del medio	Elemento del medio	Indicadores de impactos	Actividades a realizar para evitar, controlar y mitigar los impactos	Parámetros a monitorear	Punto de muestreo	Frecuencia de monitoreo	Responsables	Costos Anual ($RD)	Documentos Generados
FÍSICO-QUÍMICO	AIRE	Contaminación por el polvo que se genera por el incremento del tránsito vehicular por la comunidad	Humedecer zonas de instalaciones y caminos de acceso	Verificación que se realiza el humedecimiento según el programa	Infraestructuras e instalaciones	Continuo	Encargado de proceso	RD$9,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
			Recubrimiento de los materiales en los camiones: Lonas y Compuertas	Verificación de los camiones (lona y compuerta) al salir de la planta	Camiones que transportan los materiales, insumos y productos	Cada camión	Encargado de proceso	RD$12,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
		Contaminación por emisión de gases de combustión de vehículos, equipos, bombas y generadores eléctricos	Mantenimiento de maquinarias, equipos, vehículos y generador	Verificación de los mantenimientos de equipos, vehículos y planta	Sobre los vehículos, equipos, bombas y generadores eléctricos	Mantenimiento regular de los equipos, vehículos y planta eléctrica según programación	Encargado de proceso	RD$75,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
			Control de los horarios y la velocidad de circulación	Instrucción y capacitación a los choferes y operarios	Infraestructuras e instalaciones	Semestral	Encargado de proceso	RD$10,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
		Contaminación por el ruido debido al funcionamiento de las plantas y bombas, y por el tránsito vehicular	Control de los horarios y la velocidad de circulación	Instrucción y capacitación a los choferes y operarios	Calles de la comunidad por donde circulen los camiones	Semestral	Encargado de proceso	RD$10,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
			Controlar los ruidos en vehículos, equipos y planta eléctrica	Verificación de los mantenimientos de equipos, vehículos y planta	Sobre los vehículos, equipos y generador de electricidad	Mantenimiento regular de los equipos, vehículos y planta eléctrica según programación	Encargado de proceso	RD$105,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de los mantenimientos realizados
	SUELO	Contaminación de los suelos por acumulación de chatarra y residuos peligrosos (sólidos o líquidos)	Almacenamiento de la chatarra y otras piezas metálicas	Verificación de que la chatarra sea almacenada en el lugar destinado	Infraestructuras e instalaciones	Continuo	Encargado de proceso	RD$11,000.00	Se habilitará un libro con las incidencias del proceso
			Confinación en tanques sellados de los aceites usados y baterías	Verificación que los tanques son almacenados correctamente y entregados a gestores ambientales	Infraestructuras e instalaciones	Continuo	Encargado de proceso	RD$10,000.00	Registro con el control de los tanques de desechos y entrega a gestores ambientales autorizados
	AGUA	Contaminación de las aguas subterráneas por efluentes y aguas residuales	Mantenimiento de las trampas de grasa y sistemas de tratamiento	Verificación de la realización de la limpieza de las trampas de grasa	Infraestructuras e instalaciones	Semestral	Encargado de proceso	RD$15,000.00	Se habilitará un libro donde se reflejarán los mantenimientos
			Mantenimiento de protección alrededor de los tanques de almacenamiento de combustible	Verificación de la instalación del muro y el piso de concreto	Área donde esta ubicado el tanque de almacenamiento de combustible	Semestral	Encargado de proceso	RD$20,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de los mantenimientos realizados
			Confinación en tanques sellados de los aceites usados	Verificación que los tanques son almacenados correctamente y entregados a gestores ambientales	Infraestructuras e instalaciones	Continuo	Encargado de proceso	RD$15,000.00	Registro con el control de los tanques de desechos y entrega a gestores ambientales autorizados
BIOTICO	FLORA Y FAUNA	Afectación a la biota por las intervenciones forestales	Re-vegetación con variedades pre-existentes, adaptables y viables	Verificar la supervivencia de la re-vegetación realizada	Áreas de intervención	Semestral	Encargado de proceso	RD$70,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
	ECOSISTEMA Y PAISAJE	Afectación del ecosistema (no-biótico) por las intervenciones forestales	Re-vegetación con variedades pre-existentes, adaptables y viables	Verificar la supervivencia de la re-vegetación realizada	Áreas de intervención	Semestral	Encargado de proceso	RD$59,000.00	Se habilitará un registraro de la supervivencia de las plantas
SOCIOECONÓMICO	POBLACIÓN	Incremento de las afecciones a la salud en la comunidad cercana por el ruido y/o el polvo que generan los camiones	Control de horarios y velocidad de circulación de los camiones	Instrucción y capacitación a los choferes y operarios	Calles de la comunidad por donde circulen los camiones	Continuo	Encargado de proceso	RD$20,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
			Controlar las actividades de los transportistas de material	Instrucción en el cumplimiento del PMAA en lo relativo a su trabajo	Áreas de despacho y/o acopio de material	Continuo	Encargado de proceso	RD$15,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
		Incremento de riesgos de accidentes por el incremento del tránsito vehicular	Control de horarios y velocidad de circulación de los camiones	Inspección de la existencia de los policías acostados y señales	Vías de la comunidad por donde circulen los camiones	Mensual	Encargado de proceso	RD$18,000.00	Se habilitará un libro donde se reflejarán los resultados del control visual y las gestiones realizadas
			Controlar las actividades de los transportistas de productos	Instrucción en el cumplimiento del PMAA en lo relativo a su trabajo	Áreas de despacho y/o acopio de material o productos	Continuo	Encargado de proceso	RD$14,000.00	Se habilitará un libro de registros donde se reflejarán las incidencias
		Disminución del desempleo en la zona, con la contratación del personal local	Contratación de mano de obra local para todas las operaciones	Verificación de la efectividad del programa de contratación de mano de obra para plazas vacantes	Comunidades y poblados cercanos a los sitios de intervención	Continuo	Encargado de proceso	RD$30,000.00	Se habilitará un libro de registro con los lugares de procedencia del personal técnico y de los obreros
	RESPONSABILIDAD	Afectación de la salud del personal por el al ruido provocados por los equipos y sistemas eléctricos y mecánicos	Establecimiento de chequeos médicos periódicos	Se verificará la realización de chequeos médicos periódicos	Todo el personal	Semestral	Encargado de proceso	RD$23,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de los chequeos médicos
			Controlar los ruidos en vehículos, equipos y planta eléctrica	Verificación de los mantenimientos de equipos, vehículos y planta	Sobre los vehículos, equipos y generador de electricidad	Mantenimiento regular de los equipos, vehículos y planta eléctrica según programación	Encargado de proceso	RD$54,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de los mantenimientos realizados
		Riesgos de ocurrencia de accidentes laborarles y/o exposición a peligros	Uso de implementos de protección contra ruidos y polvo para los trabajadores y personal expuesto	Inspección visual de la existencia y uso de implementos de seguridad	Todo el personal	Continuo	Encargado de proceso	RD$10,000.00	Se habilitará un libro de registro donde se reflejarán las incidencias de la inspección visual
			Capacitación al personal en de salud, higiene, riesgos y actuación	Se verificará la realización de charlas y cursos periódicos	Todo el personal	Semestral	Encargado de proceso	RD$45,000.00	Se habilitará un libro de registro donde se reflejarán los resultados de las capacitaciones realizadas

MATRIZ RESUMEN DEL PROGRAMA DE MANEJO Y ADECUACION AMBIENTAL DEL PROYECTO CLIMACOMUNIDAD

ACTUALIZADO AL 10 DE DICIEMBRE DEL 2017 (FASE DE OPERACIÓN)

Componentes del medio	Elemento del medio	Indicadores de impactos	Actividades a realizar para evitar, controlar y mitigar los impactos	Parámetros a monitorear	Punto de muestreo	Frecuencia de monitoreo	Responsables	Costos Anual ($RD)	Documentos Generados
								RD$650,000.00	

Anexo 5: Resumen de Participación Social

INFORME DE CONSULTA PÚBLICA DEL PROYECTO "***Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural (ClimaComunidad)***", CELEBRADA EN EL CENTRO TECNOLOGICO COMUNITARIO DE VILLA ALTAGRACIA.

FECHA: 11 DE DICIEMBRE DEL 2017 HORA: 9:30 a. m.

A. Introducción

Las vistas públicas y análisis de interesados se realizan cumpliendo con los requerimientos que, para tales fines, establece la Ley 64-00 sobre Medio Ambiente y Recursos Naturales. El objetivo de esta actividad, es que los interesados (individuos, comunidades, empresas, organizaciones, autoridades, etc.) puedan conocer el Proyecto; en especial los impactos positivos y negativos que puedan crearse en la zona donde se desarrolla.

Para la realización de la vista pública, se invitó por medios de cartas a las diferentes personalidades representativas de la comunidad y sus instituciones. También se invitó a las autoridades locales, comunitarios y académicos. Por igual, se puso a disposición los datos de contacto del programa y el promotor a fin de que cualquier otro interesado (ya sea de la comunidad cercana o de otro lugar) pueda recibir la información del proyecto.

La actividad se realizó en el Centro Tecnológico Comunitario. Se dio inicio con las palabras de los consultores del proyecto, quienes dieron la bienvenida a los presentes y les orientaron sobre los objetivos de la actividad y la importancia de que todos se anoten en la hoja de asistencia en la entrada. Estos consultores están autorizados por la empresa.

El Pastor Santiago Mora, representante de la iglesia evangélica, pidió una oración por la comunidad de Villa Altagracia, por sus habitantes, por el proyecto, y que sus responsables y empleados siempre tengan a Dios en su corazón y busquen la salvación que sólo puede obtenerse por medio de la aceptación de Jesús Cristo como salvador.

B. Metodología

La metodología se explicó a los participantes, la misma consistía en:

1. Presentación del proyecto, informaciones generales y avances.
2. Muestra de cartas de val y de apoyo para con el programa.
3. Explicación de los TDR utilizados para el estudio ambiental.
4. Explicación de los impactos positivos y negativos del proyecto.
5. Explicación sobre las medidas para mitigar los impactos negativos.
6. Análisis del beneficio del proyecto para la zona y la comunidad.
7. Ventajas de tener proyectos bien manejados social y ambientalmente.

8. Sesión de preguntas y respuestas con los presentes.
9. Aplicación del formulario de evaluación del taller de consulta.
10. Palabras de clausura, refrigerio, e interacción y socialización.

Se aclaró a los presentes que, para efectos de no omitir detalles importantes en la elaboración del informe de la consulta pública; la misma sería grabada en video. Este video estaría disponible también para cualquier interesado, presente o no, en esta actividad.

C. Materiales

Se utilizó la presentación en PowerPoint para que la información se pudiera manejar de manera gráfica y fuera más fácil de entender. Se puso a disposición de las personas bolígrafos, libretas, y carpetas. La actividad se apoyó de otros medios audiovisuales.

D. Conducción

Apoyados en los medios audiovisuales, los consultores ambientales explicaron el programa en detalle, sus objetivos, las metas que tiene a corto y mediano plazo, los beneficios derivados de su construcción, y los impactos positivos y negativos que este tendrá.

En el transcurso de las explicaciones, los consultores muestran las cartas de aval dadas por las autoridades correspondientes a favor del proyecto; a la vez de dejar establecido que -en los TDR utilizados y en otras directrices del Ministerio de Medio Ambiente- se indica la obligatoriedad de realizar un Estudio Ambiental, del cual esta actividad es parte.

Al concluir las presentaciones y explicaciones, los consultores hicieron una dinámica de relajación de grupo (de 5 minutos). Acto seguido, indicaron que la siguiente parte de la actividad es la Interacción; es decir, la realización de preguntas y respuestas sobre el proyecto, las inquietudes, dudas y necesidades de información de los participantes.

E. Interacción

Pregunta 1: Astón León (*Fundación para el Desarrollo de Villa Altagracia*) indicó que es importante que el proyecto se instale, ya que eso puede servir para que muchas comunidades tengan más agua y no tengan que pagar tan cara el agua en botellones además de pagarla. Eso podría ayudar a los agricultores más pobres a tener más ingresos.

Respuesta: Es correcto. El proyecto partió de un análisis de necesidades el cual, a pesar de ser muy básico, identifico que el cambio climático es un gran reto para las comunidades pobres del país, en especial porque estas basan su economía en la agricultura la cual será afectada por el aumento de la temperatura y la reducción de las lluvias. Incluso se recomendó a la comunidad que vea el programa como una oportunidad no solo para empleo inmediato, sino para mejorar sus medios de subsistencia a futuro.

Pregunta 2: El Sr. Félix Rivas (*Unión de Juntas de Vecinos de Medina*), indica que los consultores hablan de los aportes a la sociedad, los arbitrios al ayuntamiento, y los aportes que por ley deben hacer al gobierno; pero no habla de qué ayuda precisa les darán a las juntas de vecinos. "*Por eso yo quiero que los responsables del proyecto me digan qué propuestas concretas y reales tiene para nosotros la comunidad*" preguntó este.

Respuesta: Muy buen comentario. Podemos asegurar que los promotores del programa (IDDI) están abiertos a recibirlos siempre; ya que ellos han decidido que el programa sea con la comunidad, por la comunidad y para esta. Les aconsejamos que sean proactivos y que tengan para ellos sus propias propuestas, ya que ustedes son los que más conocen sus problemas y como resolverlos. Los promotores los recibirán, los atenderán, y los escucharán. En todo caso, si no se comunican nos pueden llamar a nosotros.

Pregunta 3: La Sra. Sabine Mertes (*Club Deportivo y Cultural Los Cacaos*), dice que para ella el proyecto es de beneficio para la zona porque mientras más se invierte en proyectos, más empleo hay para la gente y hay menos delincuencia. Está contenta porque el proyecto invertirá en la zona ya que muchas personas se van de Los Cacaos y otras comunidades por la falta de oportunidades. Ella pide a los promotores que hagan una reunión con ellos cuando inicie el proyecto en la que se comprometan públicamente y den su palabra en persona de que se apoyarán las actividades deportivas y culturales.

Respuesta: Esa opinión nos parece muy buena. La falta de empleo y oportunidades es un gran problema en todo el país. Acuérdese que el programa no sólo dará empleo a técnicos, sino que también tendrá operarios, trabajadores, agricultores, regantes, criadores de abejas, etc. Pero también propiciará condiciones para que la comunidad cree otras riquezas que no sean vulnerables a los efectos del cambio climático.

Comentario: en cuanto a reunirse con los promotores, le aconsejamos que -desde que inicie la ejecución- se organicen y pidan una reunión con ellos. Ustedes tienen los teléfonos y correos de nosotros, así que planifíquenla y nos avisan para estar y ayudar.

Pregunta 4: Emilia Waison (*Iglesia Evangélica de las Asambleas de Dios en San Cristóbal*), dice que Dios enseñó el amor al prójimo y a trabajar juntos para progresar. Pero también pasa que los que traen proyectos siempre ofrecen ayuda y apoyo que luego no llega cuando se le pide. Ustedes deberían ya saber las personas de la comunidad que van a trabajar en las distintas comunidades, en los centros de trabajo, y hasta en los camiones. Es mejor si son empleados cristianos porque hay garantía de seriedad y la vocación de servicio que solo puede venir del amor a Dios y de una vida honesta.

Respuesta: nosotros realmente confesamos que aún no se han decidido las personas que van a trabajar en las distintas áreas del programa, ya que eso siempre se deja para etapas más avanzadas. En especial ya cuando se tienen los recursos finales para operar y cuando ya se sabe que el proyecto será una realidad y no crear falsas expectativas. Como usted sabe, los

promotores del programa (al igual que todos nosotros) son hombres creyentes en Dios y no tenemos duda que cuando se empiece a reclutar el personal las personas cristianas podrán participar. Si tenga en cuenta que, para que a las personas les resulte rentable, lo mejor es que sean empleados de la misma comunidad ya que así gastan menos en trasporte y comida. El programa empleará más que todo a mujeres.

Pregunta 5: La Sra. Tahira Ramírez (Grupo Comunitario SOS), pregunta "*¿cómo sabemos las personas de la comunidad que se va a cumplir lo que se dice? ¿Cómo se sabrá si el proyecto es seguro y si cumple con las normas ambientales ya que las empresas después que están en sus negocios no dejan que nadie las vea ni dan información?*"

Respuesta: esa es una buena pregunta porque trata la transparencia que todos debemos tener y pedir si queremos cuidar el ambiente y la comunidad. Mire "*todas las intervenciones del programa tendrán un letrero donde aparecerá el número del Ministerio de Medio Ambiente. Eso es obligatorio*", si tienen dudas o hay cualquier problema ustedes están en todo el derecho de ir allá y exigir que le den informaciones. Acuérdese que estos proyectos operan dentro de un marco legal muy estricto, además de los requisitos que ponen los organismos internacionales de que haya transparencia. Siempre podrán ustedes ir a medio ambiente si algo no va bien, o también podrán comunicarse con nosotros.

F. Resultados

Al no haber otras preguntas, se pasó a aplicar un formulario para que los presentes indicaran -de manera simple- como se sienten con la consulta y con las explicaciones que han recibido sobre el proyecto. Acto seguido, y como no hubo más cuestionamientos, los consultores preguntaron al grupo ellos estaban a favor del proyecto, estos dijeron que sí.

No habiendo más puntos se dio por cerrada la reunión y se dio las gracias a los presentes por asistir y participar, y se les motivó a que indicaran a otros que no pudieron venir que pueden enviarnos sus preguntas por correo electrónico o por *WhatsApp*. Siempre que sea posible, también estamos dispuestos a recibirlos en nuestras oficinas si quieren ir.

En todo caso, se dio garantías que sus preguntas e inquietudes serán bien recibidas, escuchadas atenta y respetuosamente, y serán debidamente integradas al Estudio Ambiental, así como a la operación y gestión del mismo. Ese quedó como un compromiso.

G. Reflexiones

Las directrices para la realización de las consultas públicas, implementadas por el Ministerio de Medio Ambiente, han resultado sumamente eficaces para ordenar y conducir los procesos de participación social del proyecto "ClimaComunidad". Este instrumento, nos ayuda a cumplir con los requerimientos de la Ley 64-00 y también ayuda a incrementar las buenas relaciones proyecto-comunidad. Sería una innovación que el Ministerio tenga un canal de *Youtube* donde se puedan subir los videos de las consultas públicas realicen.

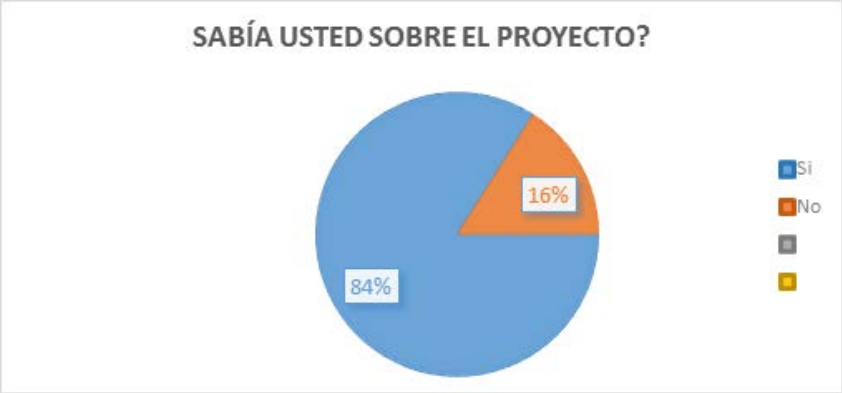
H. Adjuntos:

Resultados del Formulario

A efectos de conocer si la comunidad cercana estaba debidamente enterada del programa, sus beneficios y potenciales impactos, se aplicó a los presentes un formulario. Con este instrumento se recogió la opinión de encuestados relevantes (comunitarios, ciudadanos, empresarios, transportistas, policías y militares de la zona), y luego se sistematizó en forma de gráficos de pastel.

1. ¿Sabía usted que se hará un proyecto de cambio climático en San Cristóbal?

Se refiere a que si las personas tenían conocimiento de que en ese lugar se va implementar el programa. El 84% afirmó tener conocimiento, y el 16% restante dijo no lo sabía.



Pregunta 1: Nivel de Conocimiento sobre el Proyecto

Análisis: El alto porcentaje de personas que sabían sobre el programa, indica que los comentarios sobre la realización del proyecto fueron efectivos entre los comunitarios. Al igual su difusión.

2. ¿Está usted de acuerdo con que se realice este programa en esta zona?

Con esta pregunta, se pretende obtener la percepción de las personas sobre el programa con miras a evaluar los niveles de aceptación de las mismas y anticipar potenciales conflictos.

Pregunta 2: Nivel de Aceptación del Proyecto

Análisis: Apenas un 4% desaprueban el proyecto, alegando que "*se habla mucho de ayudar al medio ambiente y no se hace nada nada por la comunidad*" y que "*mejor deberían desarrollarse*

proyectos sociales como albergues, casas de oración, o guarderías infantiles o para madres solteras". Por otro lado, un 6% indicó que no saben o no les interesa el proyecto ya que ellos no le ven vinculación con su vida o la de su comunidad; y opinan que no deberían permitir que opinen gentes que no viven cerca del proyecto porque "*sólo se meten en eso por sacar ventaja y dinero*".

3. ¿Cómo se enteró del proyecto? ¿Sabe dónde hay información del mismo?

Se refiere a los mecanismos por los que se promueve el programa y/o se pone a disposición información sobre el mismo. En este tópico, se han trabajado varios mecanismos.

Pregunta3: Medios de Difusión del Proyecto

Análisis: De estos resultados, se desprende que el uso de letreros, y el hecho de que los comunitarios informaran a otros, garantizó la difusión del proyecto y el involucramiento de los consultados/interesados en el mismo. Esto aumentará más con la publicación luego en redes sociales.

4. ¿Cree usted que el proyecto traerá más empleos a la zona?

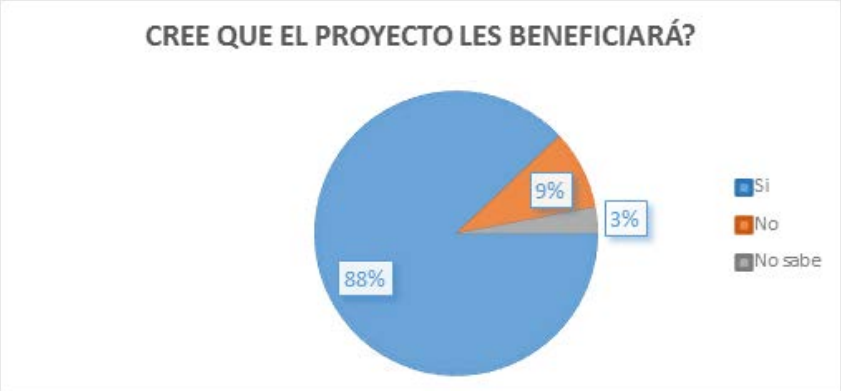
Se refiere a la capacidad del proyecto de mejorar las condiciones de vida de las personas de la comunidad, mediante la creación de empleos fijos, permanentes, de calidad y bien remunerados.

Pregunta 4: Percepción sobre el Potencial del Proyecto para Generar Empleo

Análisis: De estos resultados se desprende que para la comunidad -y para quienes hacen vida en la zona- el proyecto propiciará la creación de nuevos trabajos permanentes y formales.

5. ¿Cree usted que el proyecto beneficiará a la comunidad?

Esta pregunta se mantiene vinculada a la anterior, sin embargo, se ha explicado que los beneficios pueden ir más allá de la creación de empleos y del desarrollo económico.

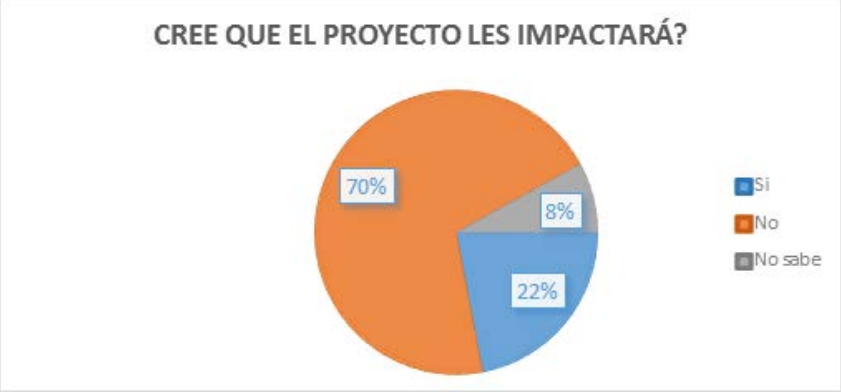


Pregunta 5: Percepción sobre los Beneficios del Proyecto hacia la Comunidad

Análisis: Los que han respondido negativamente se basan en que este tipo de proyectos no son para beneficiar a nadie salvo a los funcionarios y a los políticos, por lo que la comunidad no debe hacerse expectativas. Sugieren emplear a los comunitarios en los altos cargos del proyecto.

6. ¿Qué impactos cree usted que tendrá este proyecto?

Los consultados entienden que este tipo de proyectos siempre tienen impactos negativos. Se les explicó que cada impacto tendrá una medida de mitigación, reducción o compensación, y que estas medidas estarán contenidas en el Programa de Manejo y Adecuación Ambiental (PMAA). También se les aclaró que ellos pueden dar parte a las autoridades ambientales y jurídicas, si entienden que el proyecto les afecta, les daña o le vulnera sus derechos individuales o colectivos.



Pregunta 6: Percepción sobre los Impactos del Proyecto hacia la Comunidad

Análisis: Entre los impactos citados por las personas están el ruido y el polvo, las interrupciones del tránsito, no contratar mano de obra local, usar materiales traídos de la capital, no apoyar las actividades comunidad (recreativas o culturales, como las fiestas patronales).

Modelo de Invitación

BRIGHTLINE INSTITUTE, INC.

Res. IDNG 23-2012 | RNI 005739-2012 | RNC 430133582 |

Santo Domingo, D. N.
20 de noviembre del 2017

INVITACIÓN

Señor (a)
Persona / Institución
Dirección
Sus manos.-

Distinguido/a.

Por medio de la presente, tenemos a bien invitarle a la consulta pública del proyecto "*Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural*", el cual será ejecutado en comunidades rurales de la Provincia San Cristóbal. El proyecto consiste en la implementación de medidas y acciones para reducir la vulnerabilidad a los recursos hídricos y los medios de subsistencia ante el cambio climático.

Actualmente, este proyecto está en proceso de preparación de la propuesta completa, para obtener recursos del Fondo de Adaptación. Por esto, mucho agradeceríamos contar con su presencia o la de su institución. La actividad se realizará el día 11 de diciembre del 2017 a las 9:30 p.m., en el Centro Tecnológico Comunitario Villa Altagracia, ubicado en la Calle Padre Billini #169 Sector Pajarito, Villa Altagracia, Adjuntamos un croquis.

Gracias por su tiempo y por apoyarnos en esta jornada. La misma tiene por objetivo aumentar la participación social y la gobernanza ambiental de este proyecto y su relación con la comunidad. Por favor, confirme su asistencia o la de la persona que lo representará al número 829-943-3466 o al correo proyectos@brins.org.

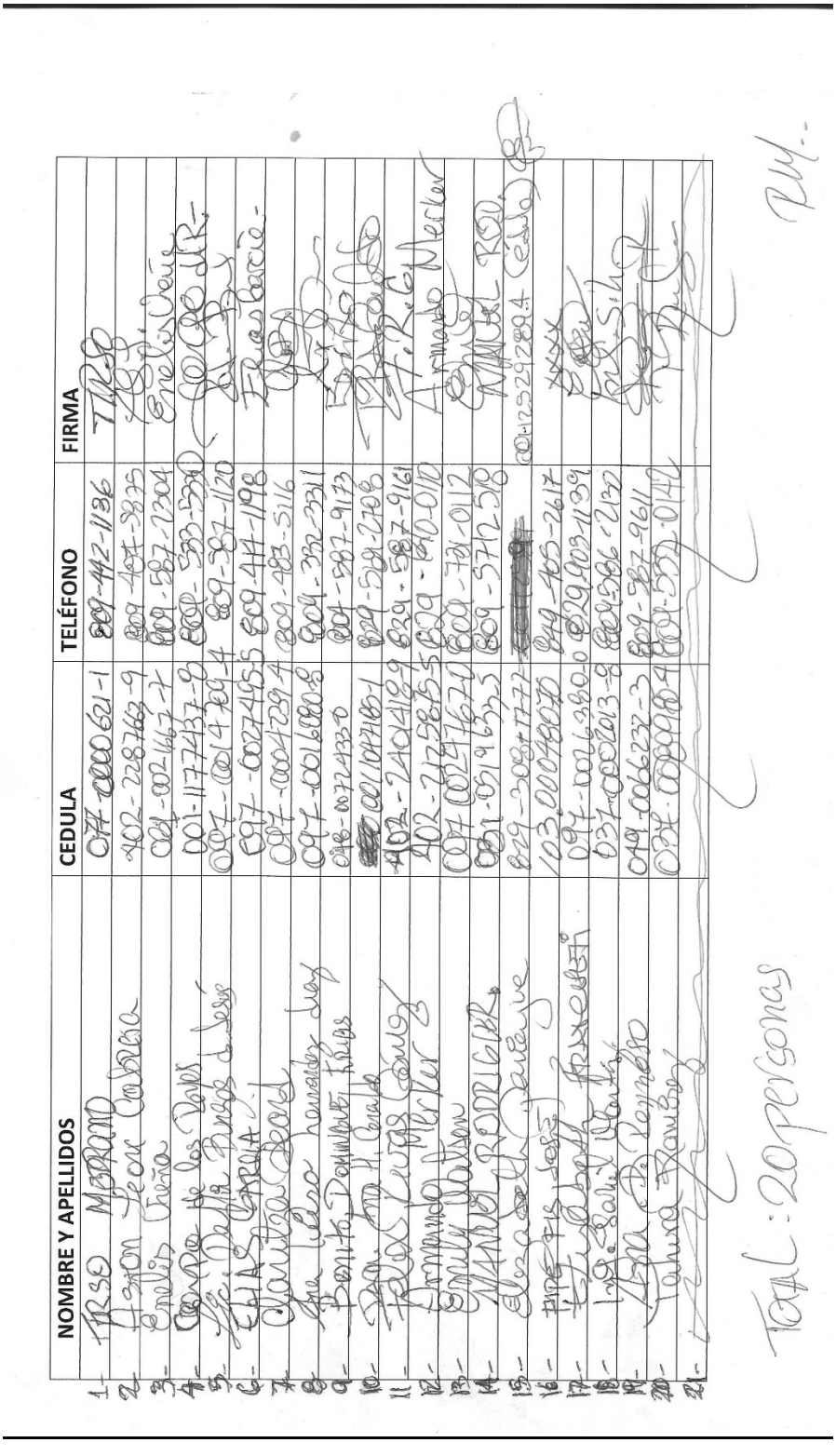
Sin más por el momento.

Lic. Robín Terrero
Gerente Administrativo

BRIGHTLINE Global Partnership, Inc.

Anacaona 10, Torre Mar Azul, DN P (829) 943 3466 E admin@brins.org W www.brins.org

Lista de los Presentes



	NOMBRE Y APELLIDOS	CEDULA	TELÉFONO	FIRMA
1-	[illegible]	047-0000621-1	809-442-1136	[illegible]
2-	[illegible]	402-2287629	809-407-8825	[illegible]
3-	[illegible]	001-0021467-2	809-587-1204	[illegible]
4-	[illegible]	001-1177437-9	809-533-5330	[illegible]
5-	[illegible]	047-0014769-4	809-587-1120	[illegible]
6-	[illegible]	097-0027465-5	809-447-1198	[illegible]
7-	[illegible]	097-0047394	809-483-5116	[illegible]
8-	[illegible]	097-0016808	809-332-3321	[illegible]
9-	[illegible]	048-0024330	809-587-9173	[illegible]
10-	[illegible]	001-1047180-7	829-509-2706	[illegible]
11-	[illegible]	402-2404129	829-587-9161	[illegible]
12-	[illegible]	402-2172635-5	829-840-0110	[illegible]
13-	[illegible]	097-0029762-1	809-731-0112	[illegible]
14-	[illegible]	001-0196325	809-572-5780	[illegible]
15-	[illegible]	029-3087772	[illegible]	[illegible]
16-	[illegible]	103-0004807-0	849-405-2617	[illegible]
17-	[illegible]	097-0024380-0	829-903-1859	[illegible]
18-	[illegible]	037-0003013-8	809-596-2130	[illegible]
19-	[illegible]	049-0062232-3	809-287-9611	[illegible]
20-	[illegible]	097-0020084	809-557-0142	[illegible]
21-	[illegible]			

TOTAL: 20 personas

	NOMBRE Y APELLIDOS	CEDULA	TELÉFONO	FIRMA
21	[illegible] Montes-Urbaéz	001-1451510-9	809 221-4660	[illegible]
22	Cesar [illegible]	402-2413472-9	809-651-9312	Cesar [illegible]
23	~~[illegible]~~	~~402~~		
24	Luis Dinson Kelas	402-2407994-3	809-222-1097	[illegible]
25	Mariana Rosario D.L.S.	097-0025920-4	809-966-1318	Mariana [illegible]
26	Jenny Guevara	001-1562870-6	809-531-1578	[illegible]
27	Pascual Silverio Monte	097-0026117-6	809-280-9167	Pascual Silverio

Total: 6 personas

Rey.

Memoria Fotográfica

Explicación de los Consultores (der.)

Intervención Sr. Pipe Fis (izq.)

Momento del Refrigerio (der.)

Anexo 6: Listado de Plantas Encontradas

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Angiosperma	Son las plantas que tienen su semilla envuelta en un recipiente llamado ovario.
Antropogénico	Algo que ha sido producto de la acción humana y que está relacionada con las modificaciones del ambiente natural.
Endémica	Cuando una especie es propia de un país o región.
Estípite	Tallo largo y no ramificado (como es el caso de las palmas).
Introducidas`	Son especies de plantas que no pudiéndose valer por sí mismas utilizan cualquier otro soporte para trepar.
in-situ	Que se determinó en el campo, en el mismo lugar del hecho.
Lianas	Son tallos sarmentados de los bejucos que trepan en los árboles, es sinónimo de trepadora.
Nativa	Especies de plantas que además de ser parte de nuestra flora, también se encuentran en la flora de otros países.
Naturalizada	Especies de plantas que no siendo oriunda de un país, medran en él y se propagan como si fuesen autóctonas.
Raro	Que tiene pocos individuos en la zona, o aquellas cuya área de distribución geográfica muy restringida.
Rastreras	Son plantas cuyo tallo crece apoyándose en el suelo.
Relicto	Son plantas de otras épocas, con muy poca representación en la flora actual.
Spp	Se refiere a que hay más de una especie del tipo de género.

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Taxonomía Estudio teórico de la clasificación de organismos teniendo en cuenta sus semejanzas y diferencias.

Forma Biológica (FV)

A = Árbol
Ar = Arbusto
H = Hierba
He = Hierba epifita
L = Liana o Bejuco
R = Rastrera
Et = Estípite

Status Biogeográfico (S)

N = Nativa
E = Endémica
Nat = Naturalizada
Ic = Introducida Cultivada
I = Introducida

Especies		**FV**	**S**
ACANTHACEAE			
Blechum pyramidale	Campeche	H	N
Ruellia tuberosa	Guaucí	H	N
Thunbergia fragrans	Velo de novia	L	N
AGAVACEAE			
Cordyline fruticosa	Cintica, Buena suerte	Ar	Ic
AMARANTHACEAE			
Achyranthes aspera	Rabo de gato	H	N
Amaranthus dubius	Bledo	H	N
Cyathula achyranthoides		H	N
ANACARDIACEAE			
Anacardium occidentale	Cajuil	A	Ic
Mangifera indica	Mango	A	Nat
Spondia cytherea	Ciruela	A	Ic
S. mombin	Jobo de puerco	A	N
S. purpurea	Ciruela	A	Ic
ANNONACEAE			
Annona muricata	Guanábana	A	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

A. reticulata	Mamón	A	N
Oxandra lanceolata	Yaya	A	N
Rollinia mucosa	Candongo, Anón	A	N
APIACEAE			
Eryngium foetidum	Cilantro del monte	H	Nat
Hydrocotyle hirsuta		H	N
APOCYNACEAE			
Allamanda cathartica	Flor de mantequilla	Ar	Ic
Mesechites angustifolia		L	N
Tabernaemontana citrifolia	Palo de leche	Ar	N
T. divaricata	Jazmín	Ar	Ic
ARACEAE			
Alocacia cucullata	Yautía	H	Ic
Anthurium gracilis		H	N
Caladium bicolor		H	Ic
Colocasia esculenta	Yautía	H	Ic
Dieffenbachia seguine	Mata puerco	H	N
Philodendron angustatum		L	N
P. locerum		L	N
Syngonium podophyllum	TraTra, Mano poderosa	L	N
ARALIACEAE			
Dendropanax arboreus	Lengua de vaca	A	N
Didymopanax morototoni	Sablito	A	N
Polyscias guilfoylei	Gallego	Ar	Ic
ARAUCARIACEAE			
Araucaria excelsa	Araucaria, 7 pisos	A	Ic
ARECACEAE			
Bactris plumeriana	Palma catey	Et	E
Chrysalidocarpus lutescens	Palma areca	Et	Ic
Cocos nucifera	Coco	Et	Ic
Roystonea hispaniolana	Palma real	Et	E
Veitchia merrillii	Palma manila	Et	Ic

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Caryota urens	Cola de pescado	Et	Ic
ARISTOLOCHIACEAE			
Aristolochia ringens	Patico	L	N
ASCLEPIADACEAE			
Asclepia nívea	Algodón de seda	H	N
ASTERACEAE			
Bidens cynapiifolia	Puntilla	H	N
Eleutheranthera ruderalis		H	N
Emilia fosbergii	Pincelito	H	N
E. Sonchifolia	Pincel	H	N
Enydra sessilis		H	N
Eupatorium odoratum	Rompezaragüey	Ar	N
Mikania cordifolia	Guaco	L	N
M. micrantha	Bejuco de finca	L	N
Parthenium hysterophorus	Escoba amarga	H	N
Pterocaulon alopecuroides	Lengua de buey	H	N
Salmea scandens	Baiguá	L	N
Synedrella nodiflora		H	N
Vernonia cinerea	Yerba morada	H	N
V. fruticosa	Gustavo de chivo	H	N
V. springeliana	Mata caballo	Ar	E
Wedelia trilobata	Yerba buena cimarro.	H	N
BIGNONIACEAE			
Macfadyena unguis-cati	Uña de gato	L	N
Spathodea campanulata	Amapola	A	N
BIXACEAE			
Bixa orellana	Bija	Ar	Nc
BOMBACACEAE			
Ochroma pyramidale	Lana	A	N
BORAGINACEAE			
Cordia globosa		Ar	N
C. mirabiloides		Ar	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

C. sulcata	Yagua	Ar	N
BROMELIACEAE			
Anana comosus	Piña	H	Ic
Tillandsia balbisiana	Tinajita	He	N
T. fasciculata	Tinajita	He	N
T. juncea	Tinajita	He	N
T. polystachya	Tinajita	H	N
T. setacea	Tinajita	He	N
T. usneoides	Guajaca	He	N
Vriesea tuerckheimii	Tinajita	He	N
BURSERACEAE			
Tetragastris balsamifera	Amacey	A	N
CACTACEAE			
Rhipsalis baccifera		He	E
CAESALPINIACEAE			
Bauhinia monandra	Huella de vaca	A	Ic
Chamaecrista nititan	Tamarindillo	H	N
Hymenaea courbaril	Algarrobo	A	N
Haematoxylon campechianum	Campeche	A	N
Mora abbottii	Cola	A	E
Senna occidentalis	Brusca	H	N
S. siamea	Casia amarilla	A	Ic
CARICACEAE			
Carica papaya	Lechoza	H	Ic
CASUARINACEAE			
Cassuarina equisetifolia	Casuarina	A	Ic
CRHYSOBALANACEAE			
Chrysobalanus icaco	Puerco gordo	Ar	N
Hirtella triandra	Cocuyo	A	N
CECROPIACEAE			
Cecropia schreberiana	Yagrumo	A	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

CLUSIACEAE			
Calophyllum calaba	Mara	A	N
Clusia rosea	Copey	A	N
Mammea americana	Mamey	A	N
COMBRETACEAE			
Buchenavia tetraphylla	Ciruelillo, Guaraguao	A	N
Combretum laxum	Bejuco de barraco	L	N
COMMELINACEAE			
Commelina elegans	Suelda consuelda	H	N
Tradescantia spathacea	Magueyito	H	Ic
CONNAGRACEAE			
Rourea surinamensis	Bejuco, Luis Gómez	L	N
CONVOLBULACEAE			
Ipomoea indica	Bejuco de batata	L	N
I. setifera		L	N
I. tiliacea	Bejuco de tabaco	L	N
Turbina corymbosa	Aguinaldo	L	N
COSTACEAE			
Costus spicatus		H	N
CUCURBITACEAE			
Cucurbita moschata	Auyama	R	Ic
Momordica charantia	Cundeamor	L	N
CYPERACEAE			
Cyperus ochraceus	Cortadera	H	N
C. luzulae	Coquille	H	N
C. odoratus		H	N
C. rotundus	Coquillo	H	N
Eleocharis interstincta	Trati-trati	H	N
Fimbristylis cymosa	Coquille	H	N
F. dichotoma	Coquillo	H	N
Rhynchospora colorata	Coquille	H	N
R. nervosa		H	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

R. elongata		H	N
Scleria lithosperma	Cortadera	H	N
S. scandens	Tibisí	H	N
DIOSCORIACEAE			
Dioscorea alata	Ñame	L	Ic
EUPHORBIACEAE			
Alchornea latifolia	Bija macho	A	N
Aleurites fordii	Javilla extranjera	A	Ic
Chamaesyce hypericifolia	Yerba lechera	H	N
Codiaeum variegatum	Crotón	Ar	Ic
Dalechampia scandens	Fogaraté	L	N
Drypetes lateriflora	Palo blanco	A	N
Euphorbia pulcherrima	Flor de pascua	Ar	Ic
Hura crepitans	Javilla	A	N
Manihot sculenta	Yuca	Ar	N
Sapium laurifolium	Daguilla	A	N
FABACEAE			
Alysicarpus vaginalis	Pela Guebo	H	N
Cajanus cajan	Guandúl	Ar	Ic
Centrosema virginianum	Divierte caminante	L	N
Clitoria pinnata		L	N
Calopogonium mucunoides	L	N	
C. galactyoides		L	N
Crotalaria falcata	Cajita	H	N
C. spectabilis	Cajita	H	N
Desmodium adscendens	Amor seco	H	N
D. barbatum	Amor seco	H	N
D. tortuosum	Amor seco	H	N
Gliricidia sepium	Piñón cubano	A	Nat
Lonchocarpus latifolius	Anón	A	N
Macroptilium lathyroides	Ajai	H	N
Mucuna urens	Ojo de buey	L	N
Pachyrhizus erosus	Auyey	L	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Rhynchosia minima	Frijolito	L	N
Ormosia krugii	Palo de peronia	A	N
Vigna luteola		L	N
FLACOURTIACEAE			
Casearia arbórea	Cascarita	Ar	N
C. guianensis	Cafecillo	A	N
C. sylvestris	Cafecillo	Ar	N
HELICORNIACEAE			
Heliconia caribaea	Plátano cimarrón	H	Ic
H. latispatha	Platanito	H	Ic
HIPPOCRATEACEAE			
Hippocratea volubilis	Jaquimey	L	N
IRIDACEAE			
Trimezia martinicensis		H	N
LAURACEAE			
Persea americana	Aguacate	A	Ic
LAMIACEAE			
Hyptis capitata		H	N
H. suaveolens		H	N
H. verticillata		H	N
H. pectinata		H	N
LAUREACEAE			
Ocotea coriaria	Cigua blanca	A	N
O. floribunda	Aguacatillo	A	N
O. globosa	Aguacatillo	A	N
O. leucoxylon	Cigua prieta	A	N
LOGANIACEAE			
Spigelia anthelmia	Yerba de lombriz	H	N
LYTHRACEAE			
Cuphea hyssopifolia	Yerba de la dicha	H	N
C. parsonsia	Mucha genta	H	NC
MALPIGHIACEAE			

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Byrsonima spicata	Maricao	A	N
Malpighia emarginata	Cereza	Ar	N
Stigmaphyllon emarginatum	Bejuco de manteca	L	N
MALVACEAE			
Hibiscus rosa-sinensis	Sangre de cristo	Ar	Ic
Sida acuta	Escoba	H	N
S. cordifolia	yerba buena	H	N
S. linearifolia	Escoba	H	N
S. rhombifolia	Escoba	H	N
S. urens	Escoba	H	N
Urena sinuata	Cadillo de perro	H	N
U. lobata	Cadillo de perro	H	N
MARICGRA VIACEAE			
Marcgravia brittoniana		Le	N
MELASTOMATACEAE			
Acisanthera quadrata		H	N
Clidemia hirta	Peluda	Ar	N
C. strigillosa	Peluda	Ar	N
C. umbellata	Peluda	Ar	N
Henriettea fascicularis	Petigrene	A	N
Miconia impetiolaris	Auquey	Ar	N
M. dodecandra		Ar	N
M. laevigata	Granadilto	Ar	N
M. mirabilis	Tres filos	Ar	N
M. prasina	Granadillo bobo	Ar	N
M. racemosa		Ar	N
Nepsera aquatica		H	N
Pterolepis glomerata		H	N
Tibouchina longifolia	Cadillo de arroyo	H	N
MELIACEAE			
Cedrela odorata	Cedro	A	N
Guarea guidonia	Cabirma	A	N
Trichilia hirta	Joboban	A	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

T. pallida	Palo amargo	A	N
MENISPERMACEAE			
Cissampelos pareira	Oreja de rat6n	L	N
MIMOSACEAE			
Acacia mangium	Cacia mangium	A	Ic
Anadenanthera peregrina	Tamarindo cimarrón	A	N
Entada gigas	Samo	L	N
Inga fagifolia	Jina extranjera	A	N
I. vera	Guama	H	N
Mimosa seratoria	Zarza	L	N
M. pudica	Moriviví	H	N
MORACEAE			
Artocarpus altilis	Pan de fruta	A	Ic
Ficus benjamina	Laurel	A	Ic
F. maxima	Higo	A	N
F. trigonata	Higo	A	N
Pseudolmedia spuria	Macao	A	N
MYRSINACEAE			
Myrsine coriacea	Palo santo	Ar	N
Wallenia laurifolia	Caimoní	Ar	N
MYRTACEAE			
Eugenia domingensis	Guázara	A	N
Eucalipthus sp	Eucalipto	A	Ic
Psidium guajava	Guayaba	Ar	N
Syzigium jambos	Pomo	A	Nar
NYCTAGYNACEAE			
Bougainvillea glabra	Trinitaria	Ar	Ic
Pisonia aculeata	Uña de gato	L	N
OLEACEAE			
Chionanthus domingensis	Lirio	A	N
ONAGRACEAE			
Ludwigia octovalvis	Yerba de jicotea	H	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

ORCHIDACEAE			
Epidendron	Orquídea	He	N
Oncidium variegatum	Angelita	He	N
OXALIDACEAE			
Oxalis barrelieri	Vinagrillo	H	N
PASSIFLORACEAE			
Passiflora edulis	Chinola	L	Ic
PINACEAE			
Pinus caribaea	Pino	A	Ic
PIPERACEAE			
Peperomia rotundifolia	Guayuyo	He	N
Piper aduncum `	Guayuyo	Ar	N
P. amalago	Guayuyo	Ar	N
P. cuspidatum	Guayuyo	Ar	N
P. jacquemontianum	Guayuyo	Ar	N
Pothomorphe peltata	Aniceto	Ar	N
POACEAE			
Andropogon bicornis		H	N
Bambusa vulgaris	Bambú	H	Nat
Brachiaria brizantha	Grama	H	N
B. decumbens	Pangola	H	Ic
Cynodon dactylon	Pelo de micci	H	N
C. nlenphuense	Yerba estrella	H	Ic
Digitaria ciliaris	Grama	H	N
D. insularis	Grama	H	N
Eleusine indica	Pata de gallina	H	N
Eragrostis amabilis		H	N
Hyparrhenia rufa	Jaragua	H	N
Ichnanthus pallens		H	N
Lasiacis divaricata	Carrizo	H	N
Olyra latifolia	Carrizo	H	N
Oplismenus hirtellus		H	N
Panicum maximum	Yerba de guinea	H	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Pennisetum purpureum	Napier	H	N
Saccharum officinarum	Caña de azúcar	H	Ic
Sporobolus tenuissimus	Pajón	H	N
POLYGALACEAE			
Seguridaca virgata	Marabeli	L	N
PORTULACACEAE			
Portulaca oleracea	Verdolaga	H	N
PROTEACEAE			
Grevillea robusta	Helecho	A	Ic
RHAMNACEAE			
Gouania polygama	Bejuco indio	L	N
RUBIACEAE			
Bertiera guinensis		Ar	N
Coffea arabica	Cafe	Ar	Ic
Diodia sarmentosa		H	N
Policourea crocea	Cafecillo	Ar	N
Psychotria domingensis	Cafetan	Ar	N
Spermacoce assurgens	Juana la blanca	H	N
Vangueria madagascariensis	Tamarindo extranjero	Ar	Ic
RUTACEAE			
Citrus aurantium	Naranaja agria	A	Ic
C.limetta	Limon dulce	Ar	Ic
C.limon	Limon agrio	Ar	Ic
C. reticulata	Mandarina	Ar	Ic
C. grandis	Toronja	A	Ic
Zanthoxylum martinicense	Pino de teta	A	N
SAPINDACEAE			
Allophylus cominia	Parida	A	N
Cupania americana	Guárana	A	N
Serjania polyphylla	Bejuco de costilla	L	N
SAPOTACEAE			

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Chrysophyllum argenteum	Caimitillo	A	N
C. oliviforme	Caimitillo	A	N
Pouteria sapota	Zapote	A	Ic
SCROPHULARIACEAE			
Capraria biflora	Feregosa	H	N
Scoparia dulcis	Escoba dulce	H	N
SIMAROUBACEAE			
Simarouba glauca	Juan primero	A	N
SMILACAEA			
Smilia domingensis	Bejuco chino	L	N
SOLANACEAE			
Physalis angulata	Tope-Tope	H	N
Solanum capsicoides	Berenjena cimarrona	H	N
S. torvum	Berenjena cimarrona	Ar	N
STAPHYLLACEAE			
Turpinia occidentalis	Violeta	A	N
STERCULIACEAE			
Guazuma tomentosa	Guazuma	A	N
G. ulmifolia	Guazuma	A	N
Melochia villosa		H	N
Theobroma cacao	Cacao	A	Ic
Waltheria indica	Tremolina	H	N
TILIACEAE			
Corchorus siliquosus	Escoba	H	N
Triumfetta bogotensis	Cadillo	H	N
T. semitriloba	Cadillo	H	N
ULMACEAE			
Trema micrantha	Memizo de paloma	A	N
URTICACEAE			
Pilea setigera	Yerba buena cimarro.	H	N
Urera baccifera	Pringamosa	Ar	N

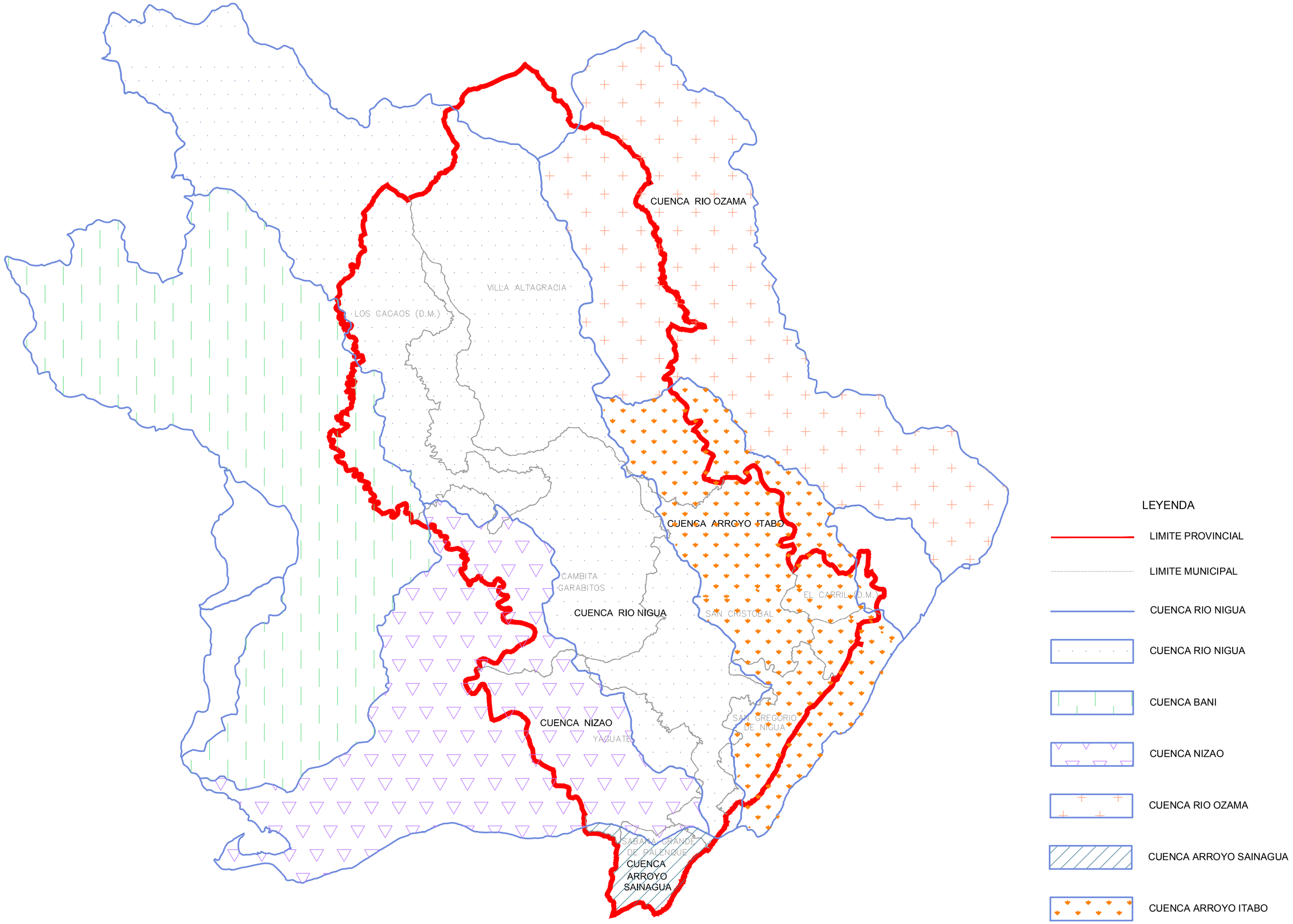
LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

VERBENACEAE			
Clerodendrum chinense	Azulejo	Ar	N
Gmelina arborea	Melina	A	Ic
Lantana camara	Dona sanita	Ar	N
Lippia alba	Orégano	Ar	Ne
L. micromera	Orégano	Ar	Ne
Priva lappulacea	Pega pollo	H	N
Stachytarpheta cayennensis	Verbena	H	N
S. jamaicensis	Verbena	H	N
VITACEAE			
Cissus trifoliata	Garito	L	N
C. verticillata	Bejuco caro	L	N
ZINGIBERACEAE			
Alpinia zerumbet	Boca de dragón	H	N
A.purpurata	Jengibre cimarrón	H	N
Renealmia jamaicensis	Jengibre cimarrón	H	N
HELECHOS			
Adiantum fragile		H	N
A. pyramidale		H	N
Anemia adiantifolia		H	N
Blechnum occidentale		Ha	N
Cnemidaria horrida		H	N
Cyathea arborea	Helecho macho	H	N
Dicranopteris flexuosa	Helecho	H	N
Diplazium centrípeta	Helecho	H	N
Nephrolepis multiflora	Camarón	H	N
N. biserrata		H	N
Niphidium crassifolium		He	N
Odontosoria aculeata	Zarza	H	N
Pityrogramma calomelonos		H	N
Polypodium polypodioides		He	N

LISTADO DE PLANTAS ENCONTRADAS DURANTE LAS VISITAS

Pteridium aquilinum	H	N
Pteris longifolia	H	N
Tectaria heracleifolia	H	N
T. incisa	H	N
Thelypteris dentata	H	N
T. serrata	H	N

Anexo 7: Mapa de Cuencas Hidrográficas



PROYECTISTA:

Brightline Institute, Inc.

PROYECTO:

Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural

#ClimaComunidad - @ClimaSanCristobal - @iddiorg

PROMOTOR:

Instituto Dominicano de Desarrollo Integral (IDDI)

DISEÑO:
ARQ. BETANIA BERIGUETE
CODIA # 28201
FIRMA

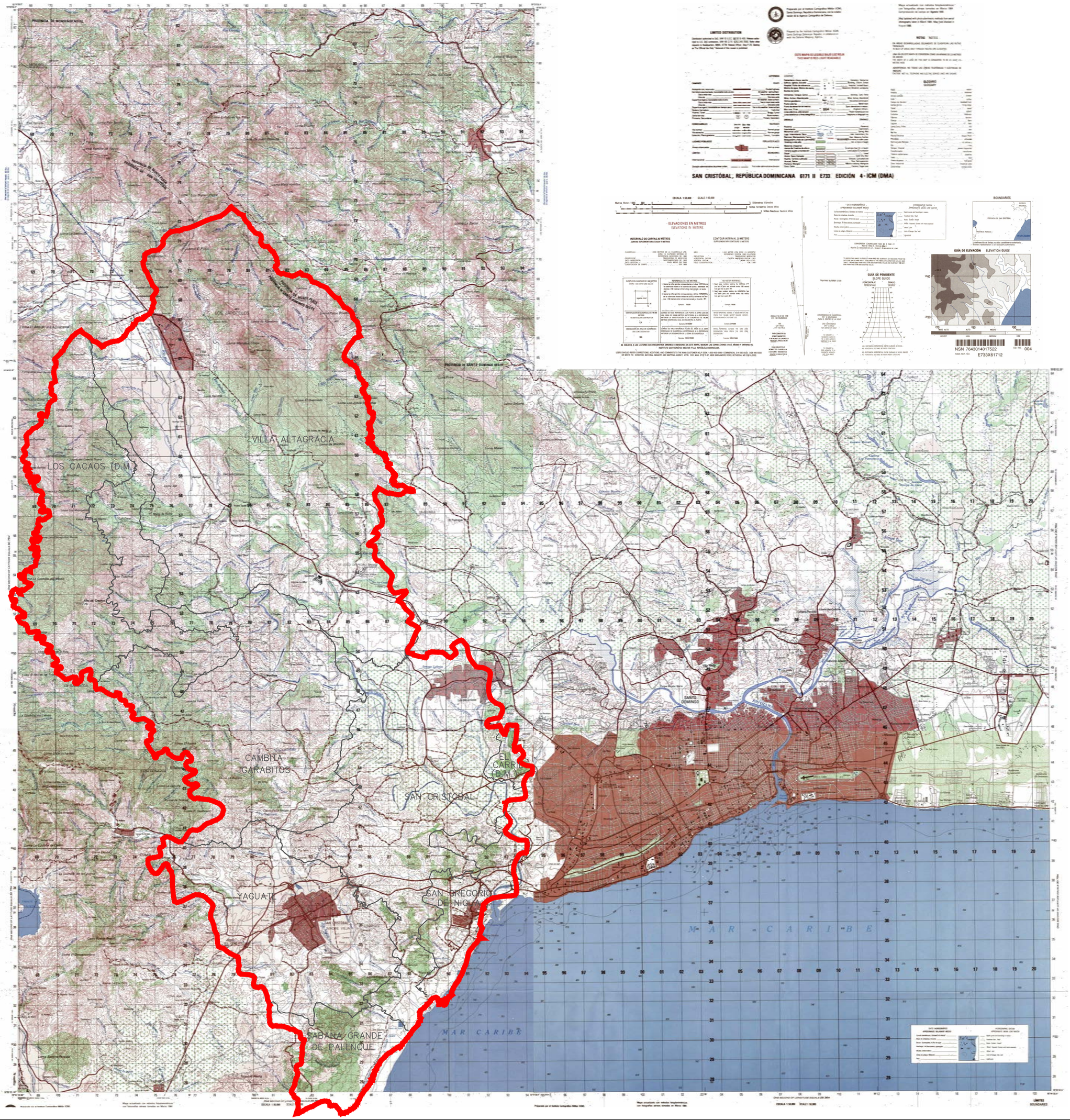
CONSULTORES

DIRECTOR:	FORESTAL:	HIDRAULICO:	SANITARIO:
FIRMA	FIRMA	FIRMA	FIRMA
ING. RAFAEL BERIGUETE	ING. JOSE A. NUÑEZ	ING. ELIZABETH PANIAGUA	ING. RAFAEL MIESES
CODIA # 21870	CODIA #	CODIA # 20901	CODIA #

TITULO DE LA HOJA:

CUENCAS HIDROGRAFICAS

ESCALA	CODIGO	FECHA	SERIE	
1:150	MC: BL-#ClimaComunidad_004	OCTUBRE/2017	A	4 / 6



PROYECTISTA:

Brightline Institute, Inc.

PROYECTO:

Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural

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PROMOTOR:

Instituto Dominicano de Desarrollo Integral (IDDI)

DISEÑO:
ARQ. BETANIA BERIGUETE
CODIA # 28201
FIRMA

CONSULTORES

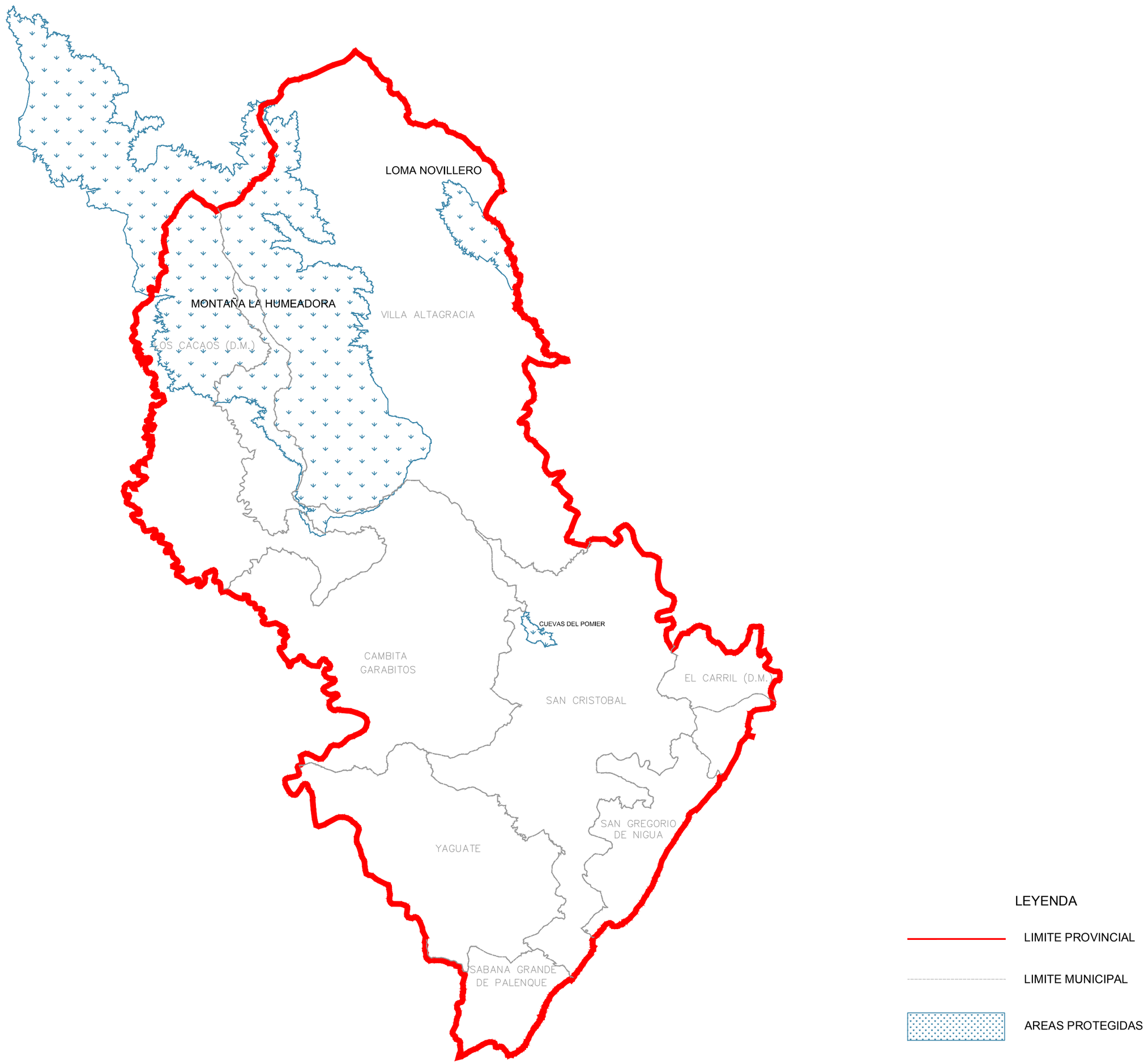
DIRECTOR:	FORESTAL:	HIDRAULICO:	SANITARIO:
FIRMA	FIRMA	FIRMA	FIRMA
ING. RAFAEL BERIGUETE	ING. JOSE A. NUÑEZ	ING. ELIZABETH PANIAGUA	ING. RAFAEL MIESES
CODIA # 21870	CODIA #2	CODIA # 20901	CODIA #2

TÍTULO DE LA HOJA:

CARTA TOPOGRAFICA

ESCALA	CODIGO	FECHA	SERIE	
1:50,000	MC: BL-#ClimaComunidad_003	OCTUBRE/2017	A	3 / 6

Anexo 8: Coincidencia con Áreas Protegidas



LEYENDA

- LIMITE PROVINCIAL
- LIMITE MUNICIPAL
- AREAS PROTEGIDAS

PROYECTISTA:

Brightline Institute, Inc.

PROYECTO:

Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural

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PROMOTOR:

Instituto Dominicano de Desarrollo Integral (IDDI)

DISEÑO:
ARQ. BETANIA BERIGUETE
CODIA # 28201
FIRMA

CONSULTORES

DIRECTOR:	FORESTAL:	HIDRAULICO:	SANITARIO:
FIRMA	FIRMA	FIRMA	FIRMA
ING. RAFAEL BERIGUETE	ING. JOSE A. NUÑEZ	ING. ELIZABETH PANIAGUA	ING. RAFAEL MIESES
CODIA # 21870	CODIA #2	CODIA # 20901	CODIA #2

TÍTULO DE LA HOJA:

AREAS PROTEGIDAS DENTRO DEL PROGRAMA

ESCALA	CODIGO	FECHA	SERIE	
1:150	MC: BL-#ClimaComunidad_005	OCTUBRE/2017	A	5/6

Anexo 9: Mapa de Uso del Suelo

Anexo 10: Política Social y Ambiental del Fondo de Adaptación

18 March 2016

Adaptation Fund Board

ENVIRONMENTAL AND SOCIAL POLICY

(APPROVED IN NOVEMBER 2013; REVISED IN MARCH 2016)

ANNEX 3: ENVIRONMENTAL AND SOCIAL POLICY

Background and Introduction

1. This document outlines an environmental and social policy for the Adaptation Fund (the Fund). The policy is intended to ensure that in furthering the Fund's mission of addressing the adverse impacts of and risks posed by climate change, projects and programmes supported by the Fund do not result in unnecessary environmental and social harms. The policy is intended to build on the Fund's existing policies, operating procedures, and project cycle.

2. The environmental and social policy will bring the Fund's practices generally into line with the practice of other leading financing institutions active in environment and development financing. Over the last twenty years, international financial and development institutions have increasingly adopted environmental and social safeguard policies to enhance sustainable development benefits and avoid unnecessary harm to the environment and affected communities. These safeguard policies allow the institutions to identify and manage the environmental and social risks of their activities, by assessing potential environmental and social harms and then by identifying and implementing steps to avoid, minimize, or mitigate those harms.

3. Among the finance and development institutions that have adopted environmental and social policies are the following:

- the World Bank (i.e. the International Bank for Reconstruction and Development and International Development Agency);[1]
- regional and subregional development banks, including the European Bank for Reconstruction and Development,[2] the Inter-American Development Bank,[3] the Asian Development Bank,[4] the African Development Bank,[5] the Caribbean Development Bank,[6] and the Black Sea Trade and Development Bank;[7]
- the International Finance Corporation[8] and Multilateral Investment Guarantee Agency;[9]

[1] World Bank, Safeguard Policies, http://go.worldbank.org/BA5ILYC6B0 (the World Bank is currently undergoing the first phase of a multi-year process to review and update of its environmental and social safeguard policies).
[2] European Bank for Reconstruction and Development, Environmental and Social Policy 2008, http://www.ebrd.com/pages/research/publications/policies/environmental.shtml (EBRD is currently updating and receiving comments on its Environmental and Social Policy).
[3] Inter-American Development Bank, Environment and Safeguards Compliance Policy, http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=665902 (this website links to information about IADB institutional reforms to improve the environmental and social safeguard policies: http://www.iadb.org/en/insitutional-reforms/better-environmental-and-social-safeguards,1830.html).
[4] Asian Development Bank, Safeguard Policy Statement, http://www.adb.org/site/safeguards/policy-statement.
[5] African Development Bank, Environmental and Social Safeguards Policies and Procedures, http://www.afdb.org/en/documents/project-operations/environmental-and-social-safeguards-policies-and-procedures/ (the African Development Bank has just completed its Consultations on an Integrated Safeguards System, http://www.afdb.org/en/consultations/closed-consultations/afdbs-integrated-safeguards-system/ and is expected to release a new policy soon).
[6] Caribbean Development Bank Policies and Strategies, http://www.caribank.org/about-cdb/bankpolicies-strategies (the CDB has a gender equality and information policy and its environmental policy is forthcoming).
[7] Black Sea Trade & Development Bank, Environment Policy, http://www.bstdb.org/about-us/key-documents/policy-documents/Environmental_policy.pdf
[8] International Finance Corporation, Performance Standards on Environmental and Social Sustainability, http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_pps.
[9] Multilateral Investment Guarantee Agency, Environmental and Social Safeguards, http://www.miga.org/projects/index.cfm?stid=1822

- the Global Environment Facility;[10]
- the United Nations Development Programme;[11]
- most export credit and insurance agencies;[12]
- some bilateral development agencies;[13] and
- many leading private commercial banks.[14]

4. The prevalence of environmental and social policies at international finance and development institutions reflects a broad consensus among governments, development economists, civil society, and other stakeholders that such policies are critical to achieving positive sustainable development outcomes and avoiding any unreasonable harm. Many countries, both donor and recipient countries, have also adopted domestic laws that are similar to many of these international environmental and social policies.

5. The environmental and social policy set forth below is designed to be integrated with the Fund's existing policies, practices, and project cycle, although some issues will have to be addressed further to operationalize the policy. The environmental and social policy is attached as Annex 3 to and incorporated into the current Operational Policies and Guidelines for Parties to access resources from the Adaptation Fund (OPG).

6. The policy would not shift the current relative roles and responsibilities between the Adaptation Fund Board (the Board), implementing entities, and executing entities. Implementing entities will continue to be responsible for risk management associated with the projects and programmes, but the risk will now be explicitly understood to include environmental and social risks presented by the proposed projects and programmes. The future accreditation or re-accreditation of implementing entities may need to reflect their capacity and commitment to address environmental and social risks. Many of the multilateral implementing entities already have environmental and social policies and management systems that will meet the standards of the Fund. Some of the national and regional implementing entities may also have this capacity and commitment, but for others there may be a need for capacity building to manage environmental and social risks.

[10] Global Environment Facility, GEF Policies on Environmental and Social Safeguard Standards and Gender Mainstreaming, http://www.thegef.org/gef/sites/thegef.org/files/documents/C.40.10_GEF_Policies_on_Safeguards_and_Gender.April_26_2011.pdf.

[11] United Nations Development Programme, Guidance Note: Environmental and Social Screening Procedure for UNDP Projects (March 19, 2012), https://info.undp.org/global/.../ESSP_Guidance_19Mar12_English.docx

[12] OECD, Recommendation of the Council on Common Approaches for Officially Supported Export Credits and Environmental and Social Due Diligence (The "Common Approaches"), http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=TAD/ECG%282012%295&doclanguage=en.

[13] See, e.g., Japan International Cooperation Agency, http://www.jica.go.jp/english/our_work/social_environmental/guideline/pdf/guideline100326.pdf; UK Department for International Development, Guide to Environmental Screening, http://www.eldis.org/vfile/upload/1/document/0708/DOC12943.pdf;

[14] Equator Principles, http://www.equator-principles.com/index.php/members-reporting. Several of the Equator Principle member banks are located in developing countries, including Absa Bank Limited in South Africa; Access Bank Plc in Nigeria; Arab African International Bank in Egypt; Banco Bradesco S.A., Banco Pine S.A., and Banco do Brasil S.A. in Brazil; Banco de Crédito (BCP) in Peru; Banco de Galicia y Buenos Aires S.A. in Argentina; Banco de la República Oriental del Uruguay in Uruguay; Bancolombia S.A. in Colombia; Ecobank Transnational Incorporated in Togo; IDFC Limited in India; and Industrial Bank Co., Ltd. in China; among others.

7. The requirements to assess and manage environmental and social risks by the implementing entity will be integrated into existing requirements for risk assessment and management. The initial screening for environmental and social risks can be included in the project/programme proposal document. The requirements for effective consultation are consistent with the Fund's current requirements for consultative processes in the development of projects/programmes with "particular reference to vulnerable groups, including gender considerations."[15]

8. The policy requires that all projects/programmes be screened for their environmental and social impacts, that those impacts be identified, and that the proposed project/programme be categorized according to its potential environmental and social impacts. Projects/ programmes likely to have significant adverse environmental or social impacts that are for example diverse, widespread, and irreversible should be categorized as Category A. Projects/programmes with potential adverse impacts that are less adverse than Category A projects/programmes, because for example they are fewer in number, smaller in scale, less widespread, reversible or easily mitigated should be categorized as Category B. Those projects/programmes with no adverse environmental or social impacts should be categorized as Category C. Regardless in which category a specific project/programme is screened, all environmental and social risks shall be adequately identified and assessed by the implementing entity in an open and transparent manner with appropriate consultation. The policy is aimed at allowing for a variety of approaches. Implementing entities that use a different but functionally equivalent system of categorization can continue to use that system and still meet the requirements of the policy.

9. The scope of the environmental and social assessment shall be commensurate with the scope and severity of potential risks. If an environmental and social assessment is required, the assessment should assess all potential environmental and social risks and include a proposed risk management plan. The plan should typically be included with the project/programme document submitted for approval. In some Category B projects/programmes where the proposed activities requiring such assessment represent a minor part of the project, and when the assessment and/or management plan cannot be completed in time or where mitigation measures extend into project/programme implementation, the Board can approve the project/programme subject to assurances included in the agreement signed between the Board and the implementing entity that any environmental and social risks will be adequately and timely addressed through a management plan or changes in project/programme design. The existing system of annual project/programme performance reports and the mid-term and terminal evaluation reports can be modified to track any required environmental and social risk management plan or changes in project/programme design. Implementing entities shall screen compliance with this policy on a project-by-project basis.

[15] Adaptation Fund, OPG, "Instructions for Project or Programme Funding for Adaptation Fund," part II (H).

Environmental and Social Policy Statement

A. General Environmental and Social Commitment

10. Environmental and social policies are fundamental to ensuring that the Fund does not support projects/programmes that unnecessarily harm the environment, public health or vulnerable communities. As part of the implementing entities' responsibilities for the project/programme, all implementing entities shall (i) have an environmental and social management system that ensures environmental and social risks are identified and assessed at the earliest possible stage of project/programme design, (ii) adopt measures to avoid or where avoidance is impossible to minimize or mitigate those risks during implementation, and (iii) monitor and report on the status of those measures during and at the end of implementation. There shall be adequate opportunities for the informed participation of all stakeholders in the formulation and implementation of projects/programmes supported by the Fund.

B. Environmental and Social Principles

11. All projects/programmes supported by the Fund shall be designed and implemented to meet the following environmental and social principles, although it is recognized that depending on the nature and scale of a project/programme all of the principles may not be relevant to every project/programme.

Compliance with the Law

12. Projects/programmes supported by the Fund shall be in compliance with all applicable domestic and international law.

Access and Equity

13. Projects/programmes supported by the Fund shall provide fair and equitable access to benefits in a manner that is inclusive and does not impede access to basic health services, clean water and sanitation, energy, education, housing, safe and decent working conditions, and land rights. Projects/programmes should not exacerbate existing inequities, particularly with respect to marginalized or vulnerable groups.

Marginalized and Vulnerable Groups

14. Projects/programmes supported by the Fund shall avoid imposing any disproportionate adverse impacts on marginalized and vulnerable groups including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS. In screening any proposed project/programme, the implementing entities shall assess and consider particular impacts on marginalized and vulnerable groups.

Human Rights

15. Projects/programmes supported by the Fund shall respect and where applicable promote international human rights.

Gender Equality and Women's Empowerment

16. Projects/programmes supported by the Fund shall be designed and implemented in such a way that both women and men (a) have equal opportunities to participate as per the Fund gender policy (refer to Annex 4 for details); (b) receive comparable social and economic benefits; (b) receive comparable social and economic benefits; and (c) do not suffer disproportionate adverse effects during the development process.

Core Labour Rights

17. Projects/programmes supported by the Fund shall meet the core labour standards as identified by the International Labor Organization.

Indigenous Peoples

18. The Fund shall not support projects/programmes that are inconsistent with the rights and responsibilities set forth in the UN Declaration on the Rights of Indigenous Peoples and other applicable international instruments relating to indigenous peoples.

Involuntary Resettlement

19. Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids or minimizes the need for involuntary resettlement. When limited involuntary resettlement is unavoidable, due process should be observed so that displaced persons shall be informed of their rights, consulted on their options, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.

Protection of Natural Habitats

20. The Fund shall not support projects/programmes that would involve unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.

Conservation of Biological Diversity

21. Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids any significant or unjustified reduction or loss of biological diversity or the introduction of known invasive species.

Climate Change

22. Projects/programmes supported by the Fund shall not result in any significant or unjustified increase in greenhouse gas emissions or other drivers of climate change.

Pollution Prevention and Resource Efficiency

23. Projects/programmes supported by the Fund shall be designed and implemented in a way that meets applicable international standards for maximizing energy efficiency and minimizing material resource use, the production of wastes, and the release of pollutants.

Public Health

24. Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids potentially significant negative impacts on public health.

Physical and Cultural Heritage

25. Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects/programmes should also not permanently interfere with existing access and use of such physical and cultural resources.

Lands and Soil Conservation

26. Projects/programmes supported by the Fund shall be designed and implemented in a way that promotes soil conservation and avoids degradation or conversion of productive lands or land that provides valuable ecosystem services.

C. Environmental and Social Management System

27. The implementing entities' capacity and commitment to reducing environmental and social risks will be assessed through the accreditation process. The implementing entities' risk management systems shall include the commitment and capacity to assess and respond to the environmental and social risks of projects/programmes supported by the Fund in light of this environmental and social policy. The implementing entities shall be responsible for screening all projects/programmes to determine the extent to which they present environmental or social risks, including all risks associated with the Fund's environmental and social principles identified above. Implementing entities proposing projects/ programmes that present environmental and social risks shall ensure that the environmental and social impacts of such projects/programmes are thoroughly assessed; that measures are identified for avoiding, reducing or mitigating all environmental and social impacts; and that the implementation of such measures is monitored and reported on through the life of the project/programme. The environmental and social risk management system shall be commensurate in scope and ambition to the potential scope and severity of environmental and social risks inherent in the project/programme design.

D. Environmental and Social Policy Delivery Process

Screening of Environmental and Social Risks by the Implementing Entity

28. All proposed projects/programmes shall be screened by the implementing entities to determine their potential to cause environmental or social harm. The screening process shall seek to identify potential environmental and social impacts and risks, taking into consideration the Fund's environmental and social principles outlined above. The screening process shall consider all potential direct, indirect, transboundary, and cumulative impacts in the project's/programme's area of influence that could result from the proposed project/programme. All proposed projects/programmes shall be categorized according to the scale, nature and severity of their potential environmental and social impacts. Projects/programmes likely to have significant adverse environmental or social impacts that are for example diverse, widespread, or irreversible should be categorized as Category A projects/programmes. Projects/programmes with potential adverse impacts that are less adverse than Category A projects/programmes, because for example they are fewer in number, smaller in scale, less widespread, reversible or easily mitigated should be categorized as Category B. Those projects/programmes with no adverse environmental or social impacts should be categorized as Category C.

29. The screening will determine the extent to which the project/programme requires further environmental and social assessment, mitigation, and management. The results of the environmental screening shall be included in the project/programme proposal initially submitted by the implementing entity to the Adaptation Fund Board secretariat (the secretariat). If during the project/programme review process the Board or secretariat determines that further information on the environmental and social assessment, mitigation, and management of risks is required, the implementing entities can be asked to provide it. If appropriate, this will be reflected in the agreement between the Board and the implementing entity. Regardless of the outcome of the screening procedure, all proposed projects/programmes shall comply with the Fund's environmental and social principles and applicable national and local laws and regulations.

Environmental and Social Assessment

30. For all projects/programmes that have the potential to cause environmental or social harm (i.e. all Category A and B projects/programmes), the implementing entity shall prepare an environmental and social assessment that identifies any environmental or social risks, including any potential risks associated with the Fund's environmental and social principles set forth above. The assessment shall (i) consider all potential direct, indirect, transboundary, and cumulative impacts and risks that could result from the proposed project/programme; (ii) assess alternatives to the project/programme; and (iii) assess possible measures to avoid, minimize, or mitigate environmental and social risks of the proposed project/programme. As a general rule, the environmental and social assessment shall be completed before the project/programme proposal submission to the Adaptation Fund. In some Category B projects/programmes where the proposed activities requiring such assessment represent a minor part of the project, and when inclusion in the proposal is not feasible, a timeline for completing the environmental and social assessment before construction begins shall be incorporated in the agreement between the Board and the implementing entity following the project/programme approval, and reported through the

annual project/programme performance report. A copy of the environmental and social assessment shall be provided to the secretariat as soon as the assessment is completed. Prior to submitting the environmental and social assessment to the Board, the secretariat may require further information from the implementing entity on the environmental and social assessment, mitigation, and management of risks, if deemed necessary.

Environmental and Social Management Plan

31. Where the environmental and social assessment identifies environmental or social risks, the assessment shall be accompanied by an environmental and social management plan that identifies those measures necessary to avoid, minimize, or mitigate the potential environmental and social risks. A commitment by the implementing entity to implement the management plan shall be a condition of the project/programme approval and reflected in the monitoring and reporting plan for that project/programme.

Monitoring, Reporting, and Evaluation

32. Implementing entities' monitoring and evaluation of projects/programmes supported by the Fund shall address all environmental and social risks identified by the implementing entity during project/programme assessment, design, and implementation. The implementing entities' annual project/programme performance reports shall include a section on the status of implementation of any environmental and social management plan, including those measures required to avoid, minimize, or mitigate environmental and social risks. The reports shall also include, if necessary, a description of any corrective actions that are deemed necessary. The mid-term and terminal evaluation reports shall also include an evaluation of the project/programme performance with respect to environmental and social risks.

Public Disclosure and Consultation

33. Implementing entities shall identify stakeholders and involve them as early as possible in planning any project/programme supported by the Fund. The results of the environmental and social screening and a draft environmental and social assessment, including any proposed management plan, shall be made available for public consultations that are timely, effective, inclusive, and held free of coercion and in an appropriate way for communities that are directly affected by the proposed project/programme. The secretariat will publicly disclose the final environmental and social assessment through the Fund's website as soon as it is received. The implementing entity is responsible for disclosing the final environmental and social assessment to project-affected people and other stakeholders. Project/programme performance reports including the status on implementation of environmental and social measures shall be publicly disclosed. Any significant proposed changes in the project/programme during implementation shall be made available for effective and timely public consultation with directly affected communities.

Grievance Mechanism

34. The implementing entities shall identify a grievance mechanism that provides people affected by projects/programmes supported by the Fund with an accessible, transparent, fair and effective process for receiving and addressing their complaints about environmental or social harms caused by any such project/programme. The mechanism can be pre-existing, national, local, or institution- or project-specific. Complaints regarding projects/programmes supported by the Fund can also be filed with the secretariat at the following address:

Adaptation Fund Board secretariat
Mail stop: MSN P-4-400
1818 H Street NW
Washington DC
20433 USA
Tel: 001-202-478-7347
afbsec@adaptation-fund.org

35. The secretariat will respond promptly to all such complaints. Where appropriate, the secretariat will refer complainants to a grievance mechanism identified by the implementing entity as the primary place for addressing complaints.

@AdaptationFund
Project Proposal Development

Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme

#ClimaSanCristobal

Términos de Referencia:
Comité de Dirección (Steering Committee)

El presente documento incluye un formato y una guía para el desarrollo de los términos de referencia para el Comité de Dirección. Los documentos incluyen algunos formatos adicionales para facilitar su utilización de manera habitual, una vez que el comité sea totalmente operacional.

Elaborado por:

Brightline Institute, Inc.
proyectos@brins.org

Encargado por:

Instituto Dominicano de Desarrollo Integral (IDDI)

Fecha: 30 de abril del 2017

Términos de Referencia

1 ¡Importante!

a. Estos términos de referencia se refieren única y exclusivamente al proyecto *Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural* ("ClimaComunidad"), y atañen solamente a las actividades que realicen en conjunto las instituciones adheridas a ellos.

b. Como norma general, las instituciones adheridas a estos términos de referencia, no interferirán en las actividades existentes de las otras organizaciones signatarias de los mismos, y no duplicarán el trabajo ya realizado por ellas en el marco de su mandato respecto al proyecto.

c. Las instituciones signatarias de estos términos de referencia, y en especial las instituciones del gobierno, respetarán las funciones y las actividades realizadas por el IDDI, en particular en lo relativo a su rol de Entidad Nacional Implementadora del Proyecto y las responsabilidades y compromisos que esto representa ante el Fondo de Adaptación y los beneficiarios del mismo.

d. Los aspectos esenciales mencionados en estos términos de referencia no son limitativos, se podrán realizar otros acuerdos en el futuro, que podrían modificar parcial o totalmente según lo acuerden las instituciones signatarias de los mismos; siempre en beneficio de la eficiencia, la equidad, la inclusión, y el bienestar general de las comunidades beneficiarias del proyecto.

e. Como norma de funcionamiento general, la toma de decisiones se realizará por consenso. No obstante, se establece que el IDDI tendrá poder de veto de las decisiones del comité, en caso que estas entren en conflicto o sean contrarias a su posición ante el Fondo de Adaptación.

f. Se da por sentado que las instituciones no adheridas a estos términos de referencia (incluyendo las modificaciones que puedan sufrir en el futuro) se excluyen automáticamente de los mecanismos legítimos de toma de decisiones estratégicas del proyecto.

CONTROL RB: 30.abr.2017

2 Antecedentes

El Fondo de Adaptación fue establecido con el objetivo de financiar programas y proyectos de adaptación en países en desarrollo altamente vulnerables a los efectos adversos del cambio climático, y que fuesen signatarios del Protocolo de Kioto. El Fondo, cuenta con la modalidad de acceso directo a recursos, lo que permite que los países receptores tengan acceso a los fondos a través de las Entidades Implementadoras. Esta modalidad busca garantizar que los proyectos se hagan según las necesidades y prioridades definidas por los propios países.

En la 29ª reunión de la Junta Ejecutiva del Fondo de Adaptación (EB por sus siglas en inglés), celebrada en Bonn, Alemania, del 16 al 17 de marzo del 2017, se aprobó la nota conceptual del proyecto "***Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana - Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural***". Este proyecto será implementado por el Instituto Dominicano de Desarrollo Integral (IDDI), con la colaboración del Ministerio de Medio Ambiente y Recursos Naturales (MIMARENA), el Instituto Nacional de Agua Potable y Alcantarillados (INAPA), el Instituto Nacional de Recursos Hidráulicos (INDRHI), otras organizaciones locales y comunitarias, academias, y el sector privado organizado.

El objetivo del Proyecto es aumentar la resiliencia y la capacidad adaptativa de los medios de subsistencia rurales a los impactos climáticos y los riesgos sobre los recursos hídricos en la Provincia de San Cristóbal. Este objetivo se logrará a través de acciones concretas enfocadas en mejorar el acceso al agua, aumentar la capacidad institucional y comunitaria, y la coordinación para la gestión integrada del agua que incluya otros usos de los recursos hídricos, especialmente para la diversificación de los medios de vida de las comunidades rurales.

El Proyecto (denominado "*ClimaComunidad*" o "*ClimaSanCristóbal*"), tiene tres componentes:

- Implementación de actividades comunitarias de gestión de recursos hídricos resilientes al cambio climático.
- Diversificación de los medios de subsistencia de las comunidades rurales en relación al cambio climático.
- Creación de capacidades para gestionar los riesgos relacionados con el cambio climático en el largo plazo.

Para el desarrollo eficiente del proyecto, se plantea establecer un comité de dirección (Steering Committee). Los presentes términos de referencia son un insumo para formalizar dicho comité.

3 Comité de Dirección

El Comité de Dirección (CD) es una estructura colaborativa, voluntaria y transitoria, cuya función principal es tomar responsabilidad por el logro de los objetivos del proyecto, vigilar que el mismo se ejecute según su diseño conceptual, apoyar la ejecución de las intervenciones en el terreno, evaluar los beneficios obtenidos con el proyecto, y monitorear los riesgos, calidad y cronograma.

4 Funciones del Comité

- Tomar responsabilidad por la viabilidad y factibilidad del proyecto, la entrega de los productos ("Outputs") y el logro de los resultados esperados para el mismo ("Outcomes").
- Asegurar que el alcance del proyecto esté alineado con los requisitos de los socios, las entidades de ejecución, los stakeholders, y otras partes interesadas.
- Proporcionar orientación, asistencia y asesoría a la unidad ejecutora del proyecto, y a cualquier tercero directamente involucrado, sobre cualquier problema relacionado con el proyecto.
- Vigilar que los esfuerzos del proyecto (inversión técnica y económica) sean apropiados, según las expectativas de los beneficiarios e interesados.
- Abordar cualquier problema que tenga implicaciones importantes para el proyecto. Esto incluye, pero no se limita a, mediar ante conflictos con otras instituciones o comunidades.
- Mantener el alcance del proyecto bajo control, en caso que surjan situaciones de urgencia/ emergencia que obliguen a considerar y/o realizar cambios.
- Reconciliar las diferencias en opinión y enfoque entre los miembros y otros terceros, y resolver cualquier disputa que surja entre ellos.

5 Rol de los Miembros

Entre las funciones individuadles de los miembros del Comité de Dirección se incluyen:

- Comprender las implicaciones estratégicas y los resultados esperados para las iniciativas y los productos del proyecto.
- Apreciar la importancia del proyecto para las instituciones clave y partes interesadas, y tal vez representar sus intereses.
- Estar genuinamente interesado en que la iniciativa sea exitosa, y que se logren los resultados que se persiguen en el proyecto.
- Ser un defensor del proyecto ante los beneficiaros del mismo y la opinión pública.

- Tener una amplia comprensión sobre la gestión del proyecto y el enfoque adoptado para ello.
- Comprometerse y participar activamente en la búsqueda de soluciones a los problemas que puedan presentarse con relación al proyecto y/o la promoción de sus resultados.

En la práctica, esto significa que cada uno de los miembros se compromete a:

- Garantizar que las expectativas de los interesados se cumplan con los resultados del proyecto
- Ayudar a equilibrar prioridades y recursos cuyo uso pueda ser conflictivo.
- Proporcionar orientación a la unidad implementadora y a los usuarios de los productos.
- Considerar cualquier razonamiento, idea o problema planteados, siendo respetuosos.
- Revisar el progreso del proyecto, y solicitar las aclaraciones necesarias para comunicarlo.
- Verificar la adherencia de las actividades del proyecto a los estándares de mejores prácticas, tanto dentro de la organización como en un contexto más amplio.

6 Frecuencia de Reuniones

Las reuniones ordinarias del comité se realizarán cada cuatro (4) meses. Esto puede variar, pero sólo en casos en los que dichas reuniones se vinculen a hitos importantes del proyecto[1]. El mismo comité puede considerar programar reuniones adicionales, o sólo entre algunos de sus miembros.

7 Membresía del Comité

Cada institución u organización incluida en el Comité de Dirección, designará dos representantes. Típicamente, los representantes del comité podrán ser gerentes de proyecto, miembros del equipo de proyecto, representantes de beneficiarios, consultores o asesores, y observadores.

El perfil deseado para dichos representantes sería:

- Directivo medio-alto de la institución que lo designa,

[1] Idealmente, la mejor manera de establecer las reuniones es vincularlas a fechas de relacionadas a hitos importantes (como la terminación de una fase, o la entrega de un producto), y no a fechas establecidas por patrones (como, por ejemplo, el último jueves de cada mes). En la práctica, hacer reuniones mediante patrones no es eficiente, por la eventual indisponibilidad de los miembros.

- Grado académico de maestría, especialidad o un equivalente apropiado.
- Experiencia en el accionar y cultura de su institución y sus mecanismos de comunicación.
- Facilidad para comunicar los avances del proyecto a la más alta gerencia de su institución.
- Disponibilidad para viajar al interior del país y el extranjero, con previa planificación.
- Experiencia en temas como ingeniería, financiación, PYMES, comunidades, cooperativas, etc.
- Relacionado profesional o intelectualmente con el tema del cambio climático.
- Capacidad de ser negociador, conciliador y previsor de situaciones de conflicto.

8 Quorum Mínimo Válido

Un mínimo de tres (3) miembros del comité será requerido para que la reunión sea reconocida como una reunión autorizada. A estos efectos, cualquier recomendación o resolución que sea adoptada por dicha reunión, deberá ser aceptada por los demás miembros del comité.

9 Coordinación del Comité

El representante del IDDI ante el Comité de Dirección será responsable agendar, organizar y mantener la coordinación de las reuniones del comité. Este designado podrá apuntar otra persona (dentro o fuera del IDDI) para que le sustituya en su ausencia, o ante cualquier otra condición (temporal o permanente) que le impida atender o cumplir con sus deberes.

10 Agenda de las Reuniones

Para cada sesión del comité, se elaborará una agenda que incluirá, entre otros: detalles del lugar, fecha y hora de la reunión. También incluirá los puntos a conocer en orden de importancia, aunque los miembros del comité podrán sugerir variaciones en el orden, los tiempos y los contenidos. La convocatoria a cada reunión ordinaria se hará con, al menos, quince (15) días de antelación, y la agenda de la reunión se enviará al menos tres (3) días antes la misma.

11 Minutas de las Reuniones

Para cada sesión del comité, se elaborará una minuta que incluirá, entre otros: detalles del lugar, fecha y hora de la reunión, lista de presencias/ ausencias, los aspectos conocidos, aprobados u

objetados por el comité, así como cualquier material anexo que sea discutido o examinado en el contexto de la reunión. La minuta se enviará dentro de los cinco (5) días posteriores a la reunión.

Un registro de las minutas será mantenido en el archivo del proyecto, incluyendo copia de la agenda definitiva, lista de presencias, documentos anexos, y constancia de que se envió a todos los miembros del comité. En caso que los participantes tengan observaciones o comentarios a la minuta, estos deberán ser oportunamente considerados por el coordinador del comité.

12 Solución de Disputas

Si el comité no puede resolver un problema entre los miembros a través de la negociación, o existiera algún punto sobre el cual no se logre consenso; los miembros el comité remitirán el asunto por escrito a las más altas instancias de sus respectivas instituciones para que estos fijen su posición con respecto a la resolución de disputas. Las decisiones conjuntas tomadas por los altos directivos de las instituciones, si se fijan por escrito, serán consideradas como definitivas.

Alternativamente, las instituciones o los miembros del comité podrán hacer consultas a terceros que puedan ser neutrales o externos a los aspectos que originan las disputas. Estas consultas podrían ser realizadas por medios presenciales y/o virtuales, y los objetivos de las mismas deberán ser –de forma transparente y conservadora- fortalecer el consenso en el comité en cuanto al tema.

13 Actualización de los Términos de Referencia

Esos términos de referencia deberán ser revisados por el comité al menos una (1) vez por cada año de implementación del proyecto. Si durante la revisión, surgieran cambios importantes en la estructura de conducción del proyecto y/o que deban ser abordados por las instituciones, las magnitudes de estos cambios deberán ser socializados con los miembros del comité quienes decidirán el mejor mecanismo para comunicarlo a los ejecutivos de sus respectivas instituciones.

14 Aceptación

Firman estos términos de referencia, en aceptación de los mismos:

Nombre _____

Cargo _____

Institución _____

Fecha _____

Nombre _____

Cargo _____

Institución _____

Fecha _____

Nombre _____

Cargo _____

Institución _____

Fecha _____

Nombre _____

Cargo _____

Institución _____

Fecha _____

Nombre _____

Cargo _____

Institución _____

Fecha _____

Nombre _____

Cargo _____

Institución _____

Fecha _____

Nombre _____

Cargo _____

Institución _____

Fecha _____

Nombre _____

Cargo _____

Institución _____

Fecha _____

Anexo 1: Modelo de Invitación

Lugar, Fecha

Nombre
Cargo
Institución
Su despacho. -

Asunto: Invitación a Conformación del "Steering Committee" del Proyecto ZACK.
Adjunto: *Términos de Referencia del Comité de Dirección*, y *Fact Sheet del Proyecto*

Distinguido Señor(a),

Por la presente, tenemos a bien comunicarle que nuestro proyecto ***Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural*** [#ClimaComunidad], ha obtenido el endorso del Fondo de Adaptación del Protocolo de Kioto, y que al efecto estamos preparando la propuesta completa del proyecto, para recibir de dicho fondo los recursos necesarios para su implementación.

En el proceso de elaborar la propuesta, nos planteamos establecer un Comité de Dirección ("*Steering Committee*") para asegurar que los socios y actores clave del proyecto sean empoderados del logro de sus objetivos, y que también puedan alcanzar otros beneficios importantes a mediano y largo plazo.

El trabajar bajo la directriz de un Steering Committee es considerado internacionalmente como una buena práctica en el campo de la gerencia, tanto en la administración pública como privada. Estas estructuras de dirección, por lo general aumentan la transparencia y visibilidad de los proyectos al tiempo que ayudan a que los beneficios de estos abarquen la mayor cantidad de sectores posibles.

Entendemos que su organización podría jugar un rol muy importante en la implementación de este Proyecto. Al respecto, cortésmente le solicitamos que participe como miembro de dicho comité y/o designe una persona-punto focal que le represente en las reuniones del mismo. Este designado por usted, tendrá la facultad de representarle y participar en la toma de decisiones del comité.

Adjunto a la presente, encontrará los términos de referencia del comité y sus funciones, que incluye información sobre la periodicidad de las reuniones, el perfil deseado de los miembros, y otros aspectos

importantes para el accionar del mismo. La reunión de conformación del comité se acordar cuando dispongamos de confirmación de las instituciones invitadas, y que estas designen sus representantes.

Mucho agradeceríamos que, en la medida de lo posible confirme su interés de ser miembro del comité de dirección del proyecto, así como la persona que le representará en el mismo. Esta confirmación puede hacerla por vía de correo electrónico dirigido a climacomunidad@iddi.org.

Reciba nuestro saludo, estima y consideración.

Sinceramente,

David Luther
Director ejecutivo

Anexo 2: Instituciones a Incluir en el Comité

- Instituto Dominicano de Desarrollo Integral (IDDI)
- Ministerio de Medio Ambiente y Recursos Naturales (MIMARENA)
- Gobernación de la provincia de San Cristóbal
- Instituto Nacional de Agua Potable y Alcantarillado (INAPA)
- Instituto Dominicano de Recursos Hidráulicos (INDRHI)
- Fondo Pro-Naturaleza (Pro-Natura)
- Instituto Tecnológico de Santo Domingo (INTEC)

Anexo 3: Modelo de Agenda

Aumento de la resiliencia climática en la Provincia de San Cristóbal, República Dominicana
Programa de Manejo Integrado de Recursos Hídricos y Desarrollo Rural

AGENDA

Reunión del Comité de Dirección del Programa No. <nnn>

<Lugar>, <DD.mmm.YYY>, <Hora>

Moderador: <***Nombre y Apellido***>, <Cargo/Puesto>, <Organización>

15 Disculpas/ Dispensas

16 Minuta de la reunión previa

17 Lista de acciones

18 Informe del gerente del programa No.<*nnn*>

19 <Punto de discusión 1>

Breve resumen del tema, no más de dos (2) ó tres (3) líneas, incluyendo referencias a cualquier documento de soporte.

Conclusión:

- *Se aclara que …*
- *Se apoya la recomendación o acción …*
- *El Comité aprueba …*

20 <Punto de discusión 2>

Breve resumen del tema, no más de dos (2) ó tres (3) líneas, incluyendo referencias a cualquier documento de soporte.

Conclusión:

- *Se aclara que …*
- *Se apoya la recomendación o acción …*
- *El Comité aprueba …*

21 <Punto de discusión 3>

Breve resumen del tema, no más de dos (2) ó tres (3) líneas, incluyendo referencias a cualquier documento de soporte.

Conclusión:

- *Se aclara que …*
- *Se apoya la recomendación o acción …*
- *El Comité aprueba …*

22 Productos/materiales disponibles

- *Informe de avances del consultor …*
- *Publicación realizada por…*
- *Noticia que aparece en el medio …*

23 Otros aspectos

24 Próxima reunión

Cierre: *no habiendo otros puntos que tratar, se gradeció la presencia de todos los asistentes y se dio por terminada la reunión a las <hora>. xxx será responsable de enviar la minuta.*

ADAPTATION FUND

Dominican Republic

July 18, 2018

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for Enhancing climate resilience in San Cristóbal Province, Dominican Republic - Integrated Water Resources Management and Rural Development Programme

In my capacity as designated authority for the Adaptation Fund in Dominican Republic, I confirm that the above national programme proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Dominican Republic.

Accordingly, I am pleased to endorse the above programme proposal with support from the Adaptation Fund. If approved, the programme will be implemented by Dominican Institute of Integral Development and executed by the Ministry of Environment and Natural Resources; the National Institute for Water Supply and Sewerage; and community-based NGOs.

Sincerely,

Ing. Pedro García Brito, M.Sc
Director of Climate Change and CDM
Ministry of Environment and Natural Resources

MINISTERIO DE MEDIO AMBIENTE Y RECURSOS NATURALES
VICEMINISTERIO DE GESTIÓN AMBIENTAL

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS (INAPA)

001890 **"Año del Fomento de la Vivienda"**

08 DIC 2016

Al: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Correo: Secretariat@Adaptation-Fund.org
Tel.: (202) 458-7347

CC: Instituto Dominicano de Desarrollo Integral, Inc. (IDDI)
Calle H #17, Zona Industrial de Herrera, SDO
Correo: info@iddi.org
Tel.: (809) 534-1077

Tema: Programa de Fortalecimiento de la Capacidad de Resiliencia en la Provincia de San Cristóbal, República Dominicana – Manejo Integral de Recursos Hídricos y Desarrollo Rural

El Instituto Nacional de Agua Potable y Alcantarillados (INAPA) es la autoridad nacional para el agua y el saneamiento en la República Dominicana, y como tal, confirmamos que la propuesta de referencia está alineada con las normas nacionales para suministro de agua y servicios sanitarios. En relación a esto, confirmamos nuestro apoyo a las intervenciones que se proponen en el marco del Programa, así como nuestra disponibilidad e interés de participar en el desarrollo e implementación de cada una de dichas intervenciones.

Al efecto, con gusto endosamos el Programa propuesto al Fondo de Adaptación, esperando que sea valorado positivamente. Si el mismo es aprobado, nosotros vamos a trabajar con el Instituto Dominicano de Desarrollo Integral, Inc. (IDDI) para emitir los permisos y autorizaciones necesarias para ejecutar las intervenciones, en la medida que estas cumplan los requerimientos de ley.

Atentamente,

Ing. Horacio Mazara,
Director Ejecutivo

Calle Guarocuya, Edif. INAPA, Centro Comercial El Millón, Apartado 1503, Santo Domingo, Rep. Dom.
Tel.: 809-567-1241 • Fax: 809-363-0537
RNC: 401-00745-2

Annex 1. Individual Projects (sub-projects)

1. Selected Infrastructures Projects

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

AMPLIACION ACUEDUCTO MULTIPLE CAOBAL, LA CUCHILLA, VILLA ALTAGRACIA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema diseñado y construido en el año 2003 para abastecer una población de 2,607 habitantes, trabajando por gravedad Y bombeo, siendo la fuente de abastecimiento el río Duey captada mediante una cajuela que abastece al acueducto de Santo Domingo, a través de la línea de aducción Ø30" L.J. y desde aquí se realiza empalme en Ø8" PVC para abastecer el acueducto de El Caobal, además tiene como componentes:

- Línea de Conducción: Ø8" PVC (SDR-26)

- Estación de Bombeo: Cisterna en H.A., capacidad 144 m^3, dos (2) bombas de eje vertical de 30 HP cada uno.

- Línea de Impulsión: Ø8" PVC, L = 1,945.84 m y Ø6" PVC, L = 1,455.60 m

- Almacenamiento: Depósito Regulador Superficial de H.A., capacidad 250 m^3.

- Línea Matriz: Ø4" PVC (SDR-26)

- Red de Distribución Ø4", Ø3" y Ø2" PVC

En la actualidad 04/2018 este sistema requiere ampliación: nuevo Depósito Regulador, mayor capacidad de la línea de conducción y red de distribución, esto debido al deterioro físico que presenta el Depósito Regulador y al crecimiento poblacional de la zona. El nuevo rediseño contemplara los siguientes componentes:

- Fuente: Río El Duey.

- Obra de Toma: Empalme desde línea de aducción Ø30" L.J. (existente), Ac. Sto. Dgo. (CAASD)

- Línea de Conducción: Ø8" PVC (existente)

- Estación de Bombeo: Cisterna en H.A. con capacidad de 144 m³, dos (2) bombas de eje vertical de 30 HP, (verja de malla ciclónica) (existente).
- Línea de Impulsión: Ø8” PVC (existente), L = 1,945.84; Ø6” PVC (existente), L= 1,455.60 m

- Tratamiento: Cloración Simple

- Almacenamiento: Depósito regulador superficial H.A. (existente) a demoler y construir uno en la misma área con Capacidad de 300 m³.

- Línea Matriz: Ø8” PVC (SDR-26), L=32.18 m (a colocar).

- Red de Distribución: Ø4" PVC (existente), L= 1,473.12 m y Ø6” PVC (SDR-26), L= 2,165.20 m; Ø4" PVC (SDR-26), L= 4,856.00 m y Ø3" PVC (SDR-26), L= 8,360.00 m (a colocar).

- Tipo de Sistema: Gravedad – Bombeo

- Acometidas Totales: 796 unidades urbanas, 417 unidades existentes y 379 unidades a instalar

- Tasa de Crecimiento Anual: 1.6%

Población:	Año 2019:	Año 2039:
	3,980 habitantes	5,467 Habitantes

Dotación: 150 lts/hab./día.

Caudales:	Año 2019:	Año 2039:
	Qmax/d= 8.64 lps.	Qmax/d= 11.86 lps.
	Qmax/h= 12.44 lps.	Qmax/h= 17.08 lps.
		Qb= 17.80 lps.

EL CAOBAL

L.C Ø8" PVC (exist).

Registro Ac. Sto. Dgo. (CAASD).

L.C Ø8" PVC (exist).

18°35'58.75" N
70° 9'9.33" O

Cisterna en H.A. con Cap= 144 m³, dos (2) bombas de eje vertical de 30 HP.

Cloración Simple

L.I. Ø8" PVC (exist.)

V.C. Ø3" HF

Ø4" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø4" HF

Ø3" PVC (SDR-26).

V.C. Ø3" HF

L.I. Ø6" PVC (exist.)

Ø3" PVC (SDR-26).

Tapon Ø3"

Ø3" PVC (SDR-26).

V.C. Ø3" HF

Ø4" PVC (SDR-26).

TRAMO ASFALTADO
L=1,931m

L.I. Ø8" PVC (exist.)

Ø4" PVC (SDR-26).

V.C. Ø3" HF

L.I. Ø6" PVC (exist.)

V.C. Ø4" HF

L.D. Ø4" PVC (exist.)

V.C. Ø4" HF

V.C. Ø4" HF

V.C. Ø3" HF

Tapon Ø3"

V.C. Ø4" HF

V.C. Ø4" HF

V.C. Ø4" HF

Ø6" PVC (SDR-26).

Ø4" PVC (SDR-26).

Ø3" PVC (SDR-26).

Deposito Regulador
Superficial H.A. Cap= 250 m³

18°35'6.72" N
70°10'29.28" O

V.C. Ø4" HF

Tapon Ø4"

Ø8" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø4" HF

V.C. Ø3" HF

Ø6" PVC (SDR-26).

TRAMO ASFALTADO
L=780m

Ø3" PVC (SDR-26).

Ø4" PVC (SDR-26).

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø3" HF

TRAMO ASFALTADO
L=695m

Ø4" PVC (SDR-26).

V.C. Ø4" HF

Tapon Ø4"

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø3" HF

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

LEYENDA

Registro Ac. Sto. Dgo. (CAASD)

Linea de Conducción Ø8" PVC, L= 577.76 m (exist.)

Cisterna en H.A. con Cap= 144 m³, dos (2) bombas de eje vertical de 30 HP.

Linea de Impulsión:

Ø8" PVC (existente), L= 1,945.85 m.

Ø6" PVC (existente), L= 1440.32 m.

Depósito Regulador Superficial de H.A., cap= 250 m³, (exist. a demoler)

" " " " cap= 300 m³, (a construir).

Linea Matriz Ø8" PVC (SDR-26) (a colocar), L= 85.43 m.

Conducción y Distribución:

Ø6" PVC (SDR-26) (a colocar), L= 2,165.20 m.

Ø4" PVC (existente), L= 1,473.12 m.

Ø4" PVC (SDR-26) (a colocar), L= 4,856.00 m.

Ø3" PVC (SDR-26) (a colocar), L= 8,360.00 m.

Tapon Ø4", Ø3".

V.C. Ø4", Ø3" HF

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

AMPLIACION ACUEDUCTO MULTIPLE CAOBAL, LA CUCHILLA, VILLA ALTAGRACIA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema diseñado y construido en el año 2003 para abastecer una población de 2,607 habitantes, trabajando por gravedad Y bombeo, siendo la fuente de abastecimiento el río Duey captada mediante una cajuela que abastece al acueducto de Santo Domingo, a través de la línea de aducción Ø30" L.J. y desde aquí se realiza empalme en Ø8" PVC para abastecer el acueducto de El Caobal, además tiene como componentes:

- Línea de Conducción: Ø8" PVC (SDR-26)

- Estación de Bombeo: Cisterna en H.A., capacidad 144 m^3, dos (2) bombas de eje vertical de 30 HP cada uno.

- Línea de Impulsión: Ø8" PVC, L = 1,945.84 m y Ø6" PVC, L = 1,455.60 m

- Almacenamiento: Depósito Regulador Superficial de H.A., capacidad 250 m^3.

- Línea Matriz: Ø4" PVC (SDR-26)

- Red de Distribución Ø4", Ø3" y Ø2" PVC

En la actualidad 04/2018 este sistema requiere ampliación: nuevo Depósito Regulador, mayor capacidad de la línea de conducción y red de distribución, esto debido al deterioro físico que presenta el Depósito Regulador y al crecimiento poblacional de la zona. El nuevo rediseño contemplara los siguientes componentes:

- Fuente: Río El Duey.

- Obra de Toma: Empalme desde línea de aducción Ø30" L.J. (existente), Ac. Sto. Dgo. (CAASD)

- Línea de Conducción: Ø8" PVC (existente)

- Estación de Bombeo: Cisterna en H.A. con capacidad de 144 m³, dos (2) bombas de eje vertical de 30 HP, (verja de malla ciclónica) (existente).
- Línea de Impulsión: Ø8” PVC (existente), L = 1,945.84; Ø6” PVC (existente), L= 1,455.60 m

- Tratamiento: Cloración Simple

- Almacenamiento: Depósito regulador superficial H.A. (existente) a demoler y construir uno en la misma área con Capacidad de 300 m³.

- Línea Matriz: Ø8” PVC (SDR-26), L=32.18 m (a colocar).

- Red de Distribución: Ø4" PVC (existente), L= 1,473.12 m y Ø6” PVC (SDR-26), L= 2,165.20 m; Ø4" PVC (SDR-26), L= 4,856.00 m y Ø3" PVC (SDR-26), L= 8,360.00 m (a colocar).

- Tipo de Sistema: Gravedad – Bombeo

- Acometidas Totales: 796 unidades urbanas, 417 unidades existentes y 379 unidades a instalar

- Tasa de Crecimiento Anual: 1.6%

Población:	Año 2019:	Año 2039:
	3,980 habitantes	5,467 Habitantes

Dotación: 150 lts/hab./día.

Caudales:	Año 2019:	Año 2039:
	Qmax/d= 8.64 lps.	Qmax/d= 11.86 lps.
	Qmax/h= 12.44 lps.	Qmax/h= 17.08 lps.
		Qb= 17.80 lps.

LOMA VERDE.

Tapon Ø3"

Ø3" PVC (SDR-26).

Tapon Ø3"

Tapon Ø3"

Ø3" PVC (SDR-26).

Ø4" PVC (exist.).

Tapon Ø3"

Ø3" PVC (SDR-26)

LOS MEJIA

Tapon Ø3"

Ø3" PVC (SDR-26).

V.C. Ø3" HF

V.C. Ø3" HF

Ø4" PVC (SDR-26).

Ø3" PVC (exist.).

V.C. Ø4" HF

Tapon Ø4"

Ø4" PVC (SDR-26).

LOS REINOSO

V.C. Ø4" HF

Ø3" PVC (SDR-26).

Ø4" PVC (SDR-26).

V.C. Ø4" HF

Ø4" PVC (SDR-26).

V.C. Ø3" HF

V.C. Ø4" HF

LOS NUÑEZ

V.C. Ø3" HF

L.I. Ø6" PVC (SDR-21).

V.C. Ø4" HF

V.C. Ø4" HF

Cloración Simple

Ø6" PVC (SDR-26) .

Deposito Regulador
Superficial H.A. cap= 150 m³.

V.C. Ø3" HF

Tapon Ø3"

Ø3" PVC (SDR-26).

18°32'50.69" N
70° 8'46.14" O

Ø6" PVC (SDR-26).

Ø4" PVC (SDR-26).

LOS JESUS

L.M. Ø6" PVC (SDR-26).

Ø3" PVC (exist.).

18°32'47.50" N
70° 8'25.93" O

L.I. Ø6" PVC (SDR-21).

Ø3" PVC (SDR-26).

Pozo #2
(a construir)

Tapon Ø3"

Ø4" PVC (exist.).

Ø2" PVC (SDR-21).

Tapon Ø2"

Pozo #1 (exist.)
(a rehabilitar y equipar)

18°32'46.13" N
70° 8'26.77" O

LEYENDA

Obra de Toma: Campo de Pozos

Dos (2), uno existente (rehabilitar y equipar) y uno a construir.

Línea de Impulsión:

Ø6" PVC (SDR-21), L= 956.08 m.

Almacenamiento:

Deposito Regulador Superficial H.A. cap= 150 m³.

Línea de Matriz:

Ø6" PVC (SDR-26), L= 30.60 m.

Red de Distribución:

Ø6" PVC (SDR-26), L= 392.63 m.

Ø4" PVC (exist.), L= 734.36 m.

Ø4" PVC (SDR-26), L= 873.78 m.

Ø3" PVC (exist.), L= 736.00 m.

Ø3" PVC (SDR-26), L= 2,579.19 m.

Ø2" PVC (SDR-21), L= 51.30 m.

Tapon Ø4", Ø3", Ø2".

V.C. Ø4", Ø3" HF

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO CASTAÑO, DISTRITO MUNICPAL MEDINA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

La comunidad de Castaño con sus sectores cuenta con dos (2) pozos con una fuente pública cada uno, los cuales no garantizan un servicio apto para el consumo humano, pues no poseen ningún tipo de tratamiento. En el 2013 se inicio la construcción del acueducto a través del Banco Interamericano de Desarrollo (BID), luego la obra fue paralizada y rescindida, en dicho año los comunitarios fueron organizados y capacitados por la ONG. Sur Futuro, formando la Asociación Comunitaria de Acueducto Rural (asocar), además los comunitarios compraron dos terrenos, uno por RD$ 90,000.00 pesos para la construcción del depósito y otro por RD$ 30,000.00 pesos para la construcción del local de la ASOCAR.

El sistema a construir que abastecerá de agua potable a la comunidad de Castaño con sus sectores: Vietnam, La Cuaba y La Cuabita, tendrá como fuente de abastecimiento las aguas subterráneas, ubicadas en la margen del Rio Sosua en la sección de Cataño, mediante un campo de pozos, además tendrá como componentes las siguientes unidades:

- Estación de bombeo: (nicho para paneles de control, equipos de bombeo y verja de malla ciclónica).
- Línea de Impulsión: Ø6” PVC (SDR-21), L=1,116.61m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador elevado 12 m H.A., Cap= 150m^3 (a construir).
- Línea Matriz: Ø6” PVC (SDR-26), L=60.00m. (a colocar)
- Red de Distribución: Ø4” PV (SDR-26), L= 1,422.55 m; Ø3” PVC (SDR-26), L= 3,932.21 m. (a colocar)
- Tipo de Sistema: Bombeo.
- Acometidas: 347 unidades rurales.
- Tasa de crecimiento: 1.6%

Población: Año 2019: 1,737 habitantes Año 2039: 2,386 habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019:

Qmax. /d = 3.77 Lps.

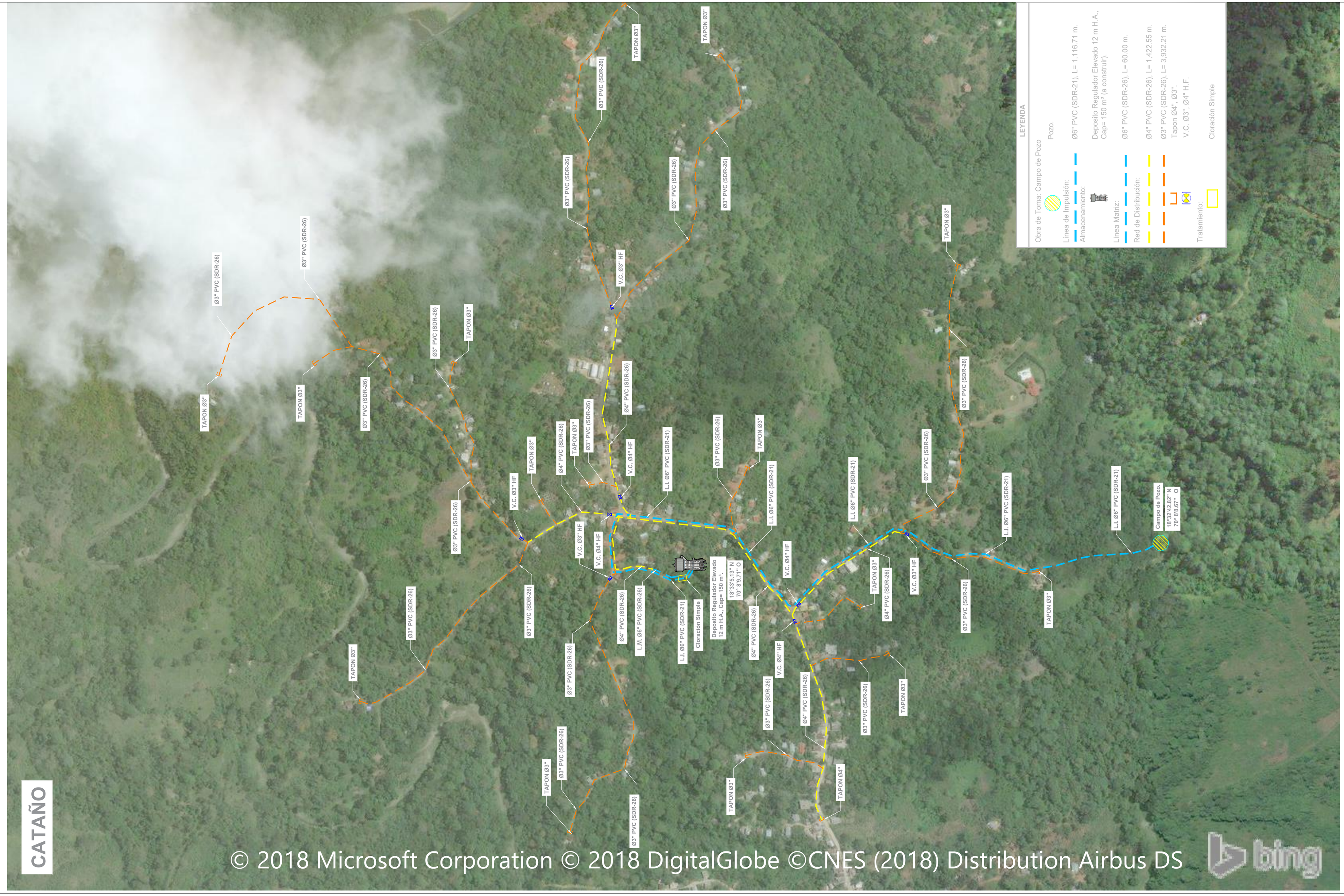
Qmax. /h = 5.43 Lps.

Año 2039:

Qmax. /d = 5.18 Lps

Qmax. /h = 7.46 Lps.

Qb. = 7.77 laps


LEYENDA
Obra de Toma: Campo de Pozo
Pozo.
Línea de Impulsión:
Ø6" PVC (SDR-21), L= 1,116.71 m.
Almacenamiento:
Deposito Regulador Elevado 12 m H.A., Cap= 150 m³ (a construir).
Línea Matriz:
Ø6" PVC (SDR-26), L= 60.00 m.
Red de Distribución:
Ø4" PVC (SDR-26), L= 1,422.55 m.
Ø3" PVC (SDR-26), L= 3,932.21 m.
Tapon Ø4", Ø3":
V.C. Ø3", Ø4" H.F.
Tratamiento:
Cloración Simple
Campo de Pozo. 18°32'42.82" N 70° 8'8.87" O
Deposito Regulador Elevado 12 m H.A., Cap= 150 m³. 18°33'5.13" N 70° 8'9.71" O
CATAÑO
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INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE LOS ALGARROBOS - OCHOA, DISTRITO MUNICIPAL MEDINA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

El sistema que abastece de agua con precariedad a la comunidad de Los Algarrobos fue construido en el año 2010, bajo la supervisión del síndico en turno y tiene como componentes: Fuente, aguas subterráneas; Obra de toma, campo de pozos (2) con una fuente publica cada uno; Línea de Impulsión Ø1" PVC, L=300 m; Depósito Regulador Superficial de Block, capacidad 2,640 Gls (10 m^3) con una fuente publica para uso de emergencia.

En vista de que la fuente (aguas subterráneas) que abastece el sistema reduce considerablemente su caudal, es necesario reubicar nueva zona para campo de pozos y extender el sistema a la comunidad de Ochoa para garantizar la demanda requerida por la población de ambas comunidades, además la propuesta contempla las siguientes unidades:

- Obra de Toma: Campo de pozos con estación de bombeo (nicho para paneles de control, equipos de bombeo y verja de malla ciclónica) ubicados en la carretera Medina – La Cuchilla. (a construir)
- Línea de Impulsión: Ø4" PVC(SDR-21), L= 1,628.00 m. (a colocar)
- Tratamiento: Cloración Simple
- Almacenamiento: Depósito Regulador Elevado 10 m H.A., capacidad 65 m^3 (a construir).
- Línea Matriz: Ø4" PVC (SDR-26), L= 59.44 m. (a colocar)
- Red de Distribución: Ø4" PVC (SDR-26), L= 313.65 m; Ø3" PVC (SDR-26), L= 4,430.00m y Ø2" PVC (SDR-26), L= 100.00 m. (a colocar)
- Tipo de Sistema: Bombeo.
- Acometidas: 160 unidades rurales.
- Tasa de crecimiento: 1.6%

Población: Año 2019: 799 habitantes. Año 2039: 1,098 habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019: Qmax/d= 1.73 lps

Qmax/h= 2.50 lps

Año 2039: Qmax/d= 2.38 lps

Qmax/h= 3.43 lps

Qb= 3.57 lps

LOS ALGARROBOS - OCHOA

ZONA DE POZO
18°32'34.10" N
70° 8'36.75" O

Cloración Simple

L.I. Ø4" PVC (SDR-21)

L.I. Ø4" PVC (SDR-21)

L.I. Ø4" PVC (SDR-21)

L.I. Ø4" PVC (SDR-21)

Ø3" PVC (SDR-26)

L.I. Ø4" PVC (SDR-21)

TAPON Ø3"

Ø3" PVC (SDR-26)

18°32'32.29" N
70° 7'49.88" O

Dep. Reg. Elevado 10 m
H.A., Cap= 65 m³.

V.C. Ø3" HF

V.C. Ø3" HF

Línea Matriz Ø4" PVC
(SDR-26)

V.C. Ø4" HF

V.C. Ø3" HF

Ø4" PVC (SDR-26)

LOS ALGARROBOS

HIDRANTE

V.C. Ø3" HF

OCHOA

Ø3" PVC (SDR-26)

Ø2" PVC (SDR-26)

TAPON Ø2"

Ø3" PVC (SDR-26)

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

Ø4" PVC (SDR-26)

V.C. Ø3" HF

Ø3" PVC (SDR-26)

V.C. Ø3" HF

V.C. Ø3" HF

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

Ø3" PVC (SDR-26)

TAPON Ø3"

Ø3" PVC (SDR-26)

TAPON Ø3"

LEYENDA

Obra de Toma: Campo de Pozos

Pozo.

Línea de Impulsión:

Ø4" PVC (SDR-21), L= 1,627.92 m.

Almacenamiento:

Deposito Regulador Elevado 10 m H.A.,
Cap= 65 m³ (a construir).

Línea Matriz:

Ø4" PVC (SDR-26)), L= 59.44 m.

Red de Distribución:

Ø4" PVC (SDR-26), L= 313.65 m.

Ø3" PVC (SDR-26), L= 4,430.00 m.

Ø2" PVC (SDR-21), L= 100.00 m.

Tapon Ø3", Ø2".

Hidrante.

V.C. Ø3", Ø4" H.F.

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

REHABILITACION ACUEDUCTO SAN FRANCISCO, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

La comunidad de San Francisco se abastece por un sistema construido por los comunitarios en el año 2004, teniendo como componentes:

- Fuente: Noria San Francisco
- Obra de Toma: Cajuela en nacimiento de la noria.
- Línea de aducción: Ø3" PVC, semi presión, L= 260.00 m, aproximados.
- Almacenamiento: Depósito Regulador Superficial en block 50 m³.
- Línea matriz: Ø2" PVC semi-presión.
- Red de Distribución: Ø2", Ø1 1/2" Y Ø1". PVC semi-presión
- Acometidas: 40 Unidades Rurales

En la actualidad 04/2018 este sistema se encuentra en estado de deterioro a causa de los fenómenos naturales, además no fue construido considerando las especificaciones técnicas.

Para que el sistema opere con eficiencia debe ser rehabilitado, teniendo como componentes:

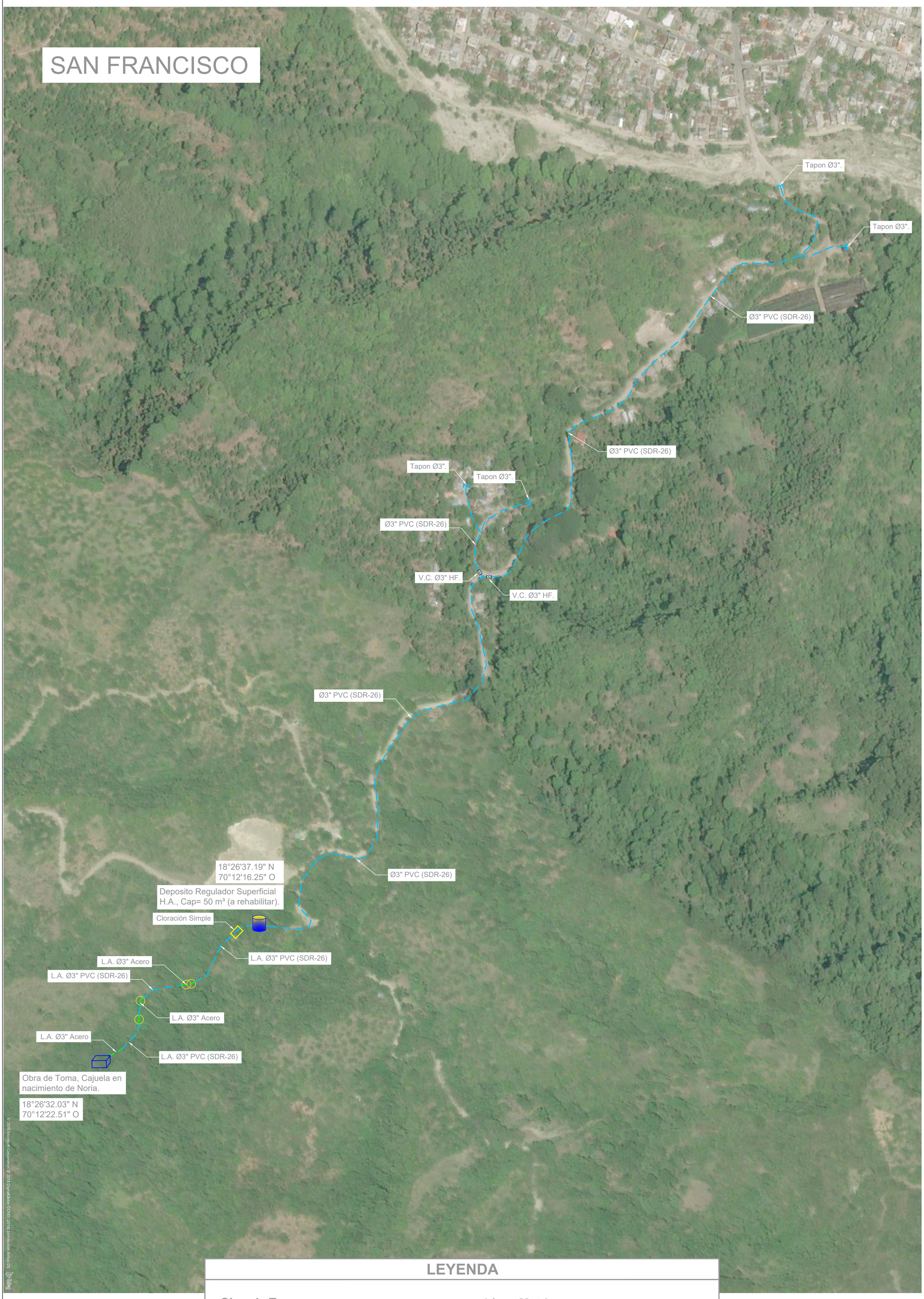
- Fuente: noria San Francisco
- Obra de Toma: Cajuela en nacimiento a rehabilitar (colocar tapa, válvula de compuerta a la salida, resane y desagüe) (a rehabilitar)
- Línea de Aducción: Sustituir tubería existente de Ø3 PVC semi-presión por Ø3" PVC (SDR-21), L= 196.15 m y Ø3" Acero, L= 52.00 para los cruces. (a colocar)
- Tratamiento: Cloración Simple
- Almacenamiento: Depósito Regulador Superficial de Block Cap= 45 m³ a rehabilitar (resane, pintura, verja, escalera exterior e interior, By-pass y limpieza del área). (a rehabilitar)
- Línea Matriz: Ø3" PVC (SDR-26), L= 140.53 m. (a colocar)
- Red de Distribución: Ø3" PVC (SDR-26), L= 1,402.91 m. (a colocar)
- Tipo de Sistema: Gravedad

- Acometidas totales: 40 unidades rurales,
- Tasa de Crecimiento: 1.6 anual

Población:	**Año 2019**	**20 años (2039)**
	346 habitantes	476 habitantes

Dotación: 100 lts/hab/día

Año 2019:	Año 2039:
Qmax. /d = 0.50 lps	Qmax. /d = 0.69 lps
Qmax. /h = 0.72 lps	Qmax. /h = 0.99 lps



LEYENDA

Obra de Toma:

Cajuela en el nacimiento de la noria. (exist.) (a rehabilitar).

Línea de Aducción:

Ø3" PVC (SDR-21), L= 196.15 m.

Ø3" Acero, L= 52.00 m.

Almacenamiento:

Deposito Regulador Superficial de Block, Cap= 45 m³ (a rehabilitar).

Línea Matriz:

Ø3" PVC (SDR-26), L= 140.53 m.

Red de Distribucion:

Ø3" PVC (SDR-26), L= 1,402.91 m.

Tapón Ø3".

V.C. Ø3" HF

Tratamiento:

Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO ARROYO HIGUERO, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

El sistema que abastece a la comunidad de Arroyo Higüero se encuentra deteriorado, fue construido en el año 1975, teniendo como componentes: Fuente, Arroyo María; Obra de Toma directa; Línea de Aducción Ø2" semi-presión; Deposito Superficial H.A. capacidad 7 m³; Redes de Distribución Ø1" y Ø1/2" PVC semi-presión.

En vista a las condiciones en que se encuentra el sistema y a la poca capacidad para almacenar y conducir el caudal demandado por la población, se propone construir un sistema de agua potable contemplando las siguientes unidades:

- Fuente: Arroyo María
- Obra de Toma: Cajuela en nacimiento del arroyo. (a construir)
- Línea de Aducción: Ø4” PVC (SDR-21), L= 635.00 m; Ø3 Acero, L= 652.00 m; Ø3” PVC (SDR-21), L= 1,167.27 m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador Elevado 10.00 m H.A., Cap.= 45 m³ (a construir).
- Línea Matriz: Ø4” PVC (SDR-26), L= 308.00 m. (a colocar)
- Red de Distribución: Ø3” PVC (SDR-26), L= 820.00 m; Ø2” PVC (SDR-21), L= 60.00 m (a colocar)
- Tipo de Sistema: Gravedad
- Acometidas: 85 unidades rurales.
- Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	426 habitantes	585 Habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019: Qmax/d = 0.92 Lps.	Año 2039: Qmax/d = 1.27 Lps.
Qmax/h = 1.33 Lps.	Qmax/h = 1.83 Lps.

Arroyo Higüero

18°28'47.22" N
70°12'24.20" O

Zona de O.T (Cajuela en nacimiento arroyo Maria)(a construir).

Ø4" PVC (SDR-21).

Ø4" PVC (SDR-21).

Ø4" PVC (SDR-21).

O.T. (exist.) (a dejar fuera de servicio).

Línea de Aducción Ø3" Acero.

Línea de Aducción Ø3" Acero.

Línea de Aducción Ø3" PVC (SDR-21).

Línea de Aducción Ø3" PVC (SDR-21).

Línea de Aducción Ø3" PVC (SDR-21).

Línea de Aducción Ø3" PVC (SDR-21).

Cloración Simple.

Deposito Regulador Elevado
10 m de H.A., capacidad 45 m³

18°27'49.50" N
70°12'19.99" O

Línea Matriz Ø4" PVC (SDR-26).

Carretera Arroyo Higuero - La Colonia.

Ø3" PVC (SDR-26).

C. Arroyo Higüero

TAPON Ø2"

Ø2" PVC (SDR-21).

V.C. Ø3" HF

V.C. Ø3" HF

Ø3" PVC (SDR-26).

V.C. Ø3" HF

TAPON Ø3"

LEYENDA

Obra de Toma:

- **Cajuela en nacimiento arroyo Maria (a construir).**

Línea de Aducción:

- **Ø4" PVC (SDR-21), L= 635.00 m.**
- **Ø3" Acero, L= 652.00 m.**
- **Ø3" PVC (SDR-21), L= 1,167.27 m.**

Almacenamiento:

- **Deposito Regulador Elevado 10.00 m H.A., cap= 45 m³**
- **Línea Matriz Ø4" PVC (SDR-26), L= 308.00 m**

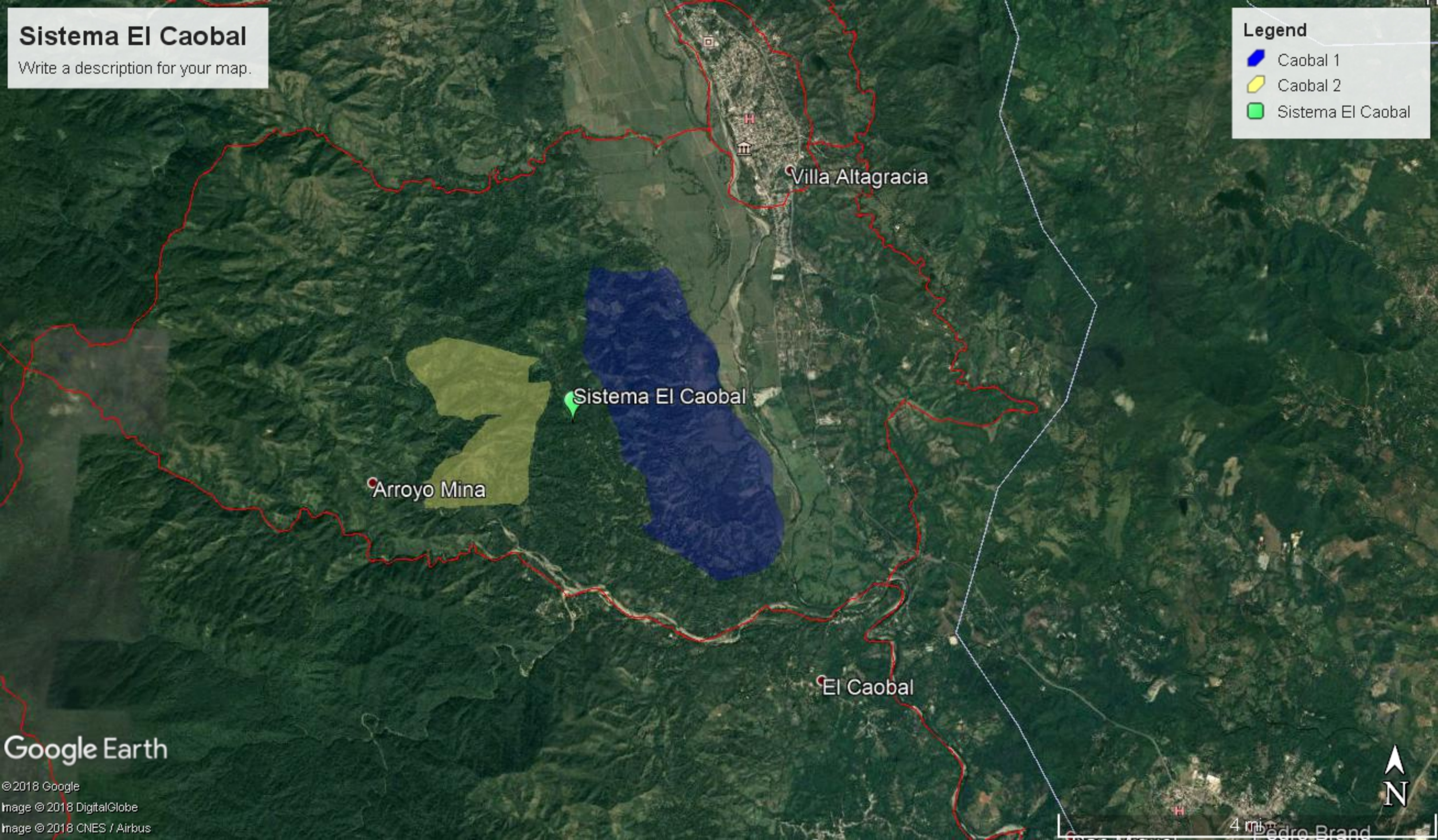
Red de Distribucion:

- Ø3" PVC (SDR-26), L= 820.00 m
- Ø2" PVC (SDR-21), L= 60.00 m
- Tapón Ø3", Ø2".
- V.C. Ø3" HF
- O.T. (exist.) (a dejar fuera de servicio).
- Carreta Arroyo Higuero-La Colonia.

Tratamiento:

- Cloración Simple

2. Selected Re-afforestation Areas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Write a description for your map.
Legend
Caobal 1
Caobal 2
Sistema El Caobal
Villa Altagracia
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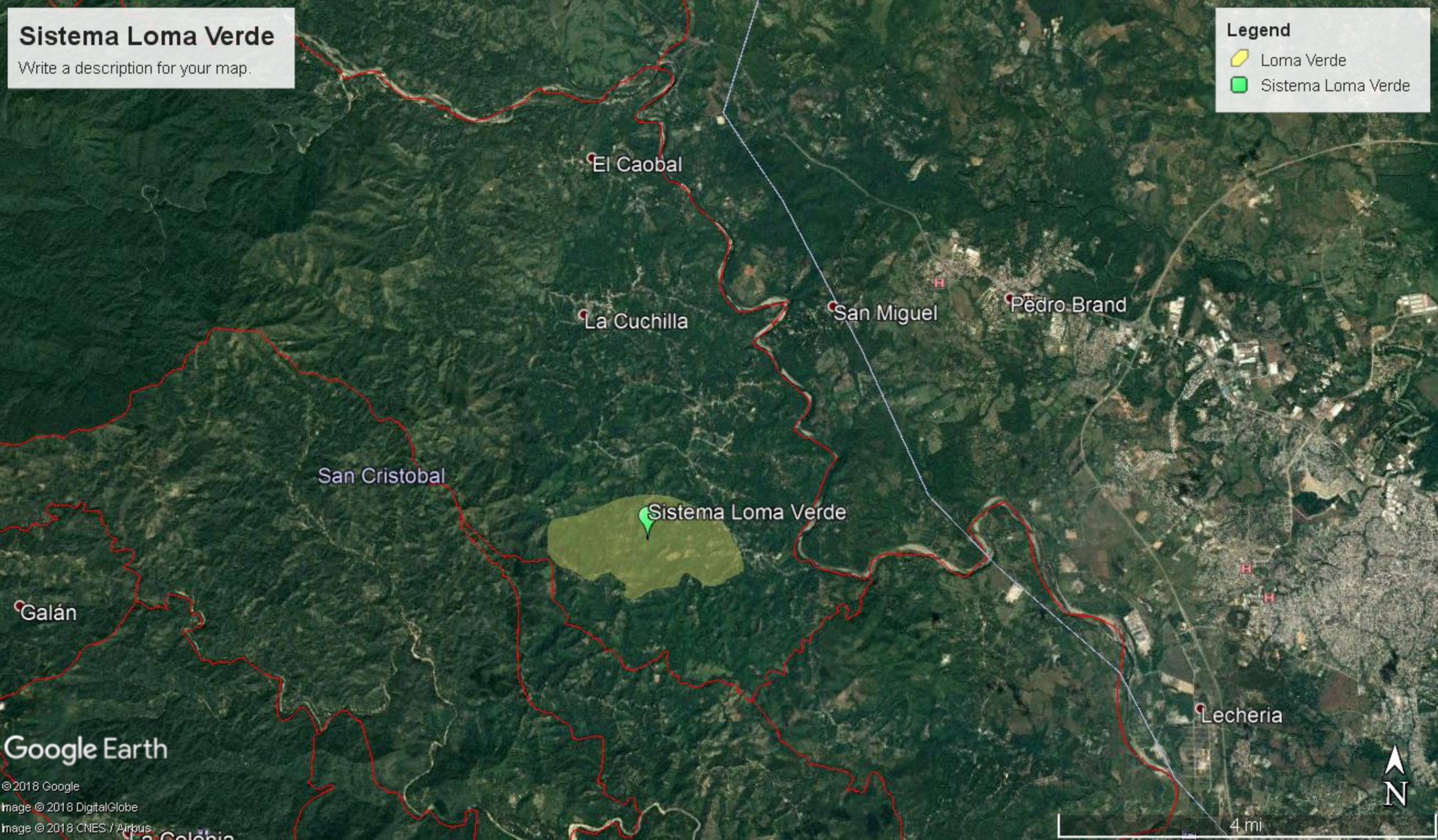
Sistema Loma Verde
Write a description for your map.
Legend
Loma Verde
Sistema Loma Verde
El Caobal
La Cuchilla
San Miguel
Pedro Brand
San Cristobal
Sistema Loma Verde
Galán
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Image © 2018 CNES / Airbus
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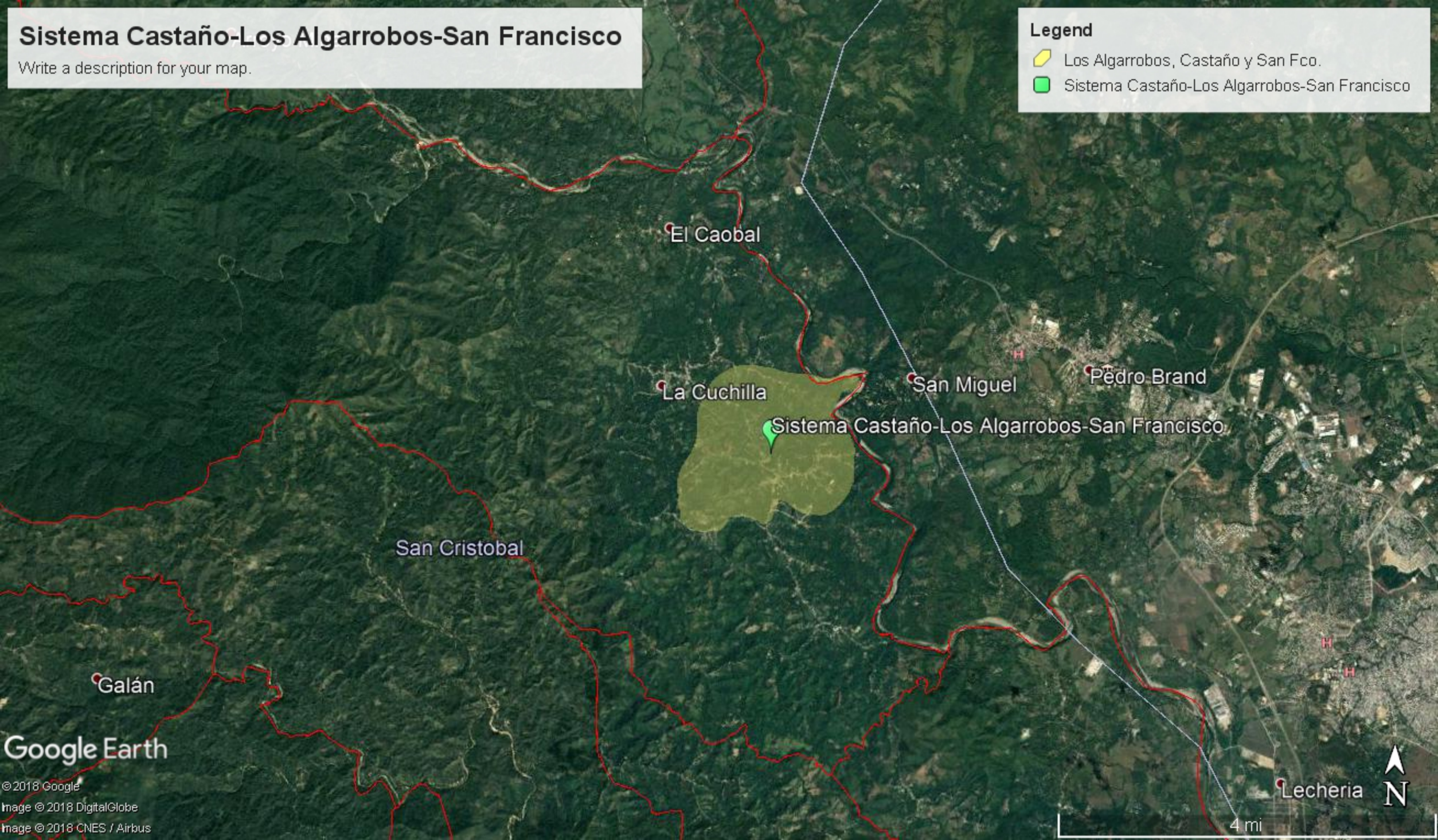
Sistema Castaño-Los Algarrobos-San Francisco
Write a description for your map.
Legend
Los Algarrobos, Castaño y San Fco.
Sistema Castaño-Los Algarrobos-San Francisco
El Caobal
La Cuchilla
San Miguel
Pedro Brand
Sistema Castaño-Los Algarrobos-San Francisco
San Cristobal
Galán
Lecheria
Google Earth
© 2018 Google
Image © 2018 DigitalGlobe
Image © 2018 CNES / Airbus
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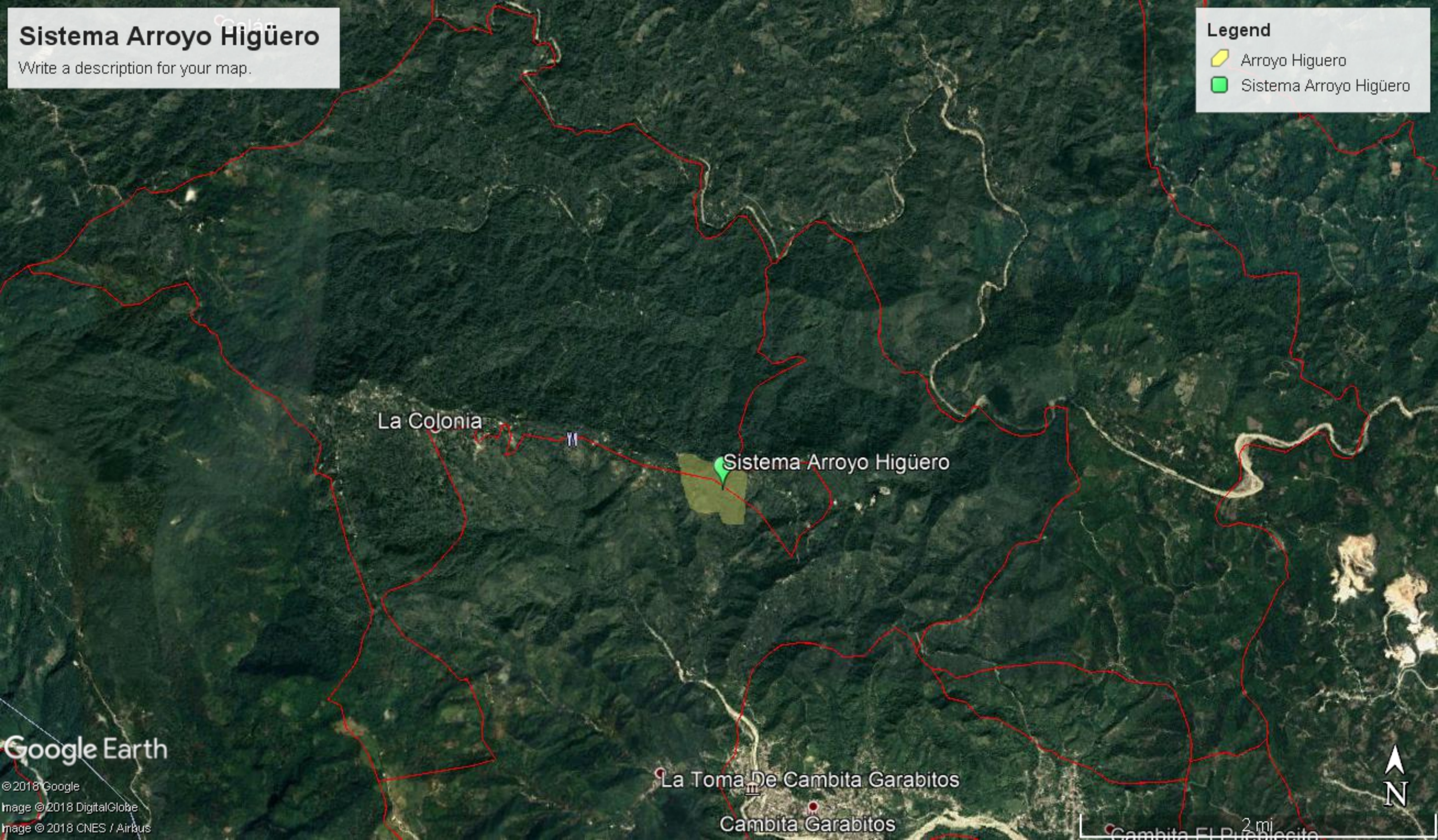
Sistema Arroyo Higüero
Write a description for your map.
Legend
Arroyo Higuero
Sistema Arroyo Higüero
La Colonia
Sistema Arroyo Higüero
La Toma De Cambita Garabitos
Cambita Garabitos
Google Earth
© 2018 Google
Image © 2018 DigitalGlobe
Image © 2018 CNES / Airbus
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Sistema El Fundo
Write a description for your map.
Legend
El Fundo
Sistema El Fundo
La Toma De Cambita Garabitos
Cambita Garabitos
Cambita El Pueblecito
Sistema El Fundo
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3. Additional Projects (excluded by the lack of foreseen funding)

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE MUCHA AGUA - FIRME PUNDUN, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema a construir abastecerá de agua potable a las comunidades de: Mucha Agua, Humachon, La Pangola, Juan Roman, El Arroyo, La Jicotea, El Limón, La Canelilla, El Alto y Firme Pundun. Teniendo como componentes las siguientes unidades:

- Fuente: Río Mucha Agua
- Obra de Toma: Dique Caucasiano (a construir)
- Línea de Aducción: Ø6” PVC (SDR-21), L= 855.35 m. (a colocar)
- Tratamiento: Planta Potabilizadora Filtración Rápida 12 lps con Tanque Adosado, Cap= 50 m³
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 200 m³ (a construir)
- Línea Matriz: Ø6” PVC (SDR-26), L= 80.00 m. (a colocar)
- Red de Distribución: Ø4” PVC (SDR-26), L=2,691.36 m y Ø3” PVC (SDR-26), L= 6,442.37m. (a colocar)
- Tipo de Sistema: Gravedad – Bombeo
- Acometidas: 450 unidades rurales.
- Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	2,286 habitantes	3,140 Habitantes

Dotación: 150 lts/hab/día.

Caudales:

Año 2019: Qmax/d= 4.96 lps	Año 2039: Qmax/d= 6.81 lps
Qmax/h= 7.14 lps	Qmax/h= 9.81 lps
	Qb= 10.22 lps

La comunidad de El Firme Pundun, será abastecida como extensión del acueducto múltiple Mucha Agua, mediante una estación de relevo, ya que la misma se encuentra en una zona más elevada que la zona de planta-depósito del sistema múltiple, para dicha extensión se contemplaron las siguientes unidades:

- Línea de Conducción: Ø3” PVC (SDR-26), L= 974.02 m desde Línea Matriz Ø6” del acueducto múltiple hasta la Estación de Bombeo (Cisterna de 30 m³, nicho para paneles de control, equipo de bombeo y verja de malla ciclónica).
- Línea de Impulsión: Ø3” PVC (SDR-13.5), L= 2,388.65 m
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 45 m^3
- Línea Matriz: Ø4” PVC (SDR-26), L= 100.00 m
- Red de Distribución: Ø3” PVC (SDR-26), L= 6,170.67 m.
- Tipo de Sistema: Bombeo
- Acometidas: 65 unidades rurales.

Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039
	330 habitantes	454 habitantes

Dotación: 150 lts/hab./día.

Caudales:

Año 2019: Qmax/d= 0.72 lps	Año 2039: Qmax/d= 0.98 lps
Qmax/h= 1.03 lps	Qmax/h= 1.42 lps
	Qb= 1.48 lps

MUCHA AGUA - FIRME PUNDUN

Obra de Toma Dique Caucasiano. (Rio Mucha Agua)
18°26'27.10" N
70°14'48.82" O

L.A. Ø6" PVC (SDR-21).

Planta de Tratamiento 12 Lps y Tanque Adosado, cap= 50 m³ con Estación de Bombeo.
18°26'2.27" N
70°14'49.43" O

Deposito Regulador Superficial H.A., Cap= 200 m³
18°25'56.54" N
70°14'40.42" O

Deposito Regulador Superficila H.A., cap= 45 m³.
18°26'34.57" N
70°13'40.33" O

Cisterna 30 m³.
18°25'57.38" N
70°14'21.24" O

Fuente publica con 3 Llaves Chorro con caseta para proteccion.

MUCHA AGUA
EL MAMEY
EL CEDRO
BOTONCILLO
HUMACHON
LA GUAMA
JUAN ROMAN
LA PANGOLA
LA JAGUITA
FIRME PUNDUN

ENVALSE PRESA VALDESIA

LEYENDA

Obra de Toma
Dique Caucasiano.

Línea de Aducción:
Ø6" PVC (SDR-21), L= 855.35 m.

Tratamiento:
Planta Potabilizadora Filtración Rapida 12 lps con Tanque Adosado, cap= 50 m³.
Estación de Bombeo.

Línea de Impulsión:
Ø6" PVC (SDR-21), L= 788.67 m.

Almacenamiento:
Deposito Regulador Superficial H.A., Cap= 200 m³

Línea de Matriz:
Ø6" PVC (SDR-26), L= 80.00 m.

Red de Distribucion:
Ø4" PVC (SDR-26), L= 2,691.36 m
Ø3" PVC (SDR-26), L= 6,442.37 m
Tapón Ø4", Ø3".
V.C. Ø4", Ø3" HF

Extension Firme Pundun

Línea de Conducción:
Ø3" PVC (SDR-26), L= 974.02 m

Estacion de Bombeo:
Cisterna 30 m³, nicho para paneles de control, equipo de bombeo y verja de malla ciclonica.

Línea de Impulsión:
Ø3" PVC (SDR-13.5), L= 2,388.65 m

Almacenamiento:
Deposito Regulador Superficial H.A., Cap= 45 m³.

Línea Matriz:
Ø4" PVC (SDR-26), L= 100.00 m

Red de Distribución:
Ø3" PVC (SDR-26), L= 6,170.67 m
Tapón Ø4", Ø3".
V.C. Ø3" HF.

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE LAS COLES – LA ESTANCIA, CAMBITA GARABITO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

El sistema a construir que abastecerá de agua potable a las comunidades de: Las Coles, El Macao y La Estancia, teniendo como fuente las aguas subterráneas ubicadas en la margen de Cañada Fría, teniendo como componentes:

- Obra de Toma: Un (1) Pozo con Estación de Bombeo (transformador, nicho para paneles de control, equipo de bombeo y verja de malla ciclónica).
- Línea de Impulsión: Ø4” PVC (SDR-21), L= 1,016.00 m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 70 m³ (a construir)
- Línea Matriz: Ø4” PVC (SDR-26), L=183.00 m. (a colocar)
- Red de Distribución: Ø3” PVC (SDR-26), L= 2,782.05 m. (a colocar)
- Tipo de Sistema: Bombeo
- Acometidas: 125 unidades rurales.

Habitantes flotantes: 600

Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	1,235 habitantes	1,472 Habitantes

Dotación: 120 lts/hab./día.

Caudales:

Año 2019:	Qmax/d= 2.14 lps	Año 2039: Qmax/d= 2.56 lps
	Qmax/h= 3.22 lps	Qmax/h= 3.68 lps
		Qb= 3.83 lps

LAS COLES - LA ESTANCIA

Campo de Pozo.

18°28'6.51" N
70°15'28.50" O

Cloración Simple

L.I. Ø4" PVC (SDR-21).

L.I. Ø4" PVC (SDR-21).

L.I. Ø4" PVC (SDR-21).

Fuente Publica con tres (3) Llaves Chorro con caseta para protección.

Ø3" PVC (SDR-26).

18°27'44.39" N
70°15'17.91" O

Deposito Regulador
Superficial H.A., Cap= 70 m³

L.I. Ø4" PVC (SDR-21).

V.C. Ø3" HF.

L.M. Ø4" PVC (SDR-26).

V.C. Ø3" HF.

Tapon Ø3"

V.C. Ø3" HF.

LAS COLES

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

V.C. Ø3" HF.

V.C. Ø3" HF.

Tapon Ø3"

Tapon Ø3"

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

EL MACAO

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

Ø3" PVC (SDR-26).

LA ESTANCIA

Ø3" PVC (SDR-26).

Tapon Ø3"

LEYENDA

Obra de Toma: Campo de Pozos.
Pozos.

Línea de Impulsión:
Ø4" PVC (SDR-21), L= 1,016.00 m.

Almacenamiento:
Deposito Regulador Superficial H.A. cap= 70 m³.

Línea Matriz:
Ø4" PVC (SDR-26), L= 183.00 m.

Red de Distribución:
Ø3" PVC (SDR-26), L= 2,782.05 m.

Fuente Publica con tres (3) Llaves Chorro.

Tapon Ø4", Ø3".

V.C. Ø3" HF.

Tratamiento:
Cloración Simple

INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

ACUEDUCTO MULTIPLE ZONA BAJA DE RESOLI, NAJAYO ARRIBA, LA PANADERIA

PROVINCIA SAN CRISTOBAL

ANTECEDENTES:

El sistema a construir abastecerá de agua potable a las comunidades de: Zona Baja de Resoli, Najayo Arriba, Tierra Amarilla, Zorra Buena (El Refugio), La Penca, Pozo Prieto, Maricao y La Panadería. Teniendo como componentes las siguientes unidades:

- Fuente: Aguas Subterráneas ubicada en la comunidad de La Panadería
- Obra de Toma: Campo de Pozos. (a construir)
- Línea de Impulsión: Ø6" PVC (SDR-21), L= 2,204.00 m y Ø6" Acero, L= 1,766.05 m. (a colocar)
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito Regulador Superficial H.A., Cap= 300 m³ (a construir)
- Línea Matriz: Ø6" PVC (SDR-26), L= 60.00 m. (a colocar)
- Red de Distribución: Ø4" PVC (SDR-26), L=10,359.76 m y Ø3" PVC (SDR-26), L= 8,119.20 m. (a colocar)

Tipo de Sistema: Bombeo

Acometidas: 778 unidades rurales.

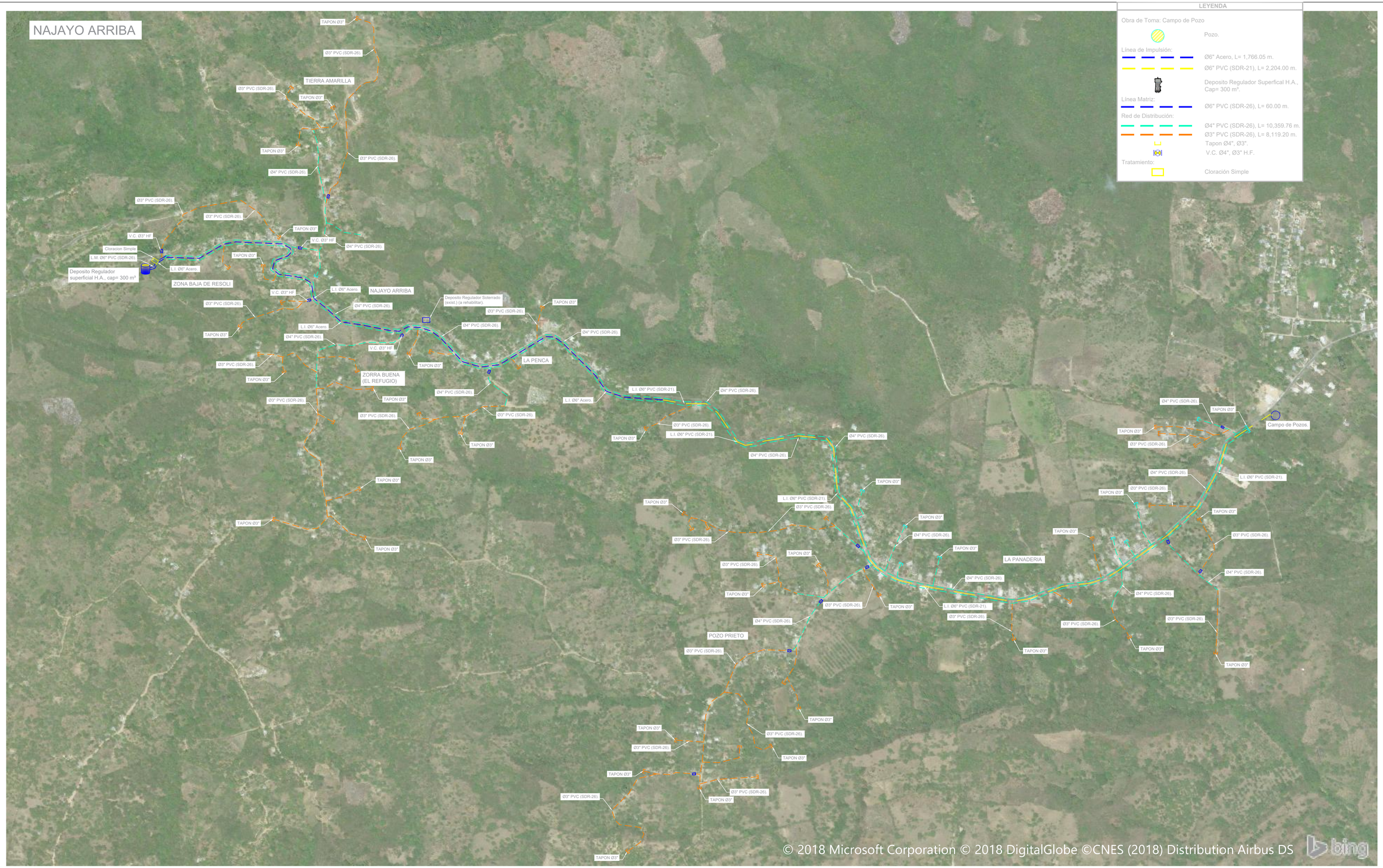
Tasa de crecimiento: 1.6%

Población:	Año 2019	Año 2039:
	3,891 habitantes	5,345 Habitantes

Dotación: 150 lts/hab/día.

Caudales:

Año 2019: Qmax/d = 8.44 Lps.	Año 2039: Qmax/d = 11.60 Lps.
Qmax/h = 12.16 Lps.	Qmax/h = 16.70 Lps.
	Qb = 17.40 Lps.


NAJAYO ARRIBA
TAPON Ø3"
Ø3" PVC (SDR-26).
TIERRA AMARILLA
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
V.C. Ø3" HF
Cloracion Simple
L.M. Ø6" PVC (SDR-26).
L.I. Ø6" Acero.
Deposito Regulador superficial H.A., cap= 300 m³.
ZONA BAJA DE RESOLI
V.C. Ø3" HF
TAPON Ø3"
Ø4" PVC (SDR-26).
L.I. Ø6" Acero.
NAJAYO ARRIBA
Deposito Regulador Soterrado (exist.) (a rehabilitar).
Ø3" PVC (SDR-26).
TAPON Ø3"
Ø3" PVC (SDR-26).
L.I. Ø6" Acero.
Ø4" PVC (SDR-26).
Ø4" PVC (SDR-26).
V.C. Ø3" HF
TAPON Ø3"
LA PENCA
Ø3" PVC (SDR-26).
TAPON Ø3"
ZORRA BUENA (EL REFUGIO)
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø3" PVC (SDR-26).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
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TAPON Ø3"
L.I. Ø6" PVC (SDR-21).
Ø4" PVC (SDR-26).
L.I. Ø6" Acero.
TAPON Ø3"
Ø3" PVC (SDR-26).
L.I. Ø6" PVC (SDR-21).
Ø4" PVC (SDR-26).
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TAPON Ø3"
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L.I. Ø6" PVC (SDR-21).
Ø3" PVC (SDR-26).
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TAPON Ø3"
TAPON Ø3"
LA PANADERIA
Ø4" PVC (SDR-26).
L.I. Ø6" PVC (SDR-21).
Ø3" PVC (SDR-26).
TAPON Ø3"
Ø4" PVC (SDR-26).
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Ø3" PVC (SDR-26).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
POZO PRIETO
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø4" PVC (SDR-26).
TAPON Ø3"
Campo de Pozos.
TAPON Ø3"
Ø3" PVC (SDR-26).
L.I. Ø6" PVC (SDR-21).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
TAPON Ø3"
Ø3" PVC (SDR-26).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
TAPON Ø3"
LEYENDA
Obra de Toma: Campo de Pozo
Pozo.
Línea de Impulsión:
Ø6" Acero, L= 1,766.05 m.
Ø6" PVC (SDR-21), L= 2,204.00 m.
Deposito Regulador Superficial H.A., Cap= 300 m³.
Línea Matriz:
Ø6" PVC (SDR-26), L= 60.00 m.
Red de Distribución:
Ø4" PVC (SDR-26), L= 10,359.76 m.
Ø3" PVC (SDR-26), L= 8,119.20 m.
Tapon Ø4", Ø3".
V.C. Ø4", Ø3" H.F.
Tratamiento:
Cloración Simple
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INSTITUTO NACIONAL DE AGUAS POTABLES Y ALCANTARILLADOS

I N A P A

DIRECCION DE INGENIERIA

DEPTO. DE DISEÑO DE SISTEMAS DE ACUEDUCTOS

FICHA TECNICA

REHABILITACION Y AMPLIACION ACUEDUCTO MIRA CIELO- DIOS DIRA, INGENIO NUEVO

PROVINCIA SAN CRISTOBAL

ANTECEDENTES

Este sistema múltiple construido en el año 1990, para abastecer de agua potable a las comunidades de Mira Cielo y Dios Dirá con una población proyectada a 20 años (2010) de 3,560 habitantes, operando por bombeo, además teniendo como componentes las siguientes unidades:

- Fuente: Aguas Subterráneas
- Obra de Toma: Campo de Pozos (3)
- Línea de Impulsión: Ø4" y Ø3" PVC SDR-26 con L = 1,122.00 M.
- Tratamiento: Cloración Simple.
- Almacenamiento: Depósito regulador, superficial de hormigón armado de 52,800 Gls.
- Línea Matriz: Ø6" PVC SDR-26 con L = 20.00 M.
- Red de Distribución: Ø4", Ø3" y Ø2" PVC SDR-26 y 2, L = 10,817.38 M.

Acometidas: 371 unidades.

Tasa de Crecimiento: 3%

Población:	**Al año 1990**	**A 20 años 2010**
	2,225 habitantes	3,560 habitantes
Dotación:	150 lts/hab/día	
Caudales:	4.83 Lps	7.72 Lps

En el año 2013, debido a la deficiencia con que operaba el sistema ocasionada por el crecimiento poblacional de la zona y que de los tres (3) pozos existentes solo uno está en servicio por lo que se elaboró rediseño de Rehabilitación y Ampliación del sistema múltiple, para ser ejecutado a través del INAPA-BID-AECID, siendo las componentes del sistema rediseñado:

- Fuente: Aguas Subterráneas.
- Obra de Toma: campo de pozos (3) existente a rehabilitar (limpieza, aforo y estudio físico-químico y bacteriológico) y construcción de un nuevo campo de pozos (3).

- Línea de impulsión: Ø4” Acero, L=1,014.94 m; Ø3” Acero L= 75.63 m y Ø2” Acero, L=202.40 m.
- Almacenamiento: depósito regulador, soterrado de hormigón armado capacidad 200 m^3 (52,800 Gls) existente a rehabilitar (resane, pintura y verja)
- Línea matriz: Ø6" PVC, L= 15.00 m. (existente)
- Red de distribución: Ø4", Ø3" y Ø2" PVC, L= 10,817.38 m (existente) y a colocar Ø6" PVC (SDR-26), L = 13.30 m; Ø2" PVC (SDR-21), L=2,044.77 m.

Tratamiento: Cloración

Acometidas totales: 585 unidades; 371 unidades (existente) y 214 unidades a instalar

Tasa de crecimiento: 1.6%

Población:	**Año 2013**	**20 años (2033)**
	2,925 habitantes	3,861 habitantes

Dotación: 125 lts/hab/día

	Qmax/d	Qmax/d= 6.982 lps.
Caudales:	5.290 lps	Qmax/h= 11.172 lps.
		Qb. = 10.474 lps.

Este proyecto no se ejecutó, ya que el BID a inicio del año en curso cerró todas sus actividades. En la actualidad 04/2018, dicho proyecto fue evaluado para ser sometido al programa de ejecución de obras del IDDI, a dicho proyecto se le modificaron algunas de sus partidas, siendo los componentes del sistema:

- Fuente: Aguas Subterráneas.
- Obra de Toma: Tres (3) pozos existentes a rehabilitar (limpieza, aforo y estudio físico-químico y bacteriológico), sólo uno (1) está operando y construcción de un nuevo campo de pozos (3). (a construir)
- Línea de impulsión: Ø4” PVC, L=1,062.40 m y Ø2” PVC, L=213.00 m, desde nuevo campo de pozos.
- Tratamiento: Cloración Simple.
- Almacenamiento: depósito regulador, soterrado de hormigón armado capacidad 200 m^3 (52,800 Gls) existente a rehabilitar (resane, pintura y verja)
- Línea matriz: Ø6" PVC. (Existente), L = 10.00 m

- Red de distribución: Ø4” PVC (exist.), L= 2,225.00 m; Ø3” PVC (exist.), L= 1,061.76; Ø2” PVC (exist.), L= 108.00 m y a colocar Ø4" PVC (SDR-26), L =1,061.76 m; Ø3" PVC (SDR-26), L= 9,598.30m y Ø2" PVC (SDR-21), L=190.00 m.

Acometidas totales: 643 unidades; 371 unidades (existente) y 272 unidades a instalar

Tasa de crecimiento: 1.6%

Dotación: 120 lts/hab/día (esta debido a que la zona de fuente de aguas subterráneas es de baja producción).

Población:	**Año 2019**	**20 años (2039)**
	3,217 habitantes	4,419 habitantes

Caudales:	**Año 2019**	**20 Años (2039)**
	Qmax/d= 5.59 lps	Qmax/d= 7.67 lps.
	Qmax/h= 8.04 lps	Qmax/h= 11.05 lps.
		Qb. = 11.51 lps.


MIRA CIELO - DIOS DIRA
LEYENDA
Obra de Toma: Campo de Pozos
Tres (3) Pozos (a rehabilitar).
Línea de Impulsión:
Ø4" PVC (exist.), L= 1,062.40 m.
Ø2" PVC (exist.), L= 213.00 m.
Almacenamiento:
Deposito Regulador Soterrado
H.A., Cap= 200 m³ (a rehabilitar).
Línea Matriz:
Ø6" PVC (exist.), L= 10.00 m.
Red de Distribucion:
Ø4" PVC (exist.), L= 2,225.00 m
Ø4" PVC (SDR-26), L= 1,061.76 m
Ø3" PVC (exist.), L= 2,273.39 m
Ø3" PVC (SDR-26), L= 9,598.30 m
Ø2" PVC (exist.), L= 108.00 m
Ø2" PVC (SDR-21), L= 190.00 m
Tapón Ø4", Ø3", Ø2".
V.C. Ø3" HF
Tratamiento:
Cloración Simple
18°20'55.26" N
70° 7'3.96" O
Deposito Regulador Superficial
H.A. Cap= 200 m³ (a rehabilitar).
Cloración Simple
L.M. Ø6" PVC (exist.).
Ø4" PVC (exist.).
L.I. Ø4" PVC (exist.).
Ø4" PVC (SDR-26).
Ø3" PVC (SDR-26).
Ø3" PVC (SDR-21).
Ø2" PVC (exist.).
Ø3" PVC (exist.).
Ø2" PVC (SDR-21).
Pozo Ac. Niza
POZO #3 (exist.)(a rehabilitar).
18°20'37.87" N
70° 6'41.12" O
L.I. Ø2" PVC (exist.).
POZO #2 (exist.)(a rehabilitar).
18°20'37.06" N
70° 6'38.58" O
POZO #1 (exist.).
18°20'34.32" N
70° 6'40.35" O
MIRA CIELO
DIOS DIRA
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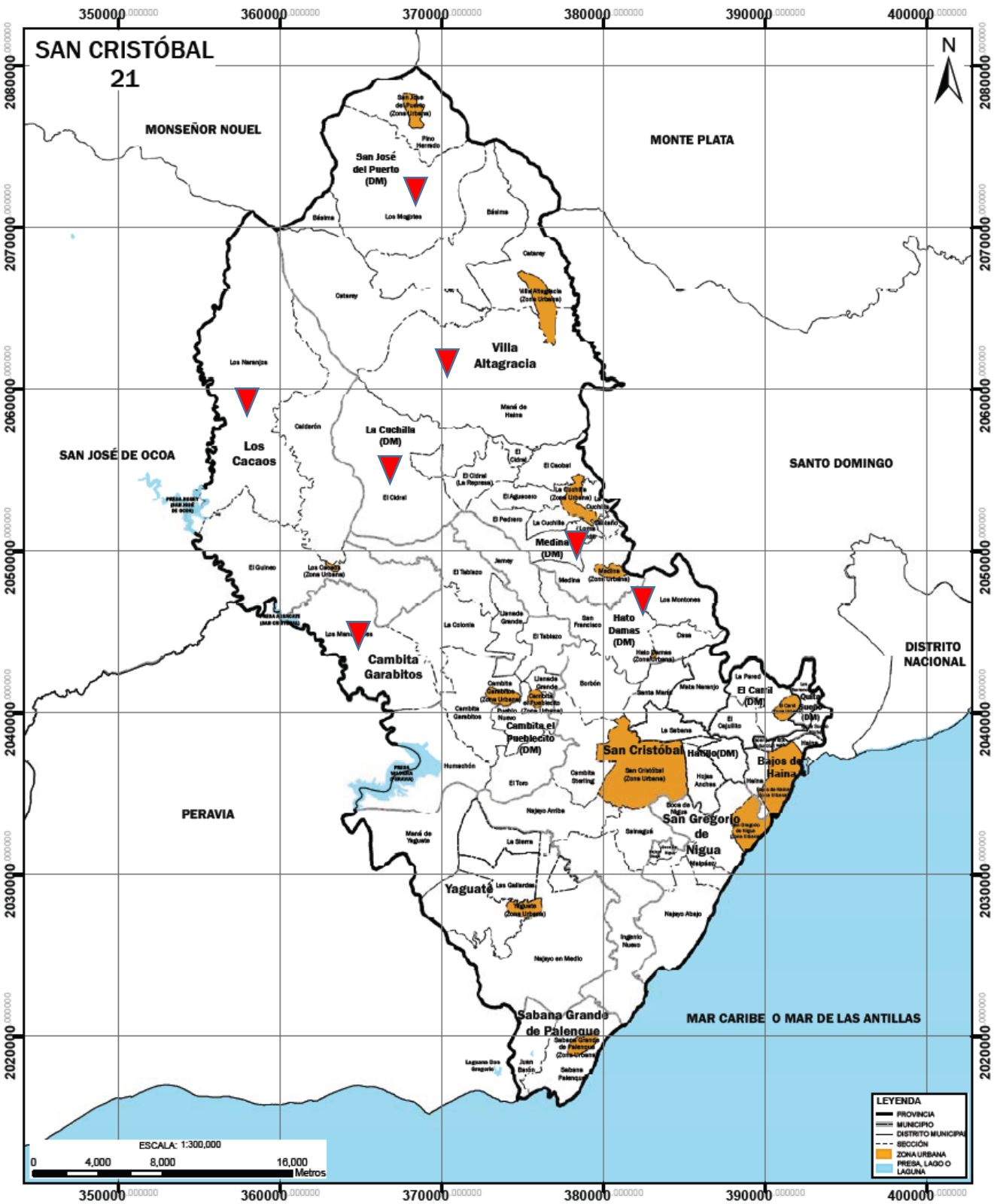
4. Location of Communities Included on the Programme


SAN CRISTÓBAL
21
N
MONSEÑOR NOUEL
MONTE PLATA
SAN JOSÉ DE OCOA
SANTO DOMINGO
DISTRITO NACIONAL
PERAVIA
MAR CARIBE O MAR DE LAS ANTILLAS
San José del Puerto (DM)
Villa Altagracia
Los Cacaos
La Cachilla (DM)
Medina (DM)
Hato Damas (DM)
Cambita Garabitos
Cambita el Pueblecito (DM)
El Carril (DM)
San Cristóbal
Bajos de Haina
San Gregorio de Nigua
Yaguate
Sabana Grande de Palenque
350000
360000
370000
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390000
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2080000
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ESCALA: 1:300,000
0
4,000
8,000
16,000
Metros
LEYENDA
PROVINCIA
MUNICIPIO
DISTRITO MUNICIPAL
SECCIÓN
ZONA URBANA
PRESA, LAGO O LAGUNA

Annex 2. Total Budget and Output-level Notes (in USD)

Description		Total	Y1	Y2	Y3	Y4	Notes
Outcome 1: Implemented climate resilient management of water resources by 30 small rural communities of San Cristóbal							
Output 1.1 Community water supply and sanitation management plans developed for 30 communities to incorporate climate change-related risks							
	Local expert	31,200.00 ok	7,800.00	7,800.00	7,800.00	7,800.00	20% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	19,800.00 ok	4,950.00	4,950.00	4,950.00	4,950.00	15% of Field Coordinator @ $2,750/month x 48 months.
	Goods and services	29,695.00 ok	12,595.00	5,700.00	5,700.00	5,700.00	Meeting organization and venue costs for communities, government and key local institutions. 7 training events @ $2,850/event + short-time consultancy on planning @ $9,745
	Travel	8,750.00 ok	1,250.00	2,500.00	2,500.00	2,500.00	Travel support for workers and community members to attend workshops to develop community water supply and management plans @ $1,250/event.
	Travel	24,000.00 ok	6,000.00	6,000.00	6,000.00	6,000.00	12.9% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.1		**113,445.00**	**32,595.00**	**26,950.00**	**26,950.00**	**26,950.00**	
Output 1.2: Water supply increased for 30 small communities under change climate impacts							
	Local expert	70,200.00 ok	17,550.00	17,550.00	17,550.00	17,550.00	45% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	79,200.00 ok	19,800.00	19,800.00	19,800.00	19,800.00	60% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	50,400.00 ok	15,120.00	20,160.00	15,120.00	-	70% of Community Specialist @ $2,400/month x 30 months.
	Goods and services	6,133,830.00 ok	613,383.00	1,840,149.00	2,453,532.00	1,226,766.00	Detailed design, implementation and community training for: water supply for 4,260 households @ $725.11/home + doméstic sanitation sercives for 2,695 households @ $941.11/home.
	Travel	84,000.00 ok	12,000.00	24,000.00	24,000.00	24,000.00	45.2% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.2		**6,417,630.00**	**677,853.00**	**1,921,659.00**	**2,530,002.00**	**1,288,116.00**	
Output 1.3: Measures for water conservation under climate impacts implemented for 2,722 hectares							
	Local expert	39,000.00 ok	9,750.00	9,750.00	9,750.00	9,750.00	25% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	26,400.00 ok	6,600.00	6,600.00	6,600.00	6,600.00	20% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	21,600.00 ok	6,480.00	8,640.00	6,480.00	-	30% of Community Specialist @ $2,400/month x 30 months.
	Goods and services	1,518,925.00 ok	151,892.50	455,677.50	607,570.00	303,785.00	Detailed design, implementation and community training for re-afforestation schemes for 2,722 ha @ $558.02/ha.
	Travel	63,000.00 ok	9,000.00	18,000.00	18,000.00	18,000.00	33.9% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 1.3		**1,668,925.00**	**183,722.50**	**498,667.50**	**648,400.00**	**338,135.00**	
TOTAL OUTCOME 1		**8,200,000.00**	**894,170.50**	**2,447,276.50**	**3,205,352.00**	**1,653,201.00**	

Annex 1. Total Budget and Output-level Notes (in USD)

Description		Total	Y1	Y2	Y3	Y4	Notes
Outcome 2: Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according their respective competences							
Output 2.1: A set of manual and other materials on best practices for water and sanitation management are developed, including a fully operational website							
	Local expert	4,500.00 ok	-	-	-	4,500.00	12.5% of Communications Expert @ $3,000/month x 12 months.
	Goods and services	8,550.00 ok	-	-	-	8,550.00	Meeting organization and venue costs for communities, government and key local institutions. 3 training events @ $2,850/event.
	Goods and services	3,750.00 ok	-	-	-	3,750.00	Travel support for workers and community members to attend workshops on best practices for resilient water and sanitation management @ $1,250/event.
	Goods and services	3,500.00 ok	-	-	-	3,500.00	Detailed design, implementation and training for: a fully operational website and relevant social networking and social media.
	Goods and services	8,700.00 ok	-	-	-	8,700.00	Promo materials, including printing, broadcasting and social media.
	Travel	15,000.00 ok	-	3,000.00	6,000.00	6,000.00	8.1% of travel costs for regular monitoring visits by programme and government staff.
Sub total Output 2.1		**44,000.00**	**-**	**3,000.00**	**6,000.00**	**35,000.00**	
Output 2.2: A Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal							
	Goods and services	6,000.00 ok	1,500.00	1,500.00	1,500.00	1,500.00	4 annual meetings with ministries and other policy-makers @1,500 $/meeting
	Local expert	14,000.00 ok	3,500.00	3,500.00	3,500.00	3,500.00	Local expert @ $350/day x 10 days x annual meeting.
	Travel	12,000.00 ok	3,000.00	3,000.00	3,000.00	3,000.00	Travel support for top institutional members to attend high level meetings @ $3,000/meeting.
Sub total Output 2.2		**32,000.00**	**8,000.00**	**8,000.00**	**8,000.00**	**8,000.00**	
Output 2.3: Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihoods activities institutionalized in 30 communities							
	Local expert	15,600.00 ok	3,900.00	3,900.00	3,900.00	3,900.00	10% of Water Resource Management Expert @ $3,250/month x 48 months.
	Local expert	6,600.00 ok	1,650.00	1,650.00	1,650.00	1,650.00	5% of Field Coordinator @ $2,750/month x 48 months.
	Local expert	31,500.00 ok	-	-	-	31,500.00	87.5% of Communications Expert @ $3,000/month x 12 months.
	Goods and services	19,950.00 ok	-	5,700.00	5,700.00	8,550.00	Meeting organization and venue costs for communities, government and key local institutions. 7 training events @ $2,850/event.
	Goods and services	8,750.00 ok	-	2,500.00	2,500.00	3,750.00	Community planning workshops: Travel support for workers and community members to attend workshops to develop community water supply and management plans @ $1,250/event.
	Goods and services	19,600.00 ok	-	-	-	19,600.00	Promo materials, including printing, broadcasting and social media.
Sub total Output 2.3		**102,000.00**	**5,550.00**	**13,750.00**	**13,750.00**	**68,950.00**	
TOTAL OUTCOME 2		**178,000.00**	**13,550.00**	**24,750.00**	**27,750.00**	**111,950.00**	

Annex 1. Total Budget and Output-level Notes (in USD)

Description	Total	Y1	Y2	Y3	Y4	Notes
Programme Implementation / Execution						
Total Implementation Cost	**8,378,000.00**	**907,720.50**	**2,472,026.50**	**3,233,102.00**	**1,765,151.00**	
Programme Execution Costs	795,910.00	251,530.00	179,080.00	181,460.00	183,840.00	Less than or equal to 9.50%
Total Programme Costs	**9,173,910.00**	**1,159,250.50**	**2,651,106.50**	**3,414,562.00**	**1,948,991.00**	
Implementing Entity Fee	779,782.35					Less than or equal to 8.50%
Total Amount Requested	**9,953,692.35**					

Annex 2a - NIE Management Fee

The programme management fee (8.5 % of the total budget) will be used by IDDI, the National Implementing Entity, to cover the costs associated with the provision of general management support of the portfolio of projects. Following table shows a breakdown of NIE estimated costs

ITEM	Amount	
	USD	%
Finance and Budget Management	249,530	32.0%
Performance Management and M&E	413,285	53.0%
Information and Communications	46,787	6.0%
Legal Support and compliance with audit requirements	38,989	5.0%
Traveling	31,191	4.0%
TOTAL	**779,782**	**100%**

1. **Finance and Budget Management:**

- Ensuring that financial management practices comply with AF requirements and support audits as required
- Manage, monitor and track AF financial resources including allocating and monitoring expenditures
- Ensuring financial reporting complies with AF standards; and
- Ensure cost-efficient procurement processes

2. **Performance Management and M&E:**

- Supervision of preparation of annual projects reports and projects evaluations,
- Provide oversight of the monitoring and evaluation function of the Executing Agencies
- Provide technical support in the areas of risk management, screening of financial, social, environmental and risk criteria;
- Provide guidance in establishing performance measurement processes; and
- Technical support on methodologies, TOR validation, identification of experts, results validation, and quality assurance.

3. **Information and Communications:**

- Information management systems
- Project management databases to track and monitor project implementation
- Dissemination of results.

4. **Legal Support and compliance with audit requirements:**

- Legal advice during the implementation of the project.

5. **Travel:**

- Project supervision mission and steering committee meetings.

Annex 2b - breakdown of the execution costs

Increase 0.0%
Inflation 2.2%

	Y1				Y2				Y3				Y4				TOTAL
ITEM	Qty	Unit	$/Unit	Cost	Qty	Unit	$/Unit	Cost	Qty	Unit	$/Unit	Cost	Qty	Unit	$/Unit	Cost	
Programme Manager	12	m	4,000	48,000	12	m	4,088	49,056	12	m	4,178	50,135	12	m	4,270	51,238	198,429
Climate specialist	12	m	2,000	24,000	12	m	2,044	24,528	12	m	2,089	25,068	12	m	2,135	25,619	99,215
Financial specialist	12	m	2,000	24,000	12	m	2,044	24,528	12	m	2,089	25,068	12	m	2,135	25,619	99,215
Accountant	12	m	1,600	19,200	12	m	1,635	19,622	12	m	1,671	20,054	12	m	1,708	20,495	79,372
Tech. officer	12	m	1,250	15,000	12	m	1,278	15,330	12	m	1,306	15,667	12	m	1,334	16,012	62,009
Adm. officer	12	m	1,250	15,000	12	m	1,278	15,330	12	m	1,306	15,667	12	m	1,334	16,012	62,009
Driver/ messenger	12	m	700	8,400	12	m	715	8,585	12	m	731	8,774	12	m	747	8,967	34,725
Office furniture				9,736													9,736
Computers and IT				18,000				300				300				300	18,900
Stationary & supplies				3,500				1,600				1,600				1,600	8,300
Vehicle				40,000				2,500				2,500				2,500	47,500
M&E and Audits				24,000				15,000				17,500				20,000	76,500
TOTAL				**248,836**				**176,379**				**182,333**				**188,362**	**795,910**

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Annex 3. Disbursement Schedule

	Upon signature of Agreement	1st Disbursement	One Year after Project Start	Year 3	Year 4	Total
Schedule date	Jan-19		Jan-20	Jan-21	Jan-22	
Programme funds		718,673.46	2,818,412.18	3,757,882.91	1,878,941.45	9,173,910.00
Implementing Entity Fee	233,934.71	42,761.07	167,695.52	223,594.03	111,797.02	779,782.35
Total	**233,934.71**	**761,434.53**	**2,986,107.71**	**3,981,476.94**	**1,990,738.47**	**9,953,692.35**

Annex 4. Project Plan and Gantt Chart

	Activity	Y1				Y2				Y3				Y4			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Programme Inception																
Outcome 1: Implemented climate resilient management of water resources by 30 small communities of San Cristóbal																	
1.1	**Community water supply and management plans developed for 30 small communities to incorporate climate change-related risks (Output 1.1)**																
1.1.1	Series of training workshops																
1.1.2	Community plans established via participatory approaches																
1.1.3	Support to communities in the continued evolution and implementation of the plans by the programme																
1.1.4	Periodical workshops for all communities																
1.2	**Water supply increased fo 30 communities under climate impacts (Output 1.2)**																
1.2.1	Design and construction of water supply and storage infrastructure and training of communities in use and maintenance of this																
1.2.2	Support to communities in the use and maintenance of infrastructure by the programme																
1.4	**Measures for water conservation under climate impacts implemented for 2,722 hectares (Output 1.3)**																
1.4.1	Design and development of reafforestation schemes and training of communities in use and maintenance of this																
1.4.2	Support to communities iin the ongoing management of schemes by the programme																
Outcome 2: Increased technical capacity of communities and institutions to assess impacts, vulnerability and adaptation needs according their respective competences																	
2.1	**A set of manual and other materials on best practices for water management and resilient livelihood are developed, including a fully operational website (Output 3.1)**																
2.1.1	Identification and documentation of best practices																
2.1.2	Dissemination of best practices																
2.1.3	Production and printing of lessons learnt documentation																
2.2	**A Provincial Climate Change Adaptation Monitoring Committee established in San Cristóbal (Output 3.2)**																
2.2.1	High level validation workshops ensuring ministerial level adoption of the plans and the importance of integrating these into community level plans																
2.2.2	Ongoing technical support and regular meetings to reach committee long-term development																
2.3	**Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihoods activities institutionalized in 8 municipalities (Output 3.3)**																
2.3.1	Production and printing of lessons learnt documentation																
2.3.2	Dissemination events																
3. Programme Implementation / Execution																	
3.1	**Programme Management Unit Established and Operational**																
3.1.1	Programme Staff Recruited																
3.1.2	Office facilities established																
3.1.3	Management Unit operational																
3.1.4	Establish programme exit strategy																
3.2	**Programme Monitoring and Evaluation**																
3.2.1	Inception report																
3.2.2	Quarterly reporting																
3.2.3	Continuous monitoring of activitiesn the ground																
3.2.4	Annual audits																
3.2.5	Programme evaluation (2)																
3.2.6	Programme Technical Report																

Annex 5. Selection of Target Communities based on Vulnerability Assessment

Following the recommendation made by stakeholders during the various consultation meetings, the level of vulnerability of water resources and current livelihoods are the key consideration in selecting the target municipalities under this programme. In the absence of a comprehensive municipal-level vulnerability ranking, a simple method was developed to rank the vulnerability of municipalities within the San Cristobal province, building on existing literature.

The process consists of the following steps:

1) The municipalities within the province were ranked according to the programme inclusion criteria, which include:

    a. Communities which 50% or more of its households are poor

    b. Communities with a population of at least 500 people; and

    c. Other criteria such as commitment, reasonableness or inclusivity.

Data about socioeconomic conditions of municipalities was obtained from the most recent National Households Survey for Multiple Purposes (ENHOGAR), cross-checked with the statistics reported by IX National Census of Population and Housing (ONE, 2014). The Municipalities' vulnerabilities to climate-induced stress regarding to water resources livelihoods, agriculture (under droughts and floods) and health, were obtained from *Critical Points of the Vulnerability to Climate Change and the Variability in the Dominican Republic* (Izzo et al., 2012). Based on these and other information, data reported by international organizations, a workshop with community key-players, a preliminary climate change vulnerability assessment was prepared[1].

Above mentioned study provides a municipality-level breakdown for the eight most vulnerable regions in the province (Municipalities of *Los Cacaos*, *Villa Altagracia*, and *Cambita Garabitos*, y Municipal Districts of *Medina*, *Cambita el Pueblecito*, *La Cuchilla*, *Hato Damas*, and *San José del Puerto*). This municipal-level analysis was then used to rank the vulnerability of the communities within the eight territories. It is worth noting that the study's findings are consistent with earlier studies showing that the above-mentioned territories are the most vulnerable in terms of water resources and livelihoods. A major limitation of the study is it does not have a strong research background (i.e., academic literature to build on), so obtained results are highly empirical.

[1] *Informe 1: Pre-Identificación de Comunidades Beneficiarias*, elaborated by Brightline Institute. This report implies a preliminary a Community-based Climate Vulnerability Assessment and Adaptation Planning, which applied four tools: (i) an *Adaptive Capacity Assessment* checklist; (ii) a *Household Vulnerability Survey*; (iii) a *Community Climate Vulnerability and Risk* analysis; and (iv) a *Priority Risk Identification Tool*.

2) Therefore, a scoring system was developed to approximate vulnerability. The municipalities were scored according to several indicators or which necessary data was available, according following categories:

   - agriculture under droughts,
   - agriculture under floods
   - water drinking water
   - water for irrigation
   - Protected areas and Biological diversity

Other categories included energy, tourism, human settlements, livelihood, flora and fauna, public health, food security, community organization, and disaster risk management. A vulnerability index was calculated for all communities and, based on the total points, the communities were then ranked vis-à-vis to other municipalities of the province.

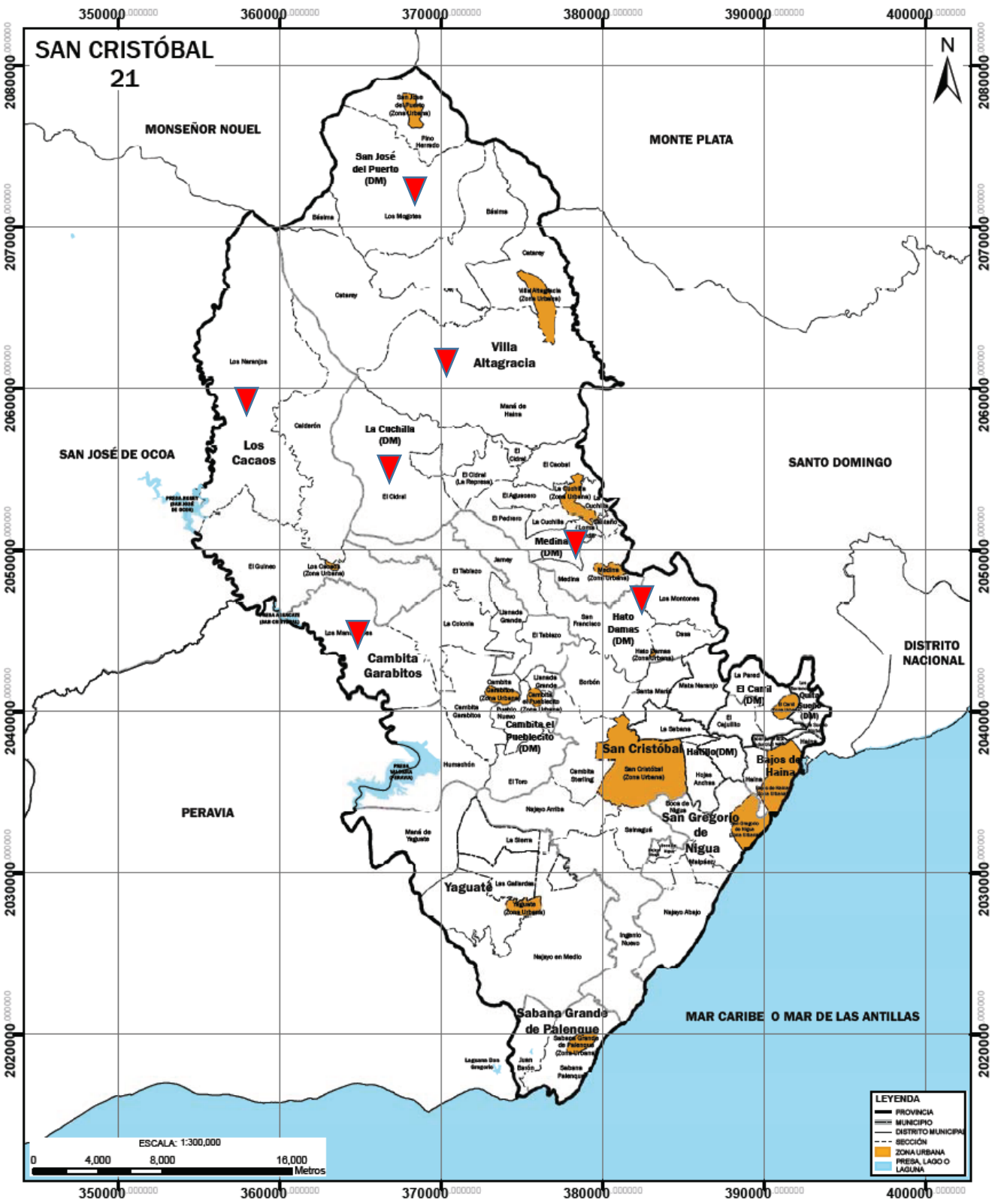
3) Finally, a "global index" each territory (municipality and/or municipal district) vis-à-vis other territories in the province was calculated. The municipality with the highest index is the most vulnerable. The eight most vulnerable municipalities of the province were then selected to serve as the target territories. Initially, it was planned to do a correction to make sure that the target municipalities are sufficiently spread out across basins and ecological zones, thereby ensuring that AF funds provide optimized learning and knowledge. However, at the end of the ranking process, it was realized that the selected municipalities are already sufficiently spread out in various locations and exhaustively cover all major sub-basins and ecological zones in the province of San Cristobal.

Another factor that was initially considered in municipalities selection is the number of ongoing development projects in a particular municipality that is relevant to adaptation. After mapping of relevant ongoing initiatives in the Dominican Republic, it was revealed that there are no-other projects that are relevant to the proposed programme (i.e., water resources management livelihood diversification, agricultural improvement, sustainable water management, etc.).

Municipalities Profiles

Communities	Households in Poverty	Water			Livelihoods				Flora and Fauna		Human Health	Food Security	Community Organization	Risks Management	Global Vulnerability
		Consumption	Irrigation	Ecosystem	Agriculture	Livestock	Forestry	Others	Flora	Fauna					
Los Cacaos	**1,586**	**4.25**	**4.00**	**2.75**	**5.00**	**4.75**	**4.00**	**5.00**	**3.00**	**3.00**	**4.00**	**5.00**	**4.50**	**4.50**	**3.73**
Los Cacaos		4	2	2	5	5	4	5	3	3	4	5	4	4	
El Guineo		4	5	3	5	5	4	5	3	3	4	5	5	5	
Los Naranjos		5	4	3	5	5	5	5	3	3	4	5	4	5	
Calderón		4	5	3	5	4	3	5	3	3	4	5	5	4	
Medina (D.M.)	**1,084**	**4.20**	**4.00**	**3.60**	**4.60**	**4.00**	**4.40**	**4.00**	**3.00**	**3.00**	**4.20**	**4.20**	**4.40**	**3.80**	**3.56**
Medina		4	2	2	4	4	4	4	3	3	3	3	4	3	
Loma Verde		4	5	4	5	4	5	5	3	3	4	4	5	4	
El Pedrero		5	5	4	5	5	5	4	3	3	5	4	4	5	
Castaño		4	4	5	4	4	5	4	3	3	5	5	4	3	
Medina		4	4	3	5	3	3	3	3	3	4	5	5	4	
Cambita Garabitos	**3,013**	**4.33**	**3.83**	**3.50**	**4.00**	**4.00**	**4.00**	**4.17**	**3.00**	**3.00**	**4.50**	**4.50**	**4.17**	**3.83**	**3.51**
Cambita Grabitos		4	1	2	3	4	4	5	3	3	4	5	4	4	
Cambita Garabitos		4	4	5	4	4	5	4	3	3	5	5	4	3	
El Fundo		5	5	3	4	4	3	4	3	3	4	4	5	4	
Arroyo Higuero		4	4	5	4	4	5	4	3	3	5	4	4	3	
Los Manantiales		5	4	3	5	4	3	4	3	3	4	4	4	5	
El Tablazo		4	5	3	4	4	4	4	3	3	5	5	4	4	
La Cuchilla (D.M.)	**1,350**	**4.17**	**3.50**	**2.33**	**4.33**	**4.17**	**3.83**	**3.83**	**3.00**	**8.00**	**4.00**	**4.50**	**4.00**	**3.50**	**3.44**

La Cuchilla (urban area)		4	2	2	3	3	2	4	3	33	3	4	4	4	
Los Algarrbos		4	1	2	5	5	4	5	3	3	4	5	4	4	
El Aguacero		5	4	3	5	5	5	4	3	3	4	5	4	4	
El Caobal		4	5	3	5	4	3	4	3	3	4	4	5	4	
El Cidral		4	4	2	4	3	5	3	3	3	5	5	4	2	
El Cidral (La Represa)		4	5	2	4	5	4	3	3	3	4	4	3	3	
Cambita El Pueblecito (D. M.)	**1,301**	**4.25**	**3.00**	**2.50**	**5.00**	**4.25**	**4.25**	**3.75**	**3.00**	**3.00**	**4.00**	**4.25**	**3.75**	**4.25**	**3.39**
Cambita El Pueblecito		4	3	2	5	4	4	4			3	3	3	4	
Llanada Grande		4	1	2	5	5	4	3	3	3	4	5	4	4	
Pueblo Nuevo		5	4	3	5	4	5	3	3	3	4	5	4	4	
El Toro		4	4	3	5	4	4	5			5	4	4	5	
Hato Damas (D.M.)	**2,198**	**3.40**	**2.00**	**2.40**	**4.20**	**4.20**	**4.00**	**4.60**	**3.00**	**3.00**	**4.20**	**4.80**	**4.60**	**3.40**	**3.29**
Hatos Damas		3	1	2	4	4	4	4	3	3	4	5	5	3	
Los Montones		4	2	2	5	4	4	5	3	3	4	5	4	4	
Dasa		4	3	3	4	4	5	5	3	3	4	5	4	3	
San Francisco		3	2	3	4	5	3	5	3	3	4	4	5	4	
Jamey		3	2	2	4	4	4	4	3	3	5	5	5	3	
Villa Altagracia	**6,697**	**3.00**	**2.67**	**2.67**	**4.00**	**4.00**	**4.00**	**4.00**	**3.00**	**3.00**	**4.33**	**5.00**	**3.67**	**4.00**	**3.25**
Villa Altagracia		3	2	3	4	4	3	4	3	3	4	5	4	4	
Catarey		3	3	2	4	5	5	4	3	3	4	5	4	4	
Maná de Haina		3	3	3	4	3	4	4	3	3	5	5	3	4	
San José del Puerto	**1,485**	**3.00**	**2.50**	**3.50**	**4.00**	**4.00**	**3.75**	**4.00**	**3.00**	**3.00**	**4.00**	**4.00**	**4.25**	**3.50**	**3.19**
San José del Puerto		3	1	3	3	3	3	3	3	3	5	4	5	4	
Básima		2	2	4	4	5	4	4	3	3	4	5	4	3	
Los Mogotes		4	3	4	5	4	3	5	3	3	3	4	5	4	
Pino Herrado		3	4	3	4	4	5	4	3	3	4	3	3	3	
Households in Poverty	**18,714**														
Included communities	**37**														
Municipalities/ Districts	**8**														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SANTO DOMINGO
DISTRITO NACIONAL
PERAVIA
MAR CARIBE O MAR DE LAS ANTILLAS
San José del Puerto (DM)
Villa Altagracia
Los Cacaos
La Cuchilla (DM)
Medina (DM)
Hato Damas (DM)
Cambita Garabitos
Cambita el Pueblecito (DM)
El Carril (DM)
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DISTRITO MUNICIPAL
SECCIÓN
ZONA URBANA
PRESA, LAGO O LAGUNA

Annex 6. Summary on Community Consultation

Consultation Meeting with Community Representatives from San Cristobal

Proposal Development "Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme"

Minutes of Meetings

Date 1: 11 December 2017
Time: 8:30 AM to 6:30 PM
Place 1: Casa de la Mujer Villa Altagraciana (CAMUVA), Villa Altagracia

Date 2: 11 December 2017
Time: 8:30 AM to 6:30 PM
Place 2: Instituto Politécnico Loyola (IPL), San Cristóbal

1. Introduction

(a) As the host of the consultation meetings, executives from CAMUVA and IPL (in respectively meetings) welcomed the participants. Executives of Brightline Institute served as co-chair and primary facilitator of the meetings. It was explained that the meetings are a part of a broader effort of the Dominican Institute of Integral Development (IDDI) to elicit stakeholder inputs to the Dominican Republic's programme proposal to the Adaptation Fund Enhancing climate resilience in San Cristóbal Province, Dominican Republic – Integrated Water Resources Management and Rural Development Programme.

(b) It was reiterated the commitment of IDDI, and key government institutions as the Ministry of Environment and Natural Resources and the National Institute for Drinking Water and Sewerage (INAPA), to make the programme proposal development a participatory process. They motivated and encouraged participants to participate in the discussions and to share their ideas on how to adapt to climate change in their communities.

(c) Following, participants self-introduced themselves. Vast majority of them are leaders in their respective communities and/or representatives of local organizations and committees. There was a total of 40 participants representing areas as Villa Altagracia, Medina, Los Cacaos, San Cristóbal, etc. and women organizations, groups of farmers, neighbors' boards, and others. The list of participants participant in the consultations (and some pictures) are attached.

(d) Representatives from provincial offices of the Ministry of Environment and INAPA, also introduced themselves. They spoke about its technical background and nature of their work,

and also delivered their remarks about the proposal. In general, they were supportive and encouraged the participants to share ideas and contribute to strengthening the proposal.

2. Discussion on the Proposal

(e) An officer from Brightline Institute presented the draft project proposal with focus on the concrete activities that the government institutions and local organizations will carry out if the proposal is successful. She explained that Adaptation Fund main strength is the emphasis is on concrete activities that have been successfully tested in communities. She also explained how the proposal fits in with the Dominican Republic's National Development Strategy 2030.

(f) The presentation was followed by a general discussion on the draft proposal. The key issues that emerged from the discussion covered the process of proposal development, activities that the community representatives want to carry out to help them manage climate change impacts, and the principles of implementation that should be integrated into the proposal.

(g) The participants asked about the process of developing the proposal. In this context, it was explained that a series of meetings among IDDI and Government Institutions, mostly the Ministry of Environment and Natural Resources have been carried out starting with a first meeting in August 2016. Other meetings with government agencies (as INAPA) and civil society organizations representatives (ProNatura, INTEC, etc.) that were carried out were also recalled. Current meetings with community representatives is the key aspect of consultation.

(h) It was also explained that IDDI is the National Implementation Entity and the Ministry of Environment and INAPA are top Execution Agencies. Brightline Institute has been requested by IDDI to assist in developing the proposal and to support advice and other requirements from the Adaptation Fund.

(i) The participants lauded the proposal's focus on livelihoods. They mentioned that in the Province, there is a strong link between inability to manage climate impacts on livelihoods and environmental degradation. For example, if the government could support them the communities during the off-season (when farming is not possible), cutting trees for charcoal could be minimized. Similar, some women told that if more jobs are created they can to receive more income and support even more their families, improving their lives.

3. Stakeholders Inputs

(j) Participants suggested the inclusion of the following activities in the proposal:

a. Concern that programme is more focused on to build new water infrastructure (more expense) instead to rehabilitate the existing one.

b. To include livestock and animal husbandry.

c. Concern that community development brings non-climate problems that aggravate the impacts of adverse climates, such as growing population, deforestation, and non-sustainable agriculture.

d. Concern that dry season gardening activities be compromised if any water shortage occurs. This case would be terrible for women and their employees under.

e. For fishing farming, gender roles should be clarified: the construction of fish ponds would be more suitable for men, and women will be capable of fish processing-related activities.

f. Concern that measures for re-afforestation be lost if occurs any forest fire.

g. Planting of trees with economic value, such as mango, avocado, macadamia, etc.

h. The implementing/ executing agencies should make sure that the activities are implemented on the ground as envisioned in the project design.

i. Development interventions in the past have created unsustainable or duplicated associations and committees in addition to the statutory bodies.

j. To include interventions related to processing and commercialize bottled water and drinking water to increase the community income.

k. Processing activities should be recommended by women, particularly processing of fish, butter, honey. Soap-making could be included.

(k) The participants welcomed the initiative to access funding and praised the Adaptation Fund. they hace some concerns that implementation should be carried out properly and that the implementing agencies should learn from the weaknesses of earlier projects of similar nature. The following implementation principles were suggested:

a. Establishment of any infrastructure/ livelihoods schemes should be supplemented by awareness raising and education so that the people could see its importance.

b. Take into account the social fabric of communities, particularly their structures, institutions, knowledge and experience, and traditional practices.

c. The IDDI and executing agencies should make sure that the activities are implemented on the ground as envisioned in the programme design.

With respect to implementation arrangements, the participants empathized the importance of to invest most of the resources directly on the communities, trough the existing governance structures, but at the same time recognize that in some communities, existing structures may not be necessarily the most supportive for delivering adaptation. The management structure at the community level could vary from one community to another. However, participants are optimist when points out that some communities have created associations, committees and bodies (i.e., risk management committees, water user associations, etc.) highly successful. The participants upheld the important role of the Ministry of the Environment as a key player.

4. Group Discussions

After lunch, workshop was focused to deeper discussions on the advantages and disadvantages of specific water resource management and livelihoods interventions. The participants formed work tables. The group discussions were guided by a questionnaire that probes (in their opinion) the advantages and disadvantages of proposed interventions under the proposal and whether or not the participants recommend the implementation of such measures in their communities.

At the end, tables reported the results of their discussions at a plenary discussion. Key results are summarized below.

1. Community Water Management

Technology	It has been used in your community?	Advantages?	Disadvantages? Problems?	Would you recommend it?
Water Supply / Storage				
Wells	Yes	Well-known in many places.	Requires too much labour to build.	Yes
Contour bunds	Yes	Prevent soil erosion. Leads to more available water in farms.	Could lead to a water excess.	Yes
Small scale dams	Yes	Best for human and animals. Can provide irrigation during dry season. Easy to build. Provide reliable water.	Difficult to control the water if is used with different purposes. Expensive.	Yes
Boreholes	Yes	Good for supply domestic needs. Safe for drinking. Reliability/ diseases-free.	Very expensive for the communities. It takes a lot of maintenance.	Yes
Conservation tillage techniques	No	n/A	n/A	n/A
Rainwater harvesting	Yes	Suitable for drinking purposes. Can be placed close to houses or schools.	Water can be polluted if not appropriated storage/ covered.	Yes
Dugouts	Yes	Useful for dry season gardening. Keeps animals with farms. Reduces water shortages. Can be used to grow fish/ recreation.	Person or animals can fell into them if are not fenced. Can be polluted easily and dry-up quickly.	Yes
Irrigation				
Shallow well irrigation	Yes	n/A	n/A	n/A
Pitcher irrigation	Yes	Can improve the lands productivity to more water-demanding crops.	Very expensive for the communities. It takes a lot of maintenance.	Yes
Sub-surface pipe irrigation	No	n/A	n/A	n/A
Flood management				

Drain channels/ ditches to manage flood waters.	Yes	Can avoid the loss of crops and soil during flood.	n/A	n/A

2. Livelihood Diversification

Technology	It has been used in your community?	Advantages?	Disadvantages? Problems?	Would you recommend it?
Dry season gardening	Yes	Increase income. Reduce food shortages. Provide feed for animals during dry season. Create jobs.	Can potentially degrade land if you don't leave land fallow. Could be sensitive to pest/ disease attacks if there's rain in the dry season.	Yes
Bee keeping	Yes	Can provide food, medicine, and cosmetic. It's an opportunity for income generation. It's an incentive to protect trees.	Bees can be dangerous to animals and humans. It needs a lot of attention and to establishment would be difficult to manage without support.	Yes
Products processing (food, medicinal, soap, handicrafts, cosmetics, etc.)	Yes	Can be useful to create jobs, medicines, food and other economic assets.	Necessary knowledge and experience could be not available in all places. Takes a lot of time and can be expensive.	Yes
Tree nurseries/ wood lots	No	n/A	n/A	Yes
Community based fish farms	No	Helps to preserve water bodies. Provides income	Initial capital requirement could be high. Community has no technical know-how. Uses a lot of water.	Yes
Small ruminants	Yes	Manure can be uses as fertilizer. Livelihood is diversified. Can to be used to create value chains.	Dependence of the rainfall/ water availability.	Yes
Bottling water facilities	Yes	Easy to install and to operate. Increase income/ jobs. Can be suitable for hotels and commerce.	Initial capital requirement could be high. Community has no technical know-how. Uses a lot of water.	Yes

5. Community Selection Discussion

The final part of the meeting was dedicated to a discussion on the factors that should guide the selection of programme target areas. The facilitators made it clear that the communities will not be decided in this meeting. The participants unanimously suggested that the extent of vulnerability to livelihoods be the key criterion that should guide the selection of community.

In selected municipality, communities will then be chosen based on the following considerations:

a. For selecting target communities for community-based water management activities:

- Communities are very committed to do activities themselves already
- seriousness of the community and/ or interest of the people
- Population of the community
- Availability of resources (land, water) in the community to carry out the intervention
- Accessibility of community
- Severity of water problem
- Sustainability (i.e. how the community propose to sustain the project after-programme)

b. For selecting target communities for livelihood diversification activities:

- Levels of poverty
- Peaceful and stable communities that can show potential to deliver the project
- Availability of markets
- Availability of raw materials
- Availability of similar projects at the community level
- Communities with high gender sensitivity
- Viability of an activity in a particular community
- Suitability of the weather
- Group that is viable and not just formed because there is money
- Availability of human resource/technical persons
- Consistency of proposed activity with customary beliefs
- Experience from past projects
- Existence of local expert knowledge
- Sustainability (i.e. how the community propose to sustain the project after-programme)

6. Closing

As participants expressed interest into participate cooperatively and collaboratively as partners with the programme, they understand that the programme and communities cannot create over-expectations in order to create more trust. In opinion of the attendants, the proposed programme has been developed in considerably greater detail, most important elements of the proposal development were explained, and the results of the community consultation have been included rationally in the context of the full proposal. They are in agree into provide more information and/or support if it's requested. In general, all of them endorsed the proposal.

Executives from CAMUVA and IPL closed the (respective) meetings. Representatives of Brightline Institute explained the next steps of the process and thanked the participants for their active participation during the meeting. Everybody was very satisfied with the programme.

7. Attendance of Stakeholders

Enhancing climate resilience in San Cristóbal Province, Dominican Republic
Integrated Water Resources Management and Rural Development Programme

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Reunión de: Consulta Comunidades
Lugar: Villa Altagracia (CAMUVA)
Fecha: 11/12/17

Nombre	Institución	Teléfono	Correo	Firma	Sexo
1. Esteban [illegible]	Federacion	809-386-4123	—	[illegible]	M
2. Cnel. Misael Alexis	Policia Municipal	825-216-4406	km.alexis@gmail.com	Misael Alexis	M.
3. Amadiz Hernandez	CAMUVA	829-723-3513	Amadyz Hernandez.cms09	Amadiz Hernandez	[illegible]
4. Alberto Ramirez	Batallon communitario	809-352-9187	Aramirez alcide@Gmail.com	[illegible]	M
5. Perfecto Jacinto S.	JUVAC	809-964-2680	Perfecto Jacinto@gmail.com	[illegible]	M
6. Yudelka Alt. Reyes	CAMUVA	849-752-4688	Yudelka59@Hotm	[illegible]	F
7. Saida Altagracia Peralta	Quisqueya aprendiendo	809-319-9466	—	[illegible]	F
8. Yissell Baret	Ministerio de la MUJer	829-884-9751	oscaricamillo@gmail.c	Baret	F
9. Carmen D. Mailo D.	Liceo Feelix E. Mejía	829-7122058	Dennis Mailo@gm	Carmen D. Mailo	F.
10. Delia Ma Maul M.	Aut. Municipal	829-333-6130	nea068@Hotmail.com	[illegible]	F
11. Altagracia Correa	alcaldesa	252-2432	—	[illegible]	F
12. Manuel de la Cruz C.	CASA de la Mujer	829-396-5384	—	Manuel [illegible]	M
13. Susana [illegible]	Alcaldía Municipal	809-559-2059	—	[illegible]	F
14. Felix Castro	CAMUVA	809-984-0149	raulcastro ESI@gmail.com	[illegible]	M
15. José Roberto Brea	UAFAM	(809) 660-3938	Josebrea@gmail.com	Brea	M

Responsable: [illegible]

@AdaptationFund - Project Proposal Development

Listado de Participantes

1/1

Enhancing climate resilience in San Cristóbal Province, Dominican Republic
Integrated Water Resources Management and Rural Development Programme

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Reunión de: Consulta Comunidades Lugar: Villa Altagracia (CAMUVA)

Fecha: 11/12/17

	Nombre	Institución	Teléfono	Correo	Firma	Sexo
1.	Gloria Santana Pie	MADHA	829-716-0858	gloria Santana@hotmail.com		F
2.	Salvador R. Montesino	CAMUVA	809-917-6798	Salvadorsmontesino@hotmail.com		M
3.	Sergio Gregorio	FEDNAC-J. Viejo	809-297-8258	—		M
4.	Yaniris Morillo A	CAMUVA	809-977-0304	Yaniris.m.acuba		F
5.	Reyes Antonio G.P.	Camuva	809-438-4254	—		M
6.	Cirilo De los Carmen	UNAPA	809-330-7724	INEcarmona2@gmail.com		M
7.	Victor Flores	COCOVA	809-415-1582	victorflores@hotmail.com		M
8.	José A. Núñez	UAFAM	829-639-7327	tony007nunez@gmail.com		M
9.	Kimberling Paniagua	B.L	809-590-1332	paniaguaxargas27		F
10.	Elizabeth Paniagua	B.L.	829-308-1777	elizabethpaniagua@gmail.		F
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Responsable:

Enhancing climate resilience in San Cristóbal Province, Dominican Republic
Integrated Water Resources Management and Rural Development Programme

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Reunión de: Consulta Instituciones Lugar: San Cristóbal (Loyola)

Fecha: 12/12/17

	Nombre	Institución	Teléfono	Correo	Firma	Sexo
1.	Fidel Cuello S.	Inapa	8295215911	FIDELCUELLO2@HO.		M
2.	FRANCISCO CORDERO	PATRONATO los cacaos	809-909-1017	OFICINA-JURIDICA@HO.		M.
3.	Isabel Robles A.	ASOCAES	829-752-4575	ASOCAES@gmail.		F
4.	Elisbetth Grullón C.	Asocaes	829-779-0805	grullonelisbeth@gmail.com		F
5.	Alcala Edward	Cadocaz	829 281 5546	"		M
6.	Juan Doria	" " "	829-719-0073	JA1034@hotmail.com		M
7.	Wilmin Pozo	ASOCAES	809 8630931	—		M
8.	Altagracia Salas	ASOCAES	849 6380366	—	Altagracia	F
9.	Lima Peralta	Camara de Comercio	809-440-4905	camaradecomercio@hotmail.com		F
10.	Jorge Roberto Brea	UAFAM	809-660-3938	superbrea@gmail.com	Brea	M
11.	Milton Brito	PEDSC	809-288-3800	pedsc@hotmail.com		M
12.	Ing: Manuel Flores	INAPA	829-961-4623	mafvaladi@hotmail.com		M
13.	José A. Núñez	UAFAM	829-639-7327	tony007nunez@gmail.com		M
14.	Elizabeth Paniagua	B.L.	829-308-1777	elizabethpaniagua@gmail.com		F
15.	Kumberling Paniagua	B.L.	809-596-1332	paniaguaxorgos27@gmail		F

Responsable:

Annex 7. Acronyms

AF	Adaptation Fund
ADEMI	Association for the Development of Microenterprises (a local savings and loan bank)
CAMUVA	House of the Women from Villa Altagracia
CC/CG	Communities Committees or Communities Groups
CBD	United Nations Convention on Biological Diversity
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CNCCMDL	National Council for Climate Change and CDM
CTCN	Climate Technology Centre & Network
COE	Emergency Operations Center
COP	Conference of the Parties (of UNFCCC)
CSW	Commission on the Status of Women
DOP	Dominican Peso
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
EGEHID	Dominican Hydropower Utility
ENHOGAR	National Households Survey for Multiple Purposes
ESP	Adaptation Fund's Environmental and Social Policy
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization of the United Nations
FEDA	Special Fund for Agricultural Development
FOI	Freedom of Information
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gases
HDI	Human Development Index
IDDI	Dominican Institute of Integral Development
INAPA	National Institute of Drinking Water and Sewerage
INDC	Intended Nationally Determined Contributions

INDRHI	National Institute of Hydraulic Resources
IPCC	Intergovernmental Panel on Climate Change
IPL	Loyola Polytechnic Institute
MSME	Micro, Small and Medium-sized Enterprises
MUDHA	Dominican-Haitian Women Organization
M&E	Monitoring and Evaluation
NAPA	National Adaptation Programmes of Action
NIE	National Implementing Entity
NGO	Non-governmental organization
PNACC-RD	National Action Plan for Adaptation to Climate Change in the Dominican Republic
PESC	Strategic Plan for San Cristobal
RIO+20	United Nations Conference on Sustainable Development
SDG	Sustainable Development Goals
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
UN WOMEN	United Nations Entity for Gender Equality and the Empowerment of Women
WHO	World Health Organization
WUB	Water Users Board
ONAMET	National Meteorological Office
ONE	National Statistics Office
PNCC	National Policy on Climate Change
REDDD+	Reduce Emissions from Deforestation and Forest Degradation
MESCYT	Ministry of Higher Education, Science, and Technology
MEPYD	Ministry of Economy, Development and Planning
DM	Municipal District
ADOPEM	Association for the Development of Women (a local savings and loan bank)
PEB	Programme Executive Board
PM	Programme Manager
PCCAMC	Provincial Climate Change Adaptation Monitoring Committee
PMU	Programme Manager Unit
PSC	Programme Steering Committee