

# Unlocking nature-based solutions through carbon markets in Colombia

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# Glossary

**Adaptations Actions:** the process and measures of adjusting to the current and future effects of climate change.

**Article 6:** refers to Article 6 of the Paris Agreement and the cooperative approaches formulated in the context of that article to enhance mitigation and climate resilience. Article 6.2. and 6.4 of the Paris Agreement develop rules and modalities that facilitate carbon markets and allow the transfer of ITMOs.

**Baldios:** an area of rural property that belongs to the land estate of the Colombian Government as it falls into the country's territorial boundaries and does not fall under private or community ownership.

**Biome:** a biogeographical unit that is characterized by its climate, soil, flora, and fauna.

**Blended finance:** refers to the strategic use of development finance for the mobilization of additional finance towards sustainable development and climate action in developing countries.

**Carbon Credits:** a tradable unit that represents one ton of greenhouse gas (GHG) emissions reduced or sequestered.

**Carbon Finance:** financial mechanism that captures the external costs of greenhouse gas (GHG) emissions.

**Carbon Pricing:** establishes a fee or monetary amount for emitting GHG emissions. There are many ways to operationalize carbon pricing, including emission trading systems, voluntary carbon markets, or a carbon tax.

**Climate Finance:** local, national, or international finance measures that aim to fund mitigation and adaptation actions that will address climate change.

**Compliance Carbon Market:** a market that allows the trade in carbon credits or certificates and makes the surrendering of such credits or certificates mandatory for regulated entities.

**Climate-smart agriculture:** an approach that helps to guide actions to transform agrifood systems towards green and resilient practices. Climate-smart agriculture addresses the interlinked challenges of food security and climate change.

**Corresponding adjustments:** a policy tool in carbon markets that is part of Article 6 within the Paris Agreement and ensures that the transfer of Internationally Tradable Mitigation Outcomes does not lead to double counting of GHG emission reductions or removals against more than one NDC.

**Cost-effective mitigation potential:** the amount of GHG emissions that can be reduced relative to a baseline emission scenario for a specific carbon price.

**Internationally Transferable Mitigation Outcome (ITMO):** refers to an GHG emission reduction or removal or other mitigation benefit that can be transferred under Article 6.2 of the Paris Agreement.

**Mitigation Actions:** human intervention that reduces the sources of GHG emissions or enhances the GHG sink.

**Mitigation potential:** the level of GHG emission reductions that could be achieved, relative to the projected emission baseline in a given year for a given carbon price. Estimates of GHG mitigation potential projected in the future can be obtained via models. These estimates vary depending on the type of model employed and on the parameters and underlying assumptions used.

**Nationally Appropriate Mitigation Action:** refer to any action that reduces emissions in developing countries and is prepared under the umbrella of a national governmental initiative. NAMAs form part of the mitigation and climate finance framework defined under the UNFCCC.

**Nationally Determined Contributions (NDC):** a climate action plan to cut emissions and adapt to climate impacts. Each Party to the Paris Agreement is required to establish an NDC and update it every five years.

**Nature-based solutions:** actions and interventions that aim to have measurable climate change adaptation and/or mitigation outcomes while protecting, sustainably managing, or restoring ecosystems and thus providing biodiversity benefits.

**Páramos:** a unique high-mountain ecosystem located mainly in the north of South America between the upper limit of the high-Andean forests and the lower limit of perpetual snow.

**Regenerative Agriculture:** a method of farming and food systems that focuses on addressing climate change through improving soil health and rebuilding soil organic matter, increasing biodiversity, and restoring degraded ecosystems.

**Resguardos indígenas:** land that belongs to an Indigenous reserve and is Government autonomously by indigenous governance structures.

**Technical Potential:** describes the quantity of GHG emissions that could be reduced or sequestered through given mitigation activities.

**Voluntary Carbon Market:** describes the carbon markets that transact carbon credits outside of emission reduction mandates.

# Acronym List

**A/R** Afforestation and Reforestation

**AATIs** Asociación de Autoridades Tradicionales Indígenas (Association of Traditional Indigenous Authorities)

**AD** Avoided Deforestation

**AFD** Agence Française de Développement (French Development Agency)

**AG** Agriculture

**APBS** Andean Price Band System

**ART/TREES** Architecture for REDD+ Transactions/The REDD+ Environmental Excellence Standards

**ASL** Amazon Sustainable Landscapes

**BAU** Business-as-Usual

**BioFund** Biocarbon Fund Initiative for Sustainable Forest Landscapes

**BUR** Biannual Update Report

**CAR** Corporaciones Autónomas Regionales (Regional Autonomous Corporations)

**CCB** Climate, Community and Biodiversity

**CDM** Clean Development Mechanism

**CI** Conservation International

**CIF** Certificado de Incentivo Forestal (Forest Incentive Certificate)

**CIPAV** Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria (Center for Systems Research Sustainable Agricultural Production)

**CONPES** Consejos Nacionales de Políticas Económicas y Social (National Councils on Economic and Social Policy)

**CRR** Comprehensive Rural Reform

**ELN** Ejército de Liberación Nacional (National Liberation Army)

**FAO** United Nations Food and Agriculture Organization

**FARC** Fuerzas Armadas Revolucionarias de Colombia (Revolutionary Armed Forces of Colombia)

**FEDEGAN** Federación Colombiana de Ganaderos (Federation of Cattle Ranchers)

**FCPF** Forest Carbon Partnership Facility

**FDI** Foreign Direct Investment

**FEP** Price Stabilization Funds

**FREL** Forest Reference Emission Levels

**FPIC** Free, Prior and Informed Consent

**FSC** Forest Stewardship Council

**GDP** Gross Domestic Product

**GNP** Gross National Product

**GEF** Global Environment Facility

**GHG** Greenhouse Gas

**GS** Gold Standard

**GIZ** Deutsche Gesellschaft für Internationale Zusammenarbeit (German Association for International Cooperation)

**HFLD** High Forest Low Deforestation

**IAM** Integrated Assessment Model

**IDB** Inter-American Development Bank

**IDEAM** Instituto de Hidrología, Meteorología y Estudios Ambientales (Institute of Hydrology, Meteorology, and Environmental Studies)

**IDMC** Internal Displacement Monitoring Center

**IGAC** Instituto Geográfico Agustín Codazzi (Geographic Institute Agustín Codazzi)

**IFA** Amazon Forest Incentive

**IFM** Improved Forest Management

**INEMAR** Instituto de Investigaciones Marinas y Costeras (Institute for Marine and Coastal Research)

**IPLC** Indigenous People and Local Communities

**ISFL** BioCarbon Fund Initiative for Sustainable Forest Landscapes

**JNR** Jurisdictional and Nested REDD+

**MACC** Marginal Abatement Cost Curves

**MADR** Ministerio de Agricultura y Desarrollo Rural (Ministry of Agriculture and Rural Development)

**MADS** Ministerio de Medio Ambiente y Desarrollo Sostenible (Ministry of Environment and Sustainable Development)

**MRV** Measuring, Reporting and Verification

**MPI** Multidimensional Poverty Index

**NAMA** Nationally Appropriate Mitigation Action

**NBS** Nature-based Solution

**NDC** Nationally Determined Contribution

**NGO** Non-Governmental Organization

**NICFI** Norwegian Initiative for Forests and Climate

**PA** Protected Areas

**APR** Area Protegida Regional (Regional Protected Area)

**PAS** Plan de Acción Sectorial (Sectoral Action Plan)

**PDET** Programa de Desarrollo con Enfoque Territorial (Development Plans with a Territorial Approach)

**PES** Payment from Ecosystem Services

**PIGCCS** Plan Integral de Gestión del Cambio Climático del Sector Agropecuario (Sectorial Integral Plan for Climate Change Management)

**PMR** Partnership for Market Readiness of the World Bank

**PND** Plan Nacional de Desarrollo (National Development Plan)

**PNGIBSE** Política Nacional para la Gestión Integral de la Biodiversidad y sus Servicios Ecosistémicos (National Policy of Integral Management of Biodiversity and Ecosystem Services)

**PNR** Plan Nacional de Restauración Ecológica, Rehabilitación y Recuperación de Áreas Degradadas (National Plan for Ecological Restoration and Recuperation of Degraded Areas)

**PSF** Price Stabilization Funds

**REDD+** Reduced Emissions from Deforestation and Forest Degradation, the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries

**REM** REDD Early Movers Program

**RENARE** Registro Nacional de Reducción de Emisiones de Gases de Efecto Invernadero (National Registry for Greenhouse Gas Reductions)

**SAFP** Andean Price Band System

**SINAP** Sistema Nacional de Areas Protegidas (National Protected Areas System)

**SLM** Sustainable Land Management

**SIGMA** Sistema de Información para la Gestión de Manglares (System for Mangrove Management in Colombia)

**TNC** The Nature Conservancy

**TFCA** Tropical Forest Conservation Act in Colombia

**UAF** Unidad Agrícola Familiar (Family Agricultural Unit)

**UNCCD** United Nations Conventions to Combat Desertification

**UNDP** United Nations Development Programme

**UNESCO** United Nations Educational, Scientific and Cultural Organization

**UNFCCC** United Nations Framework Convention on Climate Change

**UPRA** Unidad de Planificación Rural Agropecuaria (Agricultural Rural Planning Unit)

**USAID** United States Agency for International Development

**VAT** Value Added Tax

**VCM** Voluntary Carbon Market

**VCS** Verified Carbon Standard

**VER** Verified Emission Reductions

**WL** Wetlands

**WWF** World Wildlife Fund for Nature

**ZRC** Zonas de Reserva Campesina (Rural Reserve Zones)

# Acknowledgments

This report is one in a series produced by Climate Focus and the Food and Land Use Coalition (FOLU). Since September 2021, Climate Focus and FOLU have been collaborating on a research project around financing strategies for terrestrial nature-based solutions (NbS) at a country and global level. The ultimate objective of the project is to enable public and private decision-makers to prioritize and deploy activities and investments that will unlock the potential of NbS for climate mitigation, adaptation, resilience, biodiversity and beyond. Our current report series includes the publication of country-based assessments in Kenya & Colombia, as well as global analyses focused on the voluntary carbon market. For more information about the project, please see below.

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# Project Overview

The 1.5 degree target cannot be reached without protecting and restoring nature, yet there is a significant financing gap with less than 2% of climate finance currently flowing to nature-based solutions (NbS). Governments often struggle to develop investment proposals for the land-based goals of their nationally-determined contributions, largely due to a limited understanding of the rules and dynamics of private carbon markets. Private investors also often lack an understanding of where and how to invest in land-based mitigation, including which concrete project and jurisdictional-level investment opportunities exist and how to structure investments in nature and sustainable landscapes. All actors lack the information needed to assess the economic opportunities provided by a sustainable, nature-and climate-positive economy. No study has yet presented a comprehensive, country-focused assessment of optimal financing strategies for unlocking the potential of NbS.

## Through the series of reports, Climate Focus and Forest and Land Use Coalition (FOLU) will address the following five questions:

1. What is the mitigation potential of NbS at a country level? Building on the work of defining the climate mitigation potential of 20 land-based measures (from avoided deforestation, to improved rice management, to reduced food loss and waste).<sup>1</sup>
2. How much do NbS measures cost and what is the revenue potential in different geographic contexts? How can Governments and investors identify priority areas for carbon market investments?
3. What is the finance gap between current flows and what is needed to unlock the full mitigation potential of NbS measures?
4. Which funders and financial mechanisms (i.e., carbon markets, private investment, public financing) will be most effective in unlocking the potential of different types of NbS activities in different country contexts? What in particular is the role of the voluntary carbon market in financing NbS activities?
5. What are the features of an enabling environment needed to bridge the finance gap?

<sup>1</sup> Roe et al (2021)



## Executive Summary

**The unprecedented growth of voluntary carbon markets over recent years provides an opportunity for Colombia to channel finance into sustainable land use.** Carbon credit issuance has grown from 49 million tons of carbon dioxide equivalent (MtCO<sub>2</sub>e) in 2017 to 300 MtCO<sub>2</sub>e in 2021. This amounts to a market value of USD 748 billion in the first eight months of 2021 alone.<sup>1</sup> More than 53% of these credits came from nature-based solutions (NbS) – actions that protect, sustainably manage, and restore ecosystems. Tapping into the investment potential of carbon markets provides an opportunity for countries that depend on international finance to meet their Nationally Determined Contributions (NDC) under the Paris Agreement.

**This country study seeks to inform public and private decision-makers about mitigation opportunities in Colombia's ecoregions or biomes that can be unlocked by carbon investments.** The study includes assessments

of mitigation opportunities related to avoided ecosystem conversion, ecosystem restoration, afforestation, and agricultural mitigation. The authors conducted a biome-specific analysis and reviewed the relevant socio-economic barriers and opportunities that facilitate and hinder carbon investments. Based on this analysis, the study identifies carbon market opportunities for Colombia's five eco-regions.

### 1. Colombia offers significant carbon market opportunities

**According to the model developed in the context of this study, Colombia could unlock between a third and a half of its modeled mitigation potential by 2020 through carbon markets.** According to previous models, Colombia has a yearly cost-effective NbS mitigation potential of 219 MtCO<sub>2</sub>e and an NbS technical potential of 464 MtCO<sub>2</sub>e between 2020 and 2050.<sup>2</sup> The cost-effective NbS potential describes potential mitigation opportunities up to USD100/CO<sub>2</sub>e. To assess

<sup>1</sup> Donofrio, S., Maguire, P., Zwick, S., & Merry, W. (2020). Voluntary Carbon and the Post-Pandemic Recovery: A Special Climate Week NYC 2020 Installment of Ecosystem Marketplace's State of Voluntary Carbon Markets 2020 Report. Retrieved from <https://wecprotects.org/wp-content/uploads/2020/11/EM-Voluntary-Carbon-and-Post-Pandemic-Recovery-2020.pdf>; Verra - Data and Insights VCS Quarterly Update on Q4/2021. (2022). Verra. Retrieved August 1, 2022, from <https://verra.org/datainsights/data-and-insights-january-2022/>.

<sup>2</sup> Roe, S., Streck, C., Beach, R., Busch, J., Chapman, M., Daioglou, V., et al. (2021). Land-based measures to mitigate climate change:

the mitigation potential that is accessible to carbon markets, the team developed a model that considers context-specific investment barriers that make tapping into these opportunities challenging. Barriers include low levels of governance and security in some areas of the country, a weak land tenure regime, and locked-in land uses, such as concessions or protected areas. The model estimates the mitigation potential accessible to carbon markets to 33.7- 46.8% of the country's modeled mitigation potential over three decades (2.2 - 3.1 GtCO<sub>2</sub>e of 6.6 GtCO<sub>2</sub>e).

**Avoided deforestation (AD) offers the largest carbon market opportunities, followed by agriculture (AG) and afforestation/ reforestation (A/R).** Improved forest management (IFM) and Wetland (WL) activities constitute less than 3.5% of Colombia's mitigation potentials. Accounting for AD, AG, and A/R, the Andean biome shows the highest carbon market potential, with over half of the A/R and AG mitigation potential, and more than a quarter of the AD potential. The Amazon and the Orinoquia biomes also show high AD potential, and the Orinoquia offers significant additional A/R and AG opportunities. Colombia's coastal biomes of the Pacific and the Caribe hold the lowest carbon investment potential.

Table I: Breakdown of mitigation potential for AD, A/R and AG, total mitigation potential (Total %) and number of projects (Projects %) by biome.

Biomes	AD (%)	AR (%)	AG (%)	Total (%)	Projects (%)
Amazon	29.2	10.4	5.5	14.7	15.9
Andes	26.8	51.7	50.1	45.6	36.3
Caribe	9.5	19.7	11.7	16.8	12.4
Orinoquia	26.2	13.4	29.4	17.4	20.4
Pacifico	8.4	4.7	3.3	5.5	15.0

Potential and feasibility by country. Global Change Biology, 27(23), 6025–6058.

<sup>3</sup> Roe, S., et al. (2021)

<sup>4</sup> Roe, S., et al. (2021).

Figure A: Carbon market mitigation potential for NbS measures in Colombia (AD, AG, A/R, IFM, WL) for three price scenarios (high, medium, low). Phased cost-effective mitigation potential (CEMP) over the 2020-2050 period is shown for reference.<sup>3</sup> For past years, vintages are presented instead of issuances.

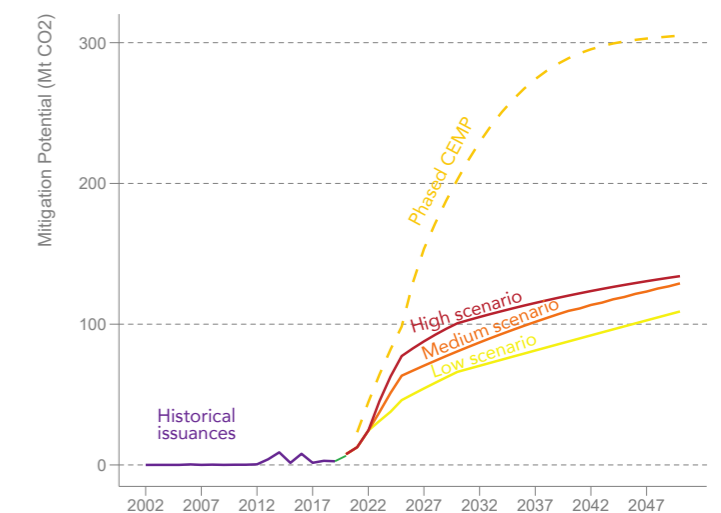


Figure B: Carbon market mitigation potential by NbS measure in Colombia (AD, AG, A/R, IFM, WL) for a medium price scenario. Average cost-effective mitigation potential (CEMP) over the 2020-2050 period is shown for reference.<sup>4</sup>

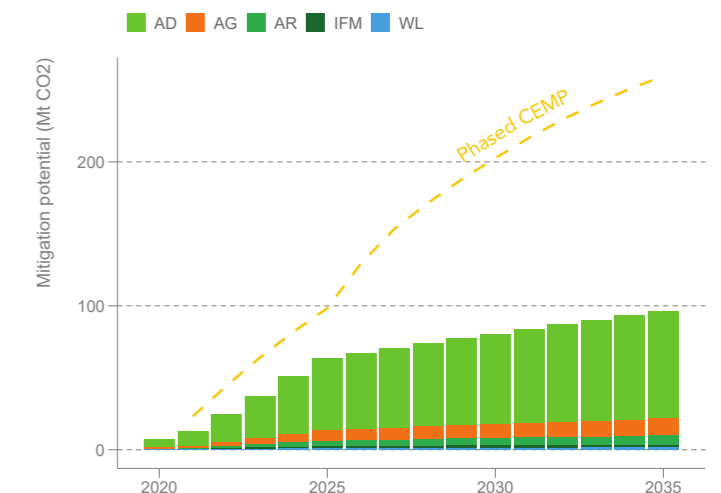
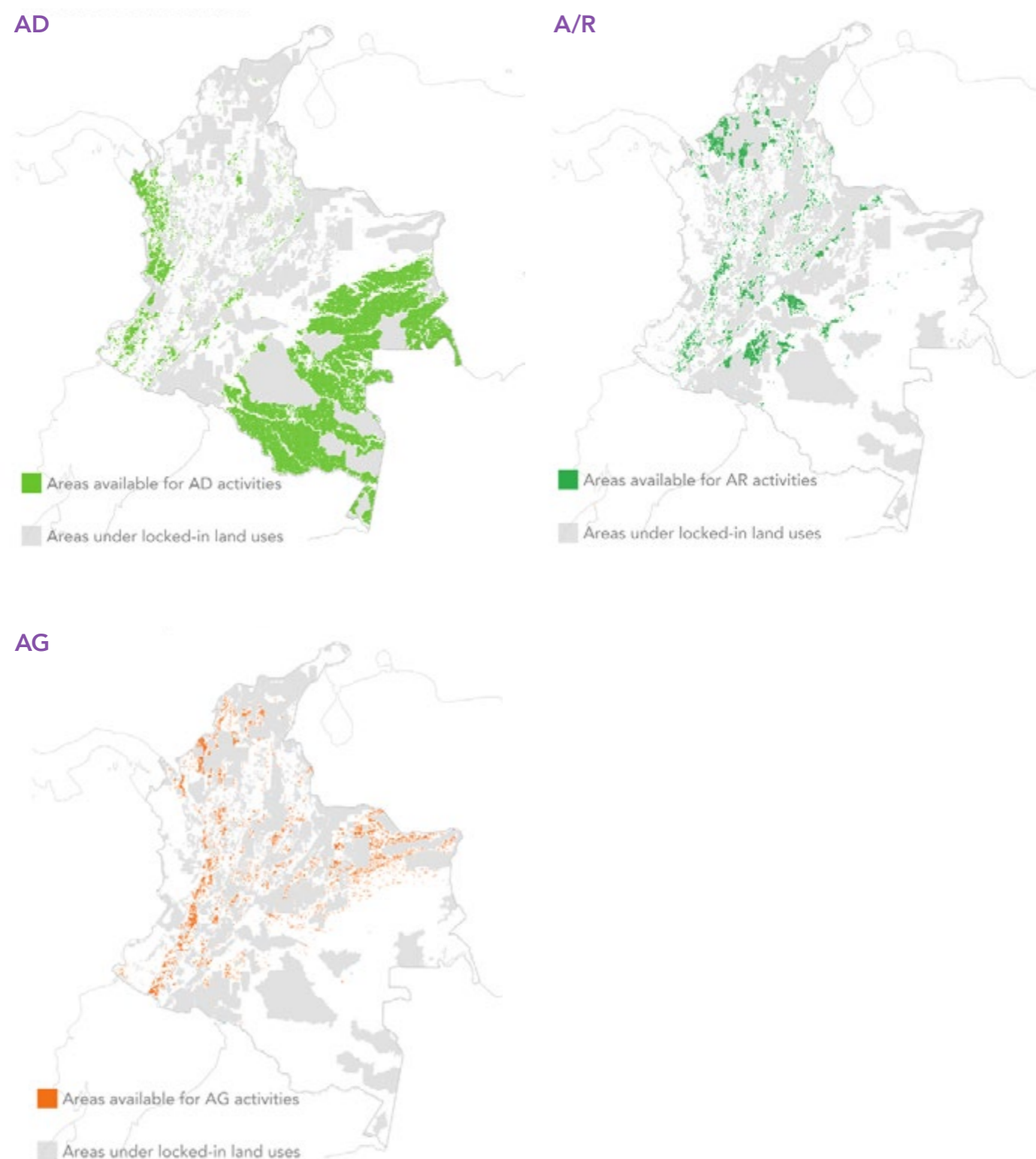




Figure C: Distribution of mitigation potential in Colombia for AD, A/R, and AG.<sup>5</sup> Locked-in land uses such as mining, oil and gas concessions, and protected areas have been removed from the original datasets. The difference between the initial potential and final potential, after accounting for these areas removed, is recorded and provides the second feasibility filter (%) that is applied to our country-level model estimates.



<sup>5</sup> Reproduced by Climate Focus with data based for AD based on Koh, L. P., Zeng, Y., Sarira, T. V., & Siman, K. (2021). Carbon prospecting in tropical forests for climate change mitigation. *Nature Communications*, 12(1), 1271; Cook-Patton, S. C., Leavitt, S. M., Gibbs, D., Harris, N. L., Lister, K., Anderson-Teixeira, K. J., et al. (2020). Mapping carbon accumulation potential from global natural forest regrowth. *Nature*, 585(7826), 545–550. Griscom, B. W., Adams, J., Ellis, P. W., Houghton, R. A., Lomax, G., Miteva, D. A., et al. (2017). Natural climate solutions. *Proceedings of the National Academy of Sciences*, 114(44), 11645–11650; and agriculture data from Food and Agriculture Organization (FAO), United Nations. (2022). Global Soil Sequestration Potential (GSOSeq) Map. Retrieved from <https://www.fao.org/soils-portal/data-hub/soil-maps-and-databases/global-soil-organic-carbon-sequestration-potential-map-gsocseq/en/>.

## 2. Colombia is a current and promising future host for carbon projects

While other financial instruments will be necessary to realize Colombia's NbS mitigation potential, carbon markets can play an important role in Colombia's climate mitigation efforts. National commitments to promote climate and conservation goals combined with an open investment policy, an active agriculture sector and an urgent need to halt deforestation opens opportunities for carbon market investments. Colombia is also considered a frontrunner in the region for integrating carbon markets into its climate strategies and institutional infrastructure, and for creating enabling market conditions.<sup>6</sup> Political will is also evident, with the newly elected President Petro confirming his support for carbon markets, in particular where they emphasize smallholder participation, strengthen Indigenous rights, and achieve climate and social justice.

Colombia has a history of actively engaging in carbon markets and welcomes additional investments. The Government is engaged in jurisdictional REDD+ programs in the Amazon and Orinoquía biomes. In addition, as of 2022, there are 110 active NbS voluntary carbon market projects in Colombia. The majority of the projects are registered under the domestic carbon standards, Cercarbono and Biocarbon Registry Standard, and supply the domestic market, particularly the offset provision under Colombia's carbon tax. Most international projects are certified under the Verified Carbon Standard (48 projects). The Andean region alone hosts 40 voluntary carbon market projects, but most credits are issued for large AD projects in the Amazon biome.

<sup>6</sup> Mercados de carbono, un objetivo de cara a la COP26 | Internacional | Portafolio. (2021, October 7). Portafolio. Retrieved August 4, 2022, from <https://www.portafolio.co/internacional/mercados-de-carbono-un-objetivo-de-cara-a-la-cop26-557105>.

## 3. There are significant investment barriers

However, before Colombia's carbon market potential can be realized, Government agencies and investors must collaborate to overcome several investment barriers. Violence and conflict, a deficiency of correctly implemented policies and enforced laws, as well as understaffed and underfunded institutions, make investments in many parts of the country a risky prospect. It is therefore essential that public and private actors collaborate to strengthen the enabling environment and mitigate these risks for markets to be able to mobilize funding to support significant mitigation action in the land sector. Weak and contested land titles pose a significant barrier to investment, and establishing institutional presence in former conflict regions remains a complicated and lengthy endeavor.

There are operational barriers due to limited human resource capacity in many regions. While Colombia has high levels of expertise in urban centers with well-developed educational programs and high-quality universities, the overall expertise and knowledge about the impacts of climate change and biodiversity loss, the opportunities that come with sustainable land use practices in rural sectors, as well as financial opportunities, remain low. In addition, contracting labor can be challenging where agricultural job offerings compete with higher-paid legal or illegal activities. Investors must also account for high communication, transportation and logistical costs to ensure that activities are well coordinated within a carbon project or program.

Figure D: The five biomes and 32 departments in Colombia.<sup>7</sup>



Figure E: Map of all Indigenous Territories in Colombia.<sup>8</sup>



<sup>7</sup> Reproduced by Climate Focus with data from Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>.

<sup>8</sup> Reproduced by Climate Focus with data from RAISG: Amazon Network of Georeferenced Socio-Environmental Information. (2020). Territorios Indígenas. Retrieved from <https://www.raisg.org/en/>. Guio Rodríguez, C. A., & Rojas Suarez, A. (2019).

## 4. Carbon market opportunities in the Andean biome

The Andean region is the leading region for agricultural production, and implementing sustainable practices coupled with forest restoration holds significant mitigation potential. Activities that increase agricultural productivity and enhance soil and water management can be coupled with forest restoration and conservation.

Improvement of agricultural practices is also essential to remove pressure from natural ecosystems and reduce deforestation. Enhancing knowledge and awareness of local communities combined with payments for ecosystem services that reward conservation may help to halt the agricultural frontier.

There are opportunities to support local communities in the management of Páramos and forests. The protection and restoration of Páramo ecosystems provides significant carbon investment opportunities. Since the Andean biome has seen large-scale historical ecosystem transformation, there is also an opportunity for community-driven reforestation activities.

Existing carbon projects can provide models for further engagement but need to be scaled to have a transformational impact. Most of these projects are small and may provide opportunities for aggregation to scale their impact. Examples for projects include investments in coffee-agroforestry systems, regenerative cocoa plantations in the agricultural sector, or community forest management in the forestry sector.

## 5. Carbon market opportunities in the Amazon biome

The Southern and Southeastern parts of the Colombian Amazon are carbon-dense and largely intact forest areas that meet the definition of a high-forest, low deforestation area. Considering the low levels of deforestation, carbon investments should cover large areas of forest. The high-forest low-deforestation context of the Colombian Amazon makes it ideal for the development of large-scale or jurisdictional programs. Such programs could be developed using Verra's JNR, ART/TREES carbon credit issuing methodologies, or Article 6.2 of the Paris Agreement as guiding crediting scheme.

Carbon markets provide an opportunity to further enhance protection of large areas of the Colombian Amazon by promoting good Indigenous stewardship of Amazonian forests. Indigenous communities could seize the opportunity to generate and commercialize carbon credits in support of their Life Plans to continue protecting their traditional knowledge, strengthening Indigenous governance structures, developing local community capacities, and protecting the forest.

Projects could also support the management of protected areas, including the creation of economic opportunities in buffer zones around such areas. The buffer zones around protected areas with higher levels of forest loss or degradation would make suitable areas for project-level carbon investments.

Carbon investments at the forest frontier can help prevent further expansion into primary forests and protected areas at the forest frontier in the Northern Amazon. The Northern Amazon is characterized by high levels of deforestation that continues to expand southwards into forested lands. Carbon investments can help to support a transition to sustainable land use that is characterized by a mix of tree crops and agriculture which help farmers and settlers shift away from the extractive rural economy.

There is an opportunity for programmatic carbon investments that integrate a high number of farms. Participating farms could be offered a similar technological package and activities for improving farm productivity,

while enhancing restoration and conservation activities.

A concerted effort of public and private partners would stand the best chance of overcoming security and governance challenges. A blended finance program could combine donor and private sector resources and possibly seek recognition under Article 6.2 of the Paris Agreement.

## 6. Carbon market opportunities in the Orinoquía biome

Mitigation opportunities exist in the introduction or the improvement of sustainable production practices in the livestock sector. The socio-economic development of the Orinoquía has been driven by the recent expansion of the oil and gas sector, in addition to the traditional livestock sector. Carbon projects and programs in certain areas of the Piedmont can be structured around livestock intensification, and freed-up land could be used to plant suitable tree crops or restore the landscape.

Interventions should concentrate on developing agroforestry and regenerative agriculture projects near urban areas where there is access to markets and services.

There is significant opportunity to collaborate with local communities to create sustainable supply chains for rice, cocoa and possibly suitable timber species. Agroforestry practices have the potential to improve and increase farm productivity and profitability, while also sequestering carbon and contributing to adaptation and mitigation in the context of climate change.

Investment in forest fire management and prevention plans offers another mitigation opportunity. Climate change is expected to lead to even hotter temperatures in dry months, endangering existing value chains. This creates an opportunity for carbon-credit-oriented forest management in the fire-prone areas of Arauca and Casanare where wildfires caused substantial

losses to forest cover and value chains in recent decades.

**Carbon finance can catalyze the building of a forestry sector in Vichada and Meta.** The Altillanura is an area with high potential for afforestation and commercial forestry projects. Most of the existing A/R projects are based in Vichada and Meta, which offer the opportunity to promote economically attractive restorative practices, as well as sustainable forest management activities.

**Carbon and climate investments could also support Indigenous forest management, governance, and empowerment.** There are opportunities to involve Indigenous communities through participatory approaches and provide technical assistance for the development of carbon projects. Agroforestry projects can provide revenue through carbon finance as well as and improving livelihoods and building local capacities.

## 7. Carbon market opportunities In the Caribbean biome

**Considering the fragmentation of remaining forest ecosystems, restoring forests that connect remaining forest patches is essential.** Projects can help to enhance biological corridors and the connectivity between forest relicts and protected areas in the region.

**The highly transformed and degraded soils of certain areas of the Caribbean biome can be regenerated into more productive areas through rehabilitation processes.** At a landscape level, these production systems can be combined with forest conservation and restoration (riparian forests, secondary forests) of degraded areas.

**Mangroves offer opportunities for 'blue carbon projects' as they remove and store significant amounts of carbon for long periods.** Mangroves are subject to a variety of illegal uses, such as logging. Projects can, in line with existing policies, combine conservation

with compatible economic use of mangroves.

## 8. Carbon market opportunities in the Pacific biome

**Colombia's Pacific region offers the opportunity to combine conservation with the development of a forest-based economy.**

Forests in the region present opportunities for the sustainable extraction of non-timber products such as resins, latex, oils, fibers and seeds. These activities can be combined with payments for ecosystem services that support activities which support the halting of deforestation. Around 220 non-timber products can be found in Pacific forests for medicinal, food, handcrafts, ornamental, toxic, religious, fuel, coloring and latex production purposes.<sup>9</sup>

## 9. Overall conclusions

**Acceptance of carbon investments among the local population will require integrating support for increased productivity in farm systems and for the resilience of rural livelihoods.** Carbon projects and programs can facilitate a transition to sustainable land use. However, efforts to reduce greenhouse gas emissions or enhance greenhouse gas removals alone will often not sufficiently garner political will, ensure local support, or mobilize longer-term finance.

**Conservation and a reduction of deforestation depends, among others, on increasing the productivity and efficiency in the agricultural sector.** Agriculture, in particular cattle ranching, is the largest driver of deforestation in Colombia. Consequently, efforts to reduce deforestation depend on linking the protection of forests, enhanced enforcement of conservation and strengthening Indigenous rights to efforts to improve rural farm operations and livelihoods.

**Afforestation/Reforestation projects can help to build a timber sector in Colombia.** A forest and timber sector that operates and manages forests sustainably can help to remove pressure from natural forests while supplying markets with timber products. There are many smaller areas that allow for silvopastoral or mixed farming systems that include tree planting, and the Orinoquía region holds potential for larger timber plantations. Areas selected for such plantations should be chosen carefully, considering the ecosystem value of natural savannahs and the inclusion of local tree species.

**Projects that strengthen the rights of Indigenous communities would help reward the good stewardship of forests by Indigenous peoples.** Such projects should be facilitated by NGOs and other intermediaries that are trusted partners of communities. While such projects are likely to yield relatively few greenhouse gas emission reductions and removals per area, they could cover large areas of community-managed forest. These projects would also help to protect Colombia's high-integrity forests over the long term.

**The realization of Colombia's carbon investment potential depends on coordinated efforts by Government entities and private investors.** NGOs often play an important role in implementing carbon projects and ensuring fair participation of local communities. Stabilizing the volatile status of frontier communities depends on benefit-sharing provisions with investors as much as it depends on clarifying weak land titles and ensuring safe and peaceful rural livelihoods. This cannot be achieved without Government support. Private investors can reward these efforts by investing in carbon projects that promote climate-smart agricultural or forestry activities.

**Project investments could be free-standing or integrated into landscape-level programs.** Projects could be implemented in partnership with Governments: where the Government supports project-level investments in more extensive public programs, private investment and public engagement could be synergistic, relying on the dual strength of public and

private action. Public programs could create an enabling environment for investment by addressing the structural risks of engagement, such as weak land titles or lacking law enforcement. The Government could support sustainable production programs through land titling, technical assistance, extension services, and conservation and restoration commitments.

**Colombia's new Government under President Gustavo Petro has committed to accelerating the 2016 Peace Agreement implementation that ended half a century of civil war in Colombia.** The Government of President Petro has pledged to mobilize NbS for people and democratize access to land.<sup>10</sup> This study hopes to inspire the Colombian Government as well as national and international stakeholders to invest in carbon market opportunities in Colombia. Investments at scale demand cooperation between public and private actors and the blending of public and private funds. Targeted programs that support human development, as well as environmental goals, can help the peace

<sup>9</sup> MinAmbiente, & IIAP. (2016).

<sup>10</sup> Petro, G. (n.d.). Plan de Gobierno Gustavo Petro: Economía para la Vida. Petro Presidente 2022. Retrieved August 25, 2022, from <https://gustavopetro.co/programa-de-gobierno/temas/propuestas-economicas/>.



# 01

## Helping decision makers to realize Colombia's carbon market opportunity

To achieve the temperature and adaptation goals of the Paris Agreement, it will be essential to transition over the next three years to low-carbon economies supported by sustainable, carbon-rich landscapes. Nature-based solutions (NbS) –actions that protect, sustainably manage, and restore ecosystems– are essential climate strategies (see Box 1). The global climate mitigation potential of terrestrial NbS has been estimated at 9-14 gigatons carbon dioxide equivalent (GtCO<sub>2</sub>e) greenhouse gas (GHG) emissions per year, and the existing terrestrial sink, such as remnant forests and other ecosystems, can sequester an additional 12 GtCO<sub>2</sub> of anthropogenic emissions per year.<sup>1</sup> To illustrate the scale of these numbers: the Climate Action Tracker estimated China's GHG emissions for 2021 to be 14.1 GtCO<sub>2</sub>e<sup>2</sup>, and the International Energy Agency estimated global transport emissions for 2019 to be 8.5 GtCO<sub>2</sub>e.<sup>3</sup>

**While NbS play a crucial role in climate change mitigation globally, they receive only a fraction of global climate finance.**

Only 3% of public climate mitigation funding is allocated to NbS, compared to 38% allocated to renewable energies.<sup>4</sup> To make things worse, global subsidies for energy, agriculture, water, and fisheries are conservatively estimated in excess of USD 4-6 trillion each year.<sup>5</sup> These subsidies often encourage resource extraction and agricultural production that further damage natural ecosystems. At best, the current level of funding for forest protection, restoration, and enhancement only reaches 5% of the estimated total needed to align with the Paris Agreement's

1.5 °C target,<sup>6</sup> indicating a significant shortfall in climate finance for forests and nature.

**Tapping into nature's mitigation potential is particularly relevant for countries that depend on NbS to meet their Nationally Determined Contributions (NDC) under the Paris Agreement.** Colombia is a prime example of a country that needs to take action to mitigate land-use emissions to achieve its climate goals. About 59% of Colombia's GHG emissions come from agriculture, forests and other land uses.<sup>7</sup> Reducing these emissions is essential to meet the country's reduction goal of limiting national emissions to not more than 169.44 MtCO<sub>2</sub>e by 2030, which corresponds to a 51% decrease in GHG emissions compared to the 2015 baseline scenario.<sup>8</sup> Considering the lack of financing for mitigation in the land sector, it is essential that countries like Colombia use climate finance strategically to maximize adaptation and mitigation benefits per dollar and peso spent.

**In this context, carbon markets provide an opportunity for Colombia to channel finance into sustainable land use.** Carbon markets have grown significantly over the last two years, driven by companies relying on these markets to offset a portion of their emissions in order to achieve their mitigation targets.<sup>9</sup> Carbon credit issuance has grown from 49 in 2017 to 300 MtCO<sub>2</sub>e in 2021. This amounts to a market value of USD 748 billion in the first eight months of 2021 alone.<sup>10</sup> More than 53% of these credits

<sup>1</sup> Roe, S., Streck, C., Beach, R., Busch, J., Chapman, M., Daioglou, V., et al. (2021). Land-based measures to mitigate climate change: Potential and feasibility by country. *Global Change Biology*, 27(23), 6025–6058.

<sup>2</sup> China. (n.d.). Climate Action Tracker. Retrieved July 22, 2022, from <https://climateactiontracker.org/countries/china/>.

<sup>3</sup> Tracking Transport 2021. (2021). IEA. Retrieved July 26, 2022, from <https://www.iea.org/reports/tracking-transport-2021>.

<sup>4</sup> Buchner, B., Baysa Naran, & de Aragão Fernandes, P. (2022). Global Landscape of Climate Finance 2021. Climate Policy Initiative (CPI). Retrieved August 1, 2022, from <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/>.

<sup>5</sup> Dasgupta, P. (2021). The economics of biodiversity: the Dasgupta review: Full Report. Retrieved from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/962785/The\\_Economics\\_of\\_Biodiversity\\_The\\_Dasgupta\\_Review\\_Full\\_Report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf).

<sup>6</sup> NYDF Assessment Partners. (2021). Taking stock of national climate action for forests. Retrieved August 1, 2022, from <https://forestdeclaration.org/resources/taking-stock-of-national-climate-action-for-forests/>.

<sup>7</sup> DEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLEIA. (2021). Tercer Informe Bienal de Actualización de Colombia a la Convención Marco de las Naciones Unidas para el Cambio Climático (CMNUCC). Retrieved from <https://unfccc.int/sites/default/files/resource/BUR3%20-%20COLOMBIA.pdf>.

<sup>8</sup> Gobierno de Colombia. (2020). Actualización de la Contribución Determinada a Nivel Nacional de Colombia (NDC) (UNFCCC). Retrieved from <https://unfccc.int/sites/default/files/NDC/2022-06/NDC%20actualizada%20de%20Colombia.pdf>.

<sup>9</sup> Verra - Data and Insights VCS Quarterly Update on Q1/2020. (2020). Verra. Retrieved August 1, 2022, from <https://verra.org/datainsights/april-2020/>.

<sup>10</sup> Donofrio, S., Maguire, P., Zwick, S., & Merry, W. (2020). Voluntary Carbon and the Post-Pandemic Recovery: A Special Climate Week NYC 2020 Installment of Ecosystem Marketplace's State of Voluntary Carbon Markets 2020 Report. Retrieved from <https://wecprotects.org/wp-content/uploads/2020/11/EM-Voluntary-Carbon-and-Post-Pandemic-Recovery-2020.pdf>; Verra - Data and Insights VCS Quarterly Update on Q4/2021. (2022). Verra. Retrieved August 1, 2022, from <https://verra.org/datainsights/data-and-insights-january-2022/>.

came from NbS, of which 72% came from developing countries.

**However, before Colombia's carbon market potential can be realized, Government agencies and investors must collaborate to overcome several investment barriers.**

Violence and conflict, a deficit of correctly implemented policies and enforced laws, as well as understaffed and underfunded institutions, make investments in many parts of the country a risky prospect. It is therefore essential that public and private actors collaborate to strengthen an enabling environment and mitigate these risks for markets to be able to mobilize funding to support significant GHG reductions and removals in the land sector.

**Several knowledge gaps need to be addressed to effectively tap into carbon market investment opportunities.** This requires an understanding of public and private decision-makers of location-specific carbon market investment opportunities and risks that takes into account national and local circumstances. So far, very few country-specific carbon market assessments for the land sector exist. Current models and studies estimate NbS potentials based on biophysical, geophysical, or financial limitations but do not consider specific national policy, socio-economic or geographical constraints.

**This country study identifies different NbS mitigation and adaptation opportunities in the context of Colombia's national and regional circumstances.** The study includes assessments of mitigation opportunities related to avoided ecosystem conversion, ecosystem restoration, afforestation, and agricultural mitigation (see **Box 3**). The authors conducted a biome-specific analysis and reviewed the relevant socio-economic barriers and opportunities that facilitate and hold back carbon investments. Based on this analysis, the study identifies carbon market opportunities for Colombia's five eco-regions.

## This study seeks to achieve the following goals:

- **Inform the Government of Colombia and its development partners of regional mitigation opportunities that may be accessible to carbon investments.** Such knowledge can

inform the Government's NDC financing strategy and complements the feasibility assessment of NbS public policies.

- **Support investors that seek accessible carbon market opportunities in Colombia.**

This case study can inform investment decisions and support investment screening and due diligence by providing an analysis within the national and regional policy context.

- **Direct project and program development experts to potential market opportunities.**

Carbon market-specific information may support local decision-makers and allow them to realize programs that may benefit from carbon investors.

**Colombia's new Government under President Gustavo Petro has committed to accelerating the 2016 Peace Agreement implementation that ended half of a century of civil war in Colombia.** The Government of

President Petro has pledged to mobilize NbS for people and democratize access to land.<sup>11</sup>

This study hopes to inspire the Colombian Government as well as national and international stakeholders to invest in carbon market opportunities in Colombia. Investments at scale demand cooperation between public and private actors and the blending of public and private funds. Targeted programs that support human development, as well as environmental goals, can help the peace process in Colombia and assist the country in safeguarding its environmental wealth while increasing rural prosperity among local communities.

## The study is structured as follows:

1. The following section provides an overview of Colombia's land use dynamics, relevant institutional frameworks, and the NbS carbon market landscape.
2. The third section outlines the methodology used to assess the mitigation potential of NbS that the voluntary carbon market can be used to unlock.
3. The subsequent sections analyze the six biomes of Colombia by reviewing their environmental composition, land use dynamics, barriers, and opportunities for leveraging carbon markets.
4. The study concludes with a section containing with recommendations for policymakers and investors.

### Box 1: Nature-based solutions

Based on International Union for Conservation of Nature's definition, nature-based solutions are actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature.

nature-based solutions address societal challenges through the protection, sustainable management and restoration of both natural and modified ecosystems, benefiting both biodiversity and human well-being. NbS are underpinned by benefits that flow from healthy ecosystems. They target major challenges like climate change, disaster risk reduction, food and water security, biodiversity loss and human health, and are critical to sustainable economic development.

Source: International Union for Conservation of Nature (IUCN). Nature-based solutions.

<sup>11</sup> Petro, G. (n.d.). Plan de Gobierno Gustavo Petro: Economía para la Vida. Petro Presidente 2022. Retrieved August 25, 2022, from <https://gustavopetro.co/programa-de-gobierno/temas/propuestas-economicas/>.



## In a snapshot: Land use in Colombia

### Box 2: Colombia's land use context

Colombia is the fourth largest country in South America (114 million ha) and the continent's fourth-largest economy. As a result of its location and physiography, the country has an enormous wealth of different climate zones and associated ecosystems. It has abundant freshwater and agricultural resources. The U.N. Food and Agriculture Organization (FAO) estimates that, in 2019, 52% of Colombia's territory was covered with forests and 43% was used for agriculture and mostly for livestock, and the remaining 5% was covered by urban areas or under water.<sup>12</sup>

Colombia is an important agricultural producer. The country is among the world's top five producers of coffee, avocado, and palm oil; among the top ten of sugar cane, banana, pineapple, and cocoa; and among the top twenty of livestock products and meat.<sup>13</sup> The agricultural sector is an essential contributor to Colombia's Gross Domestic Product (GDP) (6%), employment and rural income.<sup>14</sup>

Colombia's landscape is marked by over half a century of civil war. By December 2021, the Internal Displacement Monitoring Center counted more than 5 million internally displaced people in Colombia since 1985.<sup>15</sup> While the 2016 Peace Agreement between the guerrilla group FARC (*Fuerzas Armadas Revolucionarias de Colombia*) established the foundations of a pathway towards peace, Colombia still has a volatile environment with violence primarily concentrated in rural areas. In January and February of 2022, 274,000 people were affected by violence.<sup>16</sup> Colombia is also the largest grower of coca, an industry highly associated with conflict.

Deforestation is the largest source of emissions in Colombia. According to Colombia's third Biannual Update Report to the U.N. Framework Convention on Climate Change (UNFCCC), the country saw an increase of 8% in deforested areas between 2018 and 2019 (158,893 ha) and between 2020 and 2021 (171,685 ha).<sup>17</sup> While deforestation decreased in the Orinoquía and Pacific biomes, it significantly increased in Colombia's Amazon biome.

<sup>12</sup> Food and Agriculture Organization (FAO) of the United Nations. (n.d.). FAO Country Profiles: Colombia. Retrieved August 1, 2022, from <http://www.fao.org/countryprofiles/index/en/?iso3=COL&lang=en>.

<sup>13</sup> Food and Agriculture Organization (FAO) of the United Nations. (2022). FAOSTAT: Food and agriculture data. Retrieved August 1, 2022, from <https://www.fao.org/faostat/en/#home>.

<sup>14</sup> ECD. (2020). 9. Colombia. In *Agricultural Policy Monitoring and Evaluation 2020*. Retrieved June 28, 2022, from <https://doi.org/10.1787/928181a8-en>.

<sup>15</sup> Country Profile: Colombia. (2022). Internal Displacement Monitoring Centre. Retrieved August 1, 2022, from <https://www.internal-displacement.org/countries/colombia>.

<sup>16</sup> UN Office for the Coordination of Humanitarian Affairs (UN OCHA). (2022, March 29). *Impacto y tendencias humanitarias en Colombia*. ReliefWeb. Retrieved August 1, 2022, from <https://reliefweb.int/report/colombia/impacto-y-tendencias-humanitarias-en-colombia-enero-febrero-de-2022-29-de-marzo-de>.

<sup>17</sup> IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLEÍA. (2021). *Tercer Informe Bienal de Actualización de Colombia a la Convención Marco de las Naciones Unidas para el Cambio Climático (CMNUCC)*. Retrieved from <https://unfccc.int/sites/default/files/resource/BUR3%20-%20COLOMBIA.pdf>.

# 1. Colombia's five eco-regions

Colombia's territory encompasses a variety of ecosystems in five different biomes that are defined as separate eco-regions: the Andean mountains (32,210,000 ha), the Caribbean (11,540,000 ha) and the Pacific (7,460,000 ha) coasts, the Amazon rainforests (45,500,000 ha), and the Orinoquía basin (16,920,000 ha) (see **Table 1** and **Figure 1**).<sup>18</sup> Colombia's biomes harbor 10% of the planet's biodiversity.<sup>19</sup> Colombia is ranked first in birds and orchid biodiversity; second in plant, amphibian, freshwater fish, and butterfly biodiversity; third in reptile and palm biodiversity; and fourth in mammal biodiversity globally.<sup>20</sup>

Figure 1: The five biomes and 32 departments in Colombia.<sup>21</sup>



Table 1: Departments in each biome in Colombia.

Biomes	Departments
Amazon	Caquetá, Guaviare, Guainía, Putumayo, Vaupés, Southern Vichada, Southern Meta, Amazonas
Andes	Antioquia, Cundinamarca, Caldas, Cauca, Huila, Norte de Santander, Quindío, Risaralda, Santander, Tolima, Valle de Cauca, Nariño, Boyacá
Caribe	Atlántico, Antioquia, Bolívar, Córdoba, Guajira, Magdalena, Norte de Santander, Santander, Sucre
Orinoquía	Aráuca, Casanare, Vichada, Meta
Pacifico	Cauca, Chocó, Nariño

## 2. Forests and deforestation

Over half of the continental territory of Colombia is covered by forests, amounting to almost 60 million ha (see **Figure 2**). Most of the forest can be found in the Amazon (66.9%) and Andean (17.8%) and Pacific (9 %) biomes.<sup>22</sup> More than half of these forests are managed by Indigenous (46.1%) and Afro-Colombian (7.3%) communities.

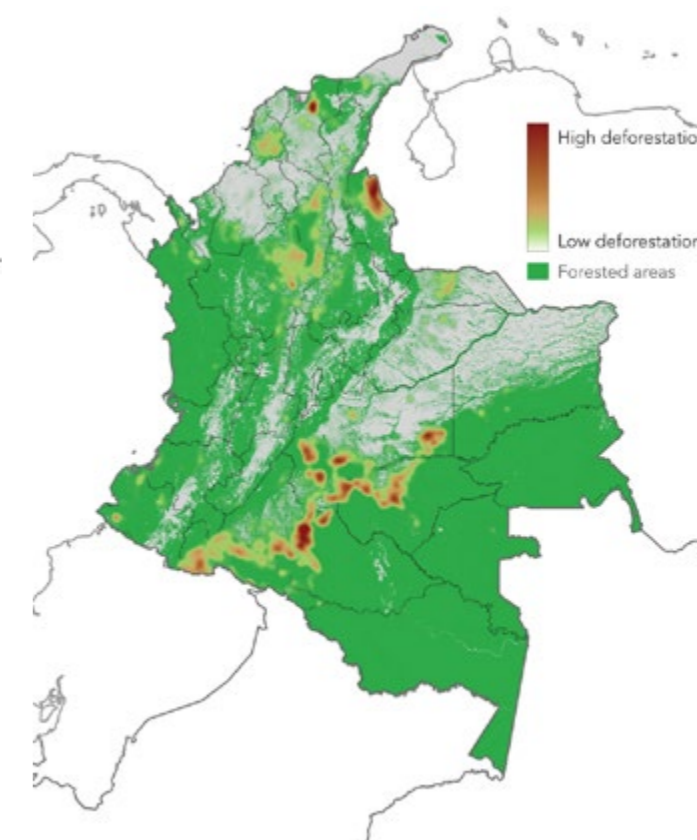
Figure 2: Land cover classes in Colombia.<sup>23</sup>



Deforestation is Colombia's largest source of GHG emissions. Forest loss is concentrated in the northern edge of the Amazon region and in parts of the Andean and Pacific regions (see **Figure 3**). These hotspots are described as "Nuclei of High Deforestation" by the Institute of Hydrology, Meteorology, and Environmental Studies (*Instituto de Hidrología, Meteorología y Estudios Ambientales*, IDEAM) and account for at least 38% of natural forest loss in Colombia. Other deforestation is scattered throughout the country instead of being concentrated in particular ecosystems.<sup>24</sup> IDEAM estimated that between 1990 and 2016, Colombia lost six million ha of natural forests, with the greatest forest loss since 2005 and in departments

that had the highest rates of armed conflict. According to the BUR submitted before the UNFCCC, the country saw an increase of 8% of the area deforested between 2018 and 2019 (158,893 ha) and 2020 and 2021 (171,685).<sup>25</sup>

Figure 3: Deforestation density in Colombia.<sup>26</sup>



The Caribbean and Pacific coastal ecosystems cover 289,122 ha of mangroves, 66,132 ha of seagrass, and 109,100 ha of coral reefs (see **Figure 4**).<sup>27</sup> Mangrove forests are hotspots for biodiversity, have the potential to store up to four times more carbon than terrestrial forests, and provide ecosystem services to local communities, such as protection from

<sup>18</sup> Rojas, G. P., & Mora, J. E. (2017). Plan de acción de biodiversidad para la implementación de la Política Nacional para la Gestión Integral de la Biodiversidad y sus Servicios Ecosistémicos 2016-2030. Retrieved June 24, 2022, from <https://www.cbd.int/doc/world/co/co-nbsap-v3-es.pdf>.

<sup>19</sup> CBD Secretariat. (n.d.). Country Profiles: Colombia. Convention on Biological Diversity (CBD). Retrieved August 1, 2022, from <https://www.cbd.int/countries/profile/?country=co>.

<sup>20</sup> Rojas, P., & Mora, E. (2017).

<sup>21</sup> Reproduced by Climate Focus with data based on Gobierno de Colombia & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>. Etter, A., Andrade, A., Saavedra-Ramírez, K., Arevalo, P., & Amaya-Valderrama, P. (2017). Risk assessment of Colombian continental ecosystems: An application of the Red List of Ecosystems methodology (v. 2.0). Retrieved from [https://www.researchgate.net/profile/Andres-Etter/publication/325498072\\_Risk\\_assessment\\_of\\_Colombian\\_continental\\_ecosystems\\_An\\_application\\_of\\_the\\_Red\\_List\\_of\\_Ecosystems\\_methodology\\_v\\_20/links/5b26f169a6fdcc69746ae24b/Risk-assessment-of-Colombian-continental-ecosystems-An-application-of-the-Red-List-of-Ecosystems-methodology-v-20.pdf](https://www.researchgate.net/profile/Andres-Etter/publication/325498072_Risk_assessment_of_Colombian_continental_ecosystems_An_application_of_the_Red_List_of_Ecosystems_methodology_v_20/links/5b26f169a6fdcc69746ae24b/Risk-assessment-of-Colombian-continental-ecosystems-An-application-of-the-Red-List-of-Ecosystems-methodology-v-20.pdf).

<sup>22</sup> IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>23</sup> Reproduced by Climate Focus with data based on ESA. (2017). Land Cover CCI Product Guide Version 2. Retrieved from [maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2\\_2.0.pdf](https://maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2_2.0.pdf).

<sup>24</sup> Ministerio de Ambiente y Desarrollo Sostenible and IDEAM. (2018). Bosques- territorios de vida: Estrategia Integral de Control de la Deforestación y Gestión de los Bosques. <https://unredd.net/documents/un-redd-partner-countries-181/latin-america-the-caribbean-334-colombia-706/16790-bosques-territorios-de-vida-estrategia-integral-de-control-a-la-deforestacion-y-gestion-de-los-bosques.html>

<sup>25</sup> IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>26</sup> Reproduced by Climate Focus with data based on Global Forest Watch. (n.d.). Colombia Deforestation Rates and Statistics. Retrieved from <https://www.globalforestwatch.org/dashboards/country/COL>.

<sup>27</sup> Avendaño, J., Rodríguez Rodríguez, A., & Gómez López, D. I. (2019). Servicios Ecosistémicos Marinos y Costeros de Colombia: Énfasis en Manglares Y Pastos Marinos. Retrieved August 1, 2022, from <https://aquadocs.org/handle/1834/15783>.

floods and access to fish for subsistence.<sup>28</sup> Coral reefs and seagrass beds also provide ecosystem services such as protection against storms, access to fish for commercial and subsistence uses, and eco-tourism.<sup>29</sup> Despite these important services, coastal ecosystems in Colombia are under threat due to erosion driven by sea level rise and infrastructure construction, ocean acidification, saltwater intrusion, and severe coastal storms linked to climate change.<sup>30</sup> Colombia's Third National Communication to the UNFCCC predicted a loss of over 12,600 ha of coastal areas by 2040 and over 45,500 ha by 2100 based on current climate change patterns.<sup>31</sup>

Figure 4: Location of aquatic, marine, and coastal ecosystems.<sup>32</sup>



<sup>28</sup> New Approach to Blue Carbon Projects Underway in Colombia. (n.d.). Yale E360. Retrieved August 1, 2022, from <https://e360.yale.edu/digest/new-approach-to-blue-carbon-projects-unveiled-in-colombia>; Avendaño, J., Rodríguez Rodríguez, A., & Gómez López, D. I. (2019).

<sup>29</sup> Bolívar, M., Rivillas-Ospina, G., Fuentes, W., Guzmán, A., Otero, L., Ruiz, G., et al. (2019). Anthropic Impact Assessment of Coastal Ecosystems in the Municipality of Puerto Colombia, NE Colombia. *Journal of Coastal Research*, 112–120.; Nuñez, A. (2019, March 31). Colombia could lose 17,000 ha of beach by 2040 - LatinAmerican Post. LatinAmericanPost. Retrieved August 1, 2022, from <https://latinamericanpost.com/27265-colombia-could-lose-17000-hectares-of-beach-by-2040>; IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>30</sup> Bolívar, M., Rivillas-Ospina, G., Fuentes, W., Guzmán, A., Otero, L., Ruiz, G., et al. (2019); Nuñez, A. (2019, March 31); IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>31</sup> IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>32</sup> Reproduced by Climate Focus based on data from Sistema de Información Ambiental de Colombia (SIAC). (n.d.). Geoservices Catalog. Retrieved from <http://www.siac.gov.co/geoservicios>.

### 3. Agriculture

**Agricultural systems in Colombia are a mix of smallholder and large-scale industrial operations.**<sup>33</sup> A small number of large agricultural producers hold a disproportionate amount of agricultural land and associated revenues.<sup>34</sup> For small farmers, agricultural production is often unprofitable.<sup>35</sup> The country has one of the world's most unequal land ownership structures and access to land was the main driver of the 60 year-long domestic conflict. Just 1% of producers own as much as 81% of land, with an average farm size of 17,195 ha.<sup>36</sup> The remaining 99% of farmers share less than 20% of the land, with an average farm size of two ha. The majority of farmers (63%) also lack access to infrastructure, credit, extension services, and other civic provisions that could enhance the profitability of their farm.<sup>37</sup>

**The main agricultural products of Colombia are coffee (839,661 ha under cultivation), palm oil (546,085 ha), rice (535,568 ha), and maize (327,774 ha) (see Figure 5).**<sup>38</sup>

Other crops include sugar cane, cocoa, plantain, bananas, beans, and avocado.<sup>39</sup> Coffee is the primary crop of the Andean region. The profitability of crops varies widely. For example, high input prices, poor infrastructure, and intermediaries drive the dairy sector in Colombia to be among the most unproductive among countries in Latin America, while the cocoa sector in Colombia is among the most productive in the region.<sup>40</sup>

<sup>33</sup> Fajardo, D., Mejía, M., Gómez, L., & Matheu, M. (2017). Radiografía de la desigualdad: Lo que nos dice el último censo agropecuario sobre la distribución de la tierra en Colombia. Retrieved from [https://www-cdn.oxfam.org/s3fs-public/file\\_attachments/radiografia\\_de\\_la\\_desigualdad.pdf](https://www-cdn.oxfam.org/s3fs-public/file_attachments/radiografia_de_la_desigualdad.pdf).

<sup>34</sup> Fajardo, D., Mejía, M., Gómez, L., et al. (2017).

<sup>35</sup> Ministerio de Ambiente y Desarrollo Sostenible, Colombia. (2017).

<sup>36</sup> Fajardo, D., Mejía, M., Gómez, L., et al. (2017).

<sup>37</sup> Montañó, M., Trouwloon, D., Hermann, B., Castro, J. P., Lema, S., & Streck, C. (2021). Shifting Finance towards Sustainable Land Use: A case study from Colombia. Retrieved from <https://s3.amazonaws.com/feldactiontracker.org/green-finance/Shifting+Finance+Colombia+Case+Study+Low+Res.pdf>.

<sup>38</sup> López Bejarano, J. M. (2020, July 21). Los cultivos con mayor número de hectáreas se concentran en el café, palma y arroz. *AgroNegocios*. Retrieved June 28, 2022, from <https://www.agronegocios.co/agricultura/los-cultivos-con-mayor-numero-de-hectareas-se-concentran-en-el-cafe-palma-y-arroz-3033622>.

<sup>39</sup> López Bejarano, J. M. (2020, July 21).

<sup>40</sup> Montañó, M., et al (2021).

<sup>41</sup> Reproduced by Climate Focus with data based on Fajardo, D., Mejía, M., Gómez, L., & Matheu, M. (2017). Radiografía de la desigualdad: Lo que nos dice el último censo agropecuario sobre la distribución de la tierra en Colombia. Retrieved from [https://www-cdn.oxfam.org/s3fs-public/file\\_attachments/radiografia\\_de\\_la\\_desigualdad.pdf](https://www-cdn.oxfam.org/s3fs-public/file_attachments/radiografia_de_la_desigualdad.pdf).

<sup>42</sup> Reproduced originally by Climate Focus based on administrative unit data and data from ESA. (2017). Land Cover CCI Product Guide Version 2. Retrieved from [maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2\\_2.0.pdf](https://maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2_2.0.pdf).

Figure 5: Percentage of land used for AG in Colombia, by commodity (of a total 8.5 million ha).<sup>41</sup>

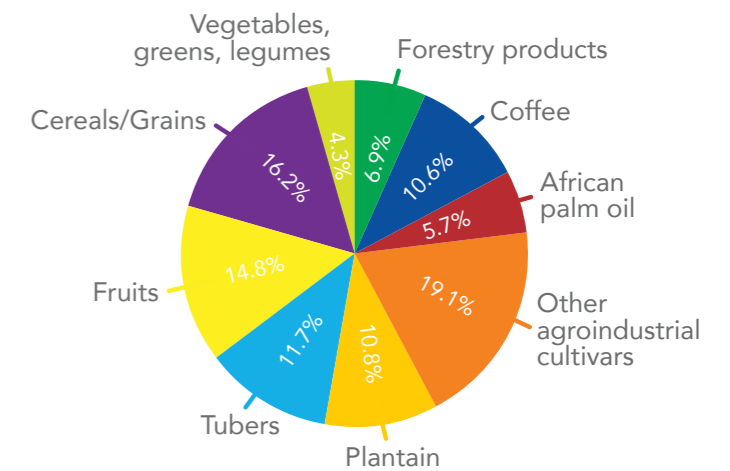
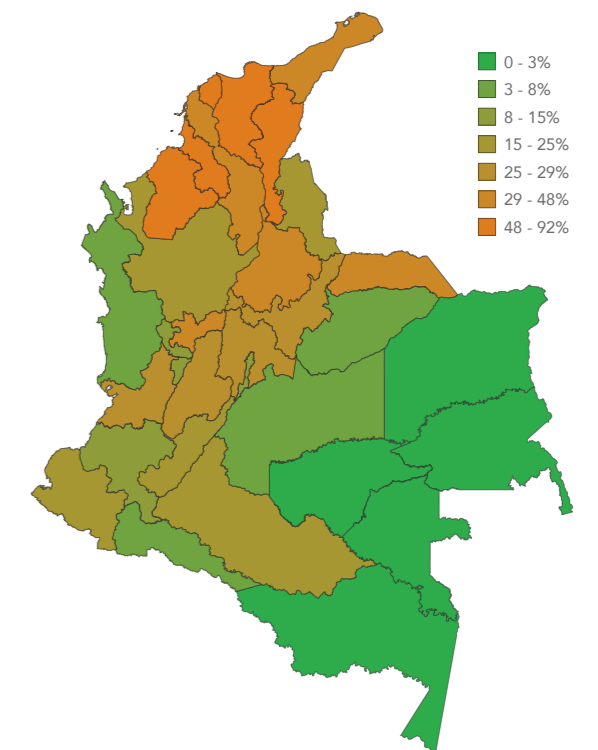


Figure 6: Percentage of land used for AG, per department.<sup>42</sup>





**By far the most significant use of agricultural land is cattle ranching, with pastures covering 34 million ha of land.** Livestock raising contributed 1.4% of Colombia's total gross national product (GNP) in 2017 and 21.8% of the agricultural GNP.<sup>43</sup> In 2022, there are almost 30 million head of cattle on 633,841 registered farms, which represents an increase of 4.7% compared to 2021.<sup>44</sup> This increase corresponds to an increase in milk production. Colombia slaughtered almost four million head of cattle last year and produced 758,737 tons of beef.<sup>45</sup> Cattle ranching is the predominant land use, with 82% of farms having less than 50 animals.<sup>46</sup>

**Colombia's rich agricultural resources are not used efficiently.** Colombia's Geographic Institute Agustín Codazzi (*Instituto Geográfico Agustín Codazzi*, IGAC) and the Rural and Agricultural Planning Unit (*Unidad de Planificación Rural Agropecuaria*, UPRA) of the Ministry of Agriculture and Rural Development (*Ministerio de Agricultura y Desarrollo Rural*, MADR) have identified that over 27 million ha of Colombian territory could be used for agricultural activities and 64 million ha for forestry.<sup>47</sup> However, as of 2016, only about 5.3 million ha were used for agriculture and 60 million ha for forests.<sup>48</sup> The opposite is the case for cattle ranching, which operates in over 34 million ha, despite a vocation of less than 15 million ha.<sup>49</sup> This often leads to land-use conflicts that are common on half of the Colombian territory, in most cases because areas that are apt for agriculture or conservation are occupied by livestock farming.<sup>50</sup>

<sup>43</sup> Federación Colombiana de Ganaderos. (2017). Ganadería Colombiana Sostenible. Principios Agroecológicos SSPi. Manizales: Curso de ganadería sostenible.

<sup>44</sup> Instituto Colombiano Agropecuario (ICA). (n.d.). Censos Pecuarios Nacional. Retrieved August 31, 2022, from <https://www.ica.gov.co/areas/pecuaria/servicios/epidemiologia-veterinaria/censos-2016/censo-2018>.

<sup>45</sup> FEDEGAN. (n.d.). Estadísticas - Cifras del Sector: Producción. Retrieved August 31, 2022, from <https://www.fedegan.org.co/estadisticas/produccion-0>.

<sup>46</sup> ICA. (2019). Censos Pecuarios Año 2019. Retrieved August 31, 2022, from <https://www.ica.gov.co/areas/pecuaria/servicios/epidemiologia-veterinaria/censos-2016/censo-2018>.

<sup>47</sup> MADR & UPRA. (2018). Identificación general de la frontera agrícola en Colombia. Bogotá. Retrieved from [https://www.minagricultura.gov.co/Normatividad/Projects\\_Documents/IDENTIFICACION%20GENERAL%20DE%20LA%20FRONTERA%20.pdf](https://www.minagricultura.gov.co/Normatividad/Projects_Documents/IDENTIFICACION%20GENERAL%20DE%20LA%20FRONTERA%20.pdf). IGAC & Subdirección de Agrología. (2016). Suelos y Tierras de Colombia. Bogotá. Quoted in Barrera, M. D., Perfetti, J. J., & Junguito, R. (2019). Uso Potencial y Efectivo de la Tierra Agrícola en Colombia: Resultados del Censo Nacional Agropecuario.

<sup>48</sup> Barrera, M. D., Perfetti, J. J., & Junguito, R. (2019). Uso Potencial y Efectivo de la Tierra Agrícola en Colombia: Resultados del Censo Nacional Agropecuario. Retrieved from [https://www.repository.fedesarrollo.org.co/bitstream/handle/11445/4079/Report\\_Septiembre\\_2019\\_Delgado\\_05\\_05\\_2022.pdf?sequence=4&isAllowed=y](https://www.repository.fedesarrollo.org.co/bitstream/handle/11445/4079/Report_Septiembre_2019_Delgado_05_05_2022.pdf?sequence=4&isAllowed=y).

<sup>49</sup> Barrera, M. D., Perfetti, J. J., & Junguito, R. (2019).

<sup>50</sup> Rojas, P., & Mora, E. (2017). Plan de acción de biodiversidad para la implementación de la Política Nacional para la Gestión Integral de la Biodiversidad y sus Servicios Ecosistémicos 2016-2030. Retrieved from <https://www.cbd.int/doc/world/co/co-nbsap-v3-es.pdf>.



# 03

## Colombia's policy landscape

**Colombia has great potential to develop its rural sector and become an important global food producer.** However, the reality of Colombia's rural sector makes the realization of this potential and successful, sustainable rural development challenging. Structural changes, such as integrating rural development and agricultural policies with climate and biodiversity policies, are needed to meet the multiple challenges the land sector faces in Colombia.

**Colombia has formulated an ambitious NDC, but is lagging on implementation.**<sup>51</sup>

Achieving its NDC targets is highly dependent on reducing land-use emissions, but deforestation levels remain high, and forest policies are often not enforced. Hope rests on the newly elected national Government, which has committed to ambitious climate and environmental policies.

**Inaugurated in August 2022, Gustavo Petro, Colombia's first elected leftist president, has made tackling environmental issues one of the three pillars of his Government to transition to a low-carbon economy.**<sup>52</sup>

The new president has promised to halt deforestation across the country, particularly in the Amazon rainforest, by limiting agribusiness expansion into the forests and bolstering carbon credit generation from nature protection.<sup>53</sup> Additionally, Petro's office has pledged to end contracting for new oil exploration, phase out coal mining and accelerate the transition to renewable energy – especially relevant to the Andean, Orinoquía, and Amazon biomes, where agribusiness expansion into the Amazon and oil and gas operations have been prevalent – and to encourage the development of public-private partnerships to promote carbon credit-issuing NbS projects.<sup>54</sup>

<sup>51</sup> Vergara, W., Finch, M., & Langer, P. (2021). Colombia Shows Leadership in the Race Against Climate Change. World Resources Institute. Retrieved August 25, 2022, from <https://www.wri.org/insights/colombia-shows-leadership-race-against-climate-change>.

<sup>52</sup> Colombia's election result points to potential fossil fuel policy shift « Carbon Pulse. (2022, June 20). Carbon Pulse. Retrieved August 3, 2022, from <https://carbon-pulse.com/163471/>.

<sup>53</sup> Business Standard (June 26, 2022) New Colombian president Gustavo Petro pledges to protect Rainforest. Available "Colombia's Election Result Points to Potential Fossil Fuel Policy Shift" Carbon Pulse. IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>54</sup> Colombia's election result points to potential fossil fuel policy shift « Carbon Pulse. (2022, June 20).

<sup>55</sup> Gobierno de Colombia. (2020). Actualización de la Contribución Determinada a Nivel Nacional de Colombia (NDC) (UNFCCC) [UNFCCC]. Retrieved from <https://unfccc.int/sites/default/files/NDC/2022-06/NDC%20actualizada%20de%20Colombia.pdf>.

<sup>56</sup> Gobierno de Colombia. (2020).

<sup>57</sup> Gobierno de Colombia. (2020).

## 1. National climate policy framework

**Colombia's NDC recognizes the critical role of nature-based solutions in climate change mitigation and adaptation.** With its updated NDC, Colombia has committed to a 51% reduction of GHG emissions by 2030 about its projected business-as-usual scenario (BAU) of 345.8 MtCO<sub>2</sub>e per year.<sup>55</sup> Regarding forestry, the Government has pledged to reduce deforestation from 158,900 ha in 2019 to 50,000 ha by 2030, a 68.5% reduction. The Government has also committed to an array of restoration activities, including rehabilitating 18,000 ha under the SINAP, restoring and conserving mangroves at the landscape level through sustainable management, and taking steps to prevent forest fires.<sup>56</sup>

**Colombia's NDC incorporates commitments around the dual goals of rural development and low-carbon agriculture.** The NDC targets the three biomes with the highest agricultural potential: Andes, Caribbean, and Orinoquía, and actions include providing agri-climate technical roundtables to disseminate knowledge on low-carbon agricultural methods to around one million farmers. The NDC also seeks to improve the efficiency of livestock production on 3.6 million ha of land through, for example, the restoration of pastureland and tree planting. Agroforestry approaches will also be encouraged among cocoa and coffee producers. Moreover, Colombia's NDC includes measures for reducing emissions from rice and cacao crops.<sup>57</sup>

**In December 2021, the Colombian Congress passed the Climate Action Law (Law 2169) that governs national climate action.**<sup>58</sup> The law anchors the transition towards climate resilience and carbon neutrality by 2050 through embedding sectoral GHG mitigation goals into law.<sup>59</sup> The law outlines 20 goals for the conservation, restoration, and maintenance of ecosystems and establishes a goal of zero net deforestation by 2030. It also calls for the restoration of at least one million ha of non-timber-producing forests by 2030, and natural conservation contracts for sustainably managing 2.5 million ha of land.

**Another critical policy tool is the National Counsels on Economic and Social Policy (Consejos Nacionales de Política Económica y Social, CONPES) which set roadmaps for public institutions to achieve development goals and determine financial needs.**

Currently, Colombia has three CONPES directly relevant to NbS and climate: CONPES 4021 sets out the public policy to halt deforestation by implementing intersectoral strategies to promote the sustainable use of the natural capital, the forestry economy, and community-based development.<sup>60</sup> CONPES 3934 for green growth aims to further productivity and economic competitiveness while ensuring natural capital's sustainable and climate-compatible use. CONPES 3836 for payment for ecosystem services intends to facilitate investments that guarantee the maintenance and generation of environmental services.<sup>61</sup>

<sup>58</sup> El Congreso de Colombia. LEY N° 2169 del 21 de Diciembre de 2021 "Por medio de la cual se impulsa el desarrollo bajo en carbono del país mediante el establecimiento de metas y medidas mínimas en materia de carbono neutralidad y resiliencia climática y se dictan otras disposiciones.". Retrieved from <https://dapre.presidencia.gov.co/normativa/normativa/LEY%202169%20DEL%2022%20DE%20DICIEMBRE%20DE%202021.pdf>.

<sup>59</sup> El Congreso de Colombia. LEY N° 2169 del 21 de Diciembre de 2021.

<sup>60</sup> República de Colombia. (2020). Documento 4021: Política Nacional Para El Control De La Deforestación Y La Gestión Sostenible De Los Bosques, CONPES: Consejo Nacional de Política Económica y Social. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/4021.pdf>.

<sup>61</sup> República de Colombia - Departamento Nacional de Planeación. Lineamientos de Política y Programa Nacional de Pago por Servicios Ambientales para la Construcción de Paz. 3836. Consejo Nacional de Política Económica y Social (CONPES) (2017) República de Colombia. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/3886.pdf>

<sup>62</sup> República de Colombia. (2018). Política de Crecimiento Verde, Documento 3934, CONPES: Consejo Nacional de Política Económica y Social (p. 44). Retrieved from <https://www.dnp.gov.co/Crecimiento-Verde/Documents/Pol%C3%ADtica%20CONPES%203934/Resumen%20Pol%C3%ADtica%20de%20Crecimiento%20Verde%20-%20diagramaci%C3%B3n%20FINAL.pdf>.

<sup>63</sup> Faguet, J.-P., Sánchez, F., & Villaveces, M.-J. (2020). The perversion of public land distribution by landed elites: Power, inequality and development in Colombia. *World Development*, 136, 105036.

<sup>64</sup> Fajardo, D., Mejía, M., Gomez, L., & Matheu, M. (2017). Radiografía de la Desigualdad: Lo Que Nos Dice el Último Censo Agropecuario sobre la Distribución de la Tierra en Colombia. Retrieved June 23, 2022, from [https://www-cdn.oxfam.org/s3fs-public/file\\_attachments/radiografia\\_de\\_la\\_desigualdad.pdf](https://www-cdn.oxfam.org/s3fs-public/file_attachments/radiografia_de_la_desigualdad.pdf).

<sup>65</sup> UPRA. (2020). Informalidad en la tenencia de la tierra en Colombia 2019. Retrieved July 27, 2022, from [https://www.upra.gov.co/documents/10184/104284/01\\_informalidad\\_tenencias\\_tierras](https://www.upra.gov.co/documents/10184/104284/01_informalidad_tenencias_tierras).

For this purpose, the policy proposes implementing new low-carbon economic opportunities based on the country's natural capital.<sup>62</sup>

## 2. Land governance and ownership

**In Colombia, the uneven distribution and ownership of land have been a source of conflict for much of the country's history.**

Colombia has one of the world's most unequal land ownership structures.<sup>63</sup> In 2017, a census of agricultural land in Colombia found that 81% of farms with an average size of two ha use just 5% of agricultural land, while 0.1% of units, with an average size of 17,195 ha, use almost 60% of the agricultural land.<sup>64</sup> Unequal land distribution also fueled the most violent and bloody armed conflict of the last hundred years in Latin America. Violence was triggered in 1948 by the assassination of president-elect Jorge Eliécer Gaitán which evolved into civil war when the guerrilla organizations FARC and the Army for the National Liberation (*Ejército de Liberación Nacional*, ELN) were created in the 1960s.

**More than five million Colombians are internally displaced, and insecure land tenure continues to be a widespread problem.**<sup>65</sup> In 2019, 52.7% of land in Colombia

was informal, meaning that the owners did not have any formal rights or means to prove ownership of their property. Over recent decades, rural communities have often seen themselves trapped between guerilla groups and paramilitaries, which drives displacement and direct threats toward specific individuals or families. Almost 90% of the internally displaced have been driven from rural to urban areas by conflict and violence, and expulsion of land users to gain territorial control is a strategic tool frequently used in the conflict.<sup>66</sup> While displaced people have a right to land restitution (under Law 1448 of 2011), the process is complicated and slow, hindered by many financial, social, and economic barriers.<sup>67</sup>

**The armed conflict had a direct impact on land use in Colombia.** In some areas, it made the protection of forests impossible; in other regions the conflict helped protect forests and ecosystems. Where entities such as the FARC occupied large swathes of forest areas, these forests were protected for strategic reasons, and the FARC acted indirectly as environmental regulators.<sup>68</sup> The Peace Agreement signed in 2016 between the FARC and the Government led many areas to a power vacuum in rural communities and their lands. Ex-FARC strongholds became accessible to armed and unarmed legal and illegal actors. In many places, this led to increased deforestation driven by cattle ranching and illegal cropping, as well as a new wave of violence toward local populations.<sup>69</sup>

**The Peace Agreement seeks to address the issue of land distribution, displacement, and tenure.** The Agreement grants land to landless farmers and formalizes legitimate landholders who do not possess valid legal documents.<sup>70</sup> The Comprehensive Rural Reform under the Peace Agreement aims to decrease rural poverty and promote long-term peace through four key pillars of activities: 1) the creation of a Land Fund (*Fondo de Tierras*) and subsidies or credits to help to provide land to smallholders; 2) the implementation of National Plans for sectors related to public services and infrastructure; 3) the provision of Development Plans with a Territorial Approach (*Programas de Desarrollo con Enfoque Territorial*, PDETs) to ensure national plans meet local needs over 15 years; and 4) the institution of a food security system that meets specific regional needs.<sup>71</sup>

**The Comprehensive Rural Reform suffers from severe delays in implementation.**<sup>72</sup> The Land Fund, comprised of state-owned land and land seized from illegal activity, has only allocated rights to 17.9% of the land that has been included in the fund by the end of 2021.<sup>73</sup> Land grabbing is taking place on land previously controlled by the FARC, especially in the Andean and Eastern Amazon regions. In addition, with the signing of the Peace Agreement, there has been an increase in areas cultivated with coca, with the expectation that cleared and cultivated land can potentially be regularized.<sup>74</sup> Despite the agreement, today, there are conflicts over previously controlled

FARC areas among FARC dissidents and other armed groups.<sup>75</sup> However, there is hope. The new Government under President Petro has committed to supporting land reforms and swift implementation of the Peace Agreement.

**About a third of Colombia's land is owned by Indigenous and Afro-American communities, half is owned by private entities, and the remainder by the State.**<sup>76</sup> Among Colombia's forest areas 37.6 million ha are owned by Indigenous and Afro-Colombian communities and 31.4 million ha of public forest lands are administered by the Government.<sup>77</sup> The 1991 Colombian Constitution legally recognizes collective land ownership and collective land tenure for Indigenous Reserves (*Resguardos Indígenas*) and Afro-Colombian community lands.<sup>78</sup> Recognized Indigenous reserves have political autonomy and their own Government. Governance is mainly in the hands of Indigenous traditional authorities (*Asociación de Autoridades Tradicionales Indígenas*, AATIs). AATIs manage their territories according to their Life Plans (*Planes de Vida*), which reflect the vision of the indigenous community regarding their future based on the preservation and care of their traditional knowledge. Since 2018, Indigenous reserves can also be governed by their own Indigenous Councils (*Consejos Indígenas*), which are recognized as Governmental entities by the Colombian State. AATIs can decide to establish themselves as Indigenous Territorial Entities (*Entidades Territoriales*), which enables them to design and implement their own economic and social policies, formalize and strengthen their sustainable forest use models, and plan their territories according to their Life Plans.

**Additionally, through Law 160/1994, Colombia created Smallholders Reserve Zones (*Zonas de Reserva Campesina – ZRC*).** These ZRCs are planning units aimed at containing the expansion of the agricultural frontier by promoting rural economies and formalizing land titling to overcome land-related conflicts.<sup>79</sup> The ZRC are a key element for accomplishing the 2016 Peace Agreement and will most likely be strengthened by the new Government. Currently, there are 64 consolidated ZRC, some of them located on the borders of important ecosystems such as the dry tropical forest and paramos.

**Weak, absent, and contested land titles remain a source of conflict.** There are overlapping titles, claims and use across different types of land, particularly between publicly-owned land and collectively- or privately-owned land.<sup>80</sup> State-owned land includes protected areas, areas with forestry or mining concessions, and *baldíos*—land that is considered vacant or undeveloped.<sup>81</sup> Between 20% and 60% of land in Colombia is held under informal arrangements and 48% of the 3.7 million rural parcels in the National Cadaster do not have registered titles.<sup>82</sup> Despite efforts in recent decades to further the formalization of and access to land tenure, lack of land ownership remains a widespread problem in Colombia.<sup>83</sup>

**UPRA has, among others, been created to address tenure problems.** UPRA is mandated by Decree 2145 of 2011 to, among others, ensure efficient use of soils and competitive agricultural production; define appropriate agricultural uses for different areas; define criteria and instruments for rural agricultural land use planning and ownership; plan formalization processes for rural land; monitor

<sup>66</sup> Internal Displacement Monitoring Centre. (2022). Country Profile: Colombia. Retrieved August 1, 2022, from <https://www.internal-displacement.org/countries/colombia>.

<sup>67</sup> United States Agency for International Development. (2017). Property Rights and Resource Governance: Colombia. Retrieved June 23, 2022, from [https://www.land-links.org/wp-content/uploads/2017/01/USAID\\_Land\\_Tenure\\_Colombia\\_Profile\\_Revised\\_December-2017.pdf](https://www.land-links.org/wp-content/uploads/2017/01/USAID_Land_Tenure_Colombia_Profile_Revised_December-2017.pdf).

<sup>68</sup> FARC peace deal in Colombia sparked war on forests, report says. (2021, November 8). Mongabay Environmental News. Retrieved July 6, 2022, from <https://news.mongabay.com/2021/11/farc-peace-deal-in-colombia-sparked-war-on-forests-report-says/>.

<sup>69</sup> Ganzenmüller, R., Sylvester, J. M., & Castro-Nunez, A. (2022). What Peace Means for Deforestation: An Analysis of Local Deforestation Dynamics in Times of Conflict and Peace in Colombia. *Frontiers in Environmental Science*, 10. Retrieved July 1, 2022, from <https://www.frontiersin.org/article/10.3389/fenvs.2022.803368>.

<sup>70</sup> FAO. (2022). Colombia. Inclusive and Sustainable Territories and Landscapes Platform. Retrieved June 28, 2022, from <https://www.fao.org/in-action/territorios-inteligentes/countries/col/en/>.

<sup>71</sup> Gobierno de Colombia. (n.d.). Acuerdo Reforma Agraria. Retrieved June 28, 2022, from <https://www.funcionpublica.gov.co/documentos/418537/1564007/AcuerdoReforma+Agraria.pdf>.

<sup>72</sup> Matriz de Acuerdos de Paz, & Instituto Kroc de Estudios Internacionales. (2021). Cinco años de implementación del Acuerdo Final en Colombia: Logros, desafíos y oportunidades para aumentar los niveles de implementación, diciembre 2016 - octubre 2021. Retrieved August 3, 2022, from <https://curate.nd.edu/show/05741r69f09>.

<sup>73</sup> Congreso de la República de Colombia. (2021). ¿En Qué Va La Reforma Rural Integral Del Acuerdo De Paz? Informe 08: Seguimiento multi-partidista a la implementación del Acuerdo de Paz. Retrieved from [https://viva.org.co/cajavirtual/svc0750/pdfs/01\\_INFORME\\_PDET\\_NO\\_ENREDEN\\_LA\\_PAZ\\_BAJA.pdf](https://viva.org.co/cajavirtual/svc0750/pdfs/01_INFORME_PDET_NO_ENREDEN_LA_PAZ_BAJA.pdf).

<sup>74</sup> Jiménez Castelblanco, J. G. (2019). Portafolio de productos y servicios financieros finagro y su aplicación en la amazonia: Caso Caquetá y Guaviare. Retrieved from <https://sinchi.org.co/files/PUBLICACIONES%20DIGITALES/Documentos%20de%20debate/04.pdf>.

<sup>75</sup> Nilsson, M., & González Marín, L. (2020). Violent Peace: Local Perceptions of Threat and Insecurity in Post-Conflict Colombia. *International Peacekeeping*, 27(2), 238–262.

<sup>76</sup> United States Agency for International Development. (2017). CPT Colombia. (2021, July 6). Land Ownership, Mother of All Conflicts. Community Peacemaker Teams. Retrieved June 23, 2022, from <https://cpt.org/2021/07/06/colombia-land-ownership-mother-all-conflicts>.

<sup>77</sup> United States Agency for International Development. (2017).

<sup>78</sup> Herrera Arango, J. (2018). CPT Colombia. (2021). United States Agency for International Development. (2017).

<sup>79</sup> Marín, W., Osejo, A., & Posada Molina, V. (2017). Zonas de Reserva Campesina en el escenario del posconflicto | Biodiversidad. Instituto Humboldt. Retrieved August 17, 2022, from <http://reporte.humboldt.org.co/biodiversidad/2017/cap4/404/>.

<sup>80</sup> Herrera Arango, J. (2018). CPT Colombia. (2021 United States Agency for International Development. (2017).

<sup>81</sup> CPT Colombia. (2021, July 6); Herrera Arango, J. (2018, May 17). Collective land tenure in Colombia: Data and trends. Center for International Forestry Research (CIFOR). Retrieved August 3, 2022, from <https://www.cifor.org/knowledge/publication/6877/>.

<sup>82</sup> United States Agency for International Development. (2017).

<sup>83</sup> Herrera Arango, J. (2018). Faguet, J.-P. et al. (2020). United States Agency for International Development. (2017).

and regulate the market for rural land; provide information related to infrastructure, cadasters and registries; track and optimize rural economic trends; and publish technical information.<sup>84</sup> Colombia is also in the process of creating a Multipurpose Cadastral to improve land administration and support an agricultural reform to protect livelihoods and nature.<sup>85</sup>

### 3. Forest conservation and protection policies

The Colombian Government has a suite of laws and decrees that aim to protect forests, promote sustainable forest management, and restore natural forests.<sup>86</sup> However, despite these legal acts, deforestation rates remain high, the legal forest sector remains very small, and the restoration of forests is progressing slowly. Colombia has very few forest plantations - they account for only 1% of the total forest area, and about 80% of the domestic timber comes from natural forests.<sup>87</sup> The Forestry Incentive Certificate (*Certificado de Incentivo Forestal*, CIF), is a tax credit that was introduced in 1994 to promote the establishment of commercial forest plantations to produce raw materials for wood products such as furniture, plywood, pulp, and paper. Between 1995 and 2015, the CIF supported the reforestation of 258,000 ha of forests. However,

there is a general lack of enforcement of forest laws and, due to the prevalence of armed conflict, a lack of Government-control over natural resources.

Colombia has also established several institutions that govern sustainable forest management and conservation. The Ministry of Environment and Sustainable Development (*Ministerio de Medio Ambiente y Desarrollo Sostenible*, MADS) and IDEAM were both created in the early 1990s and remain cornerstones of the National Environmental System (*Sistema Nacional Ambiental*, SINA). IDEAM oversees National System for Forestry Information (*el Sistema Nacional de Información Forestal*, SNIF), the National Forest Inventory (*el Inventario Forestal Nacional*, IFN), and the System for Monitoring Forests and Carbon (*el Sistema de Monitoreo de Bosques y Carbono*, SMByC).<sup>88</sup>

At the local level, the Regional Autonomous Corporations (*Corporaciones Autónomas Regionales*, CAR) oversee natural resources, promote sustainable development in their respective jurisdictions, and operate as the maximum environmental authority. Among the functions of the CARs are to grant the environmental permits and licenses needed for the use of natural resources, as well as to manage the national parks within their jurisdiction.<sup>89</sup>

Colombia's National System of Protected Areas (*Sistema Nacional de Áreas Protegidas*, SINAP) includes 1,447 protected areas covering over 31 million ha, including 12,545 million ha of maritime territory.<sup>90</sup> The National Natural Park Administration (*Parques Nacionales Nacionales*, PNN) oversees the Systems of National Natural Parks (*Sistema de Parques Nacionales Naturales*, SPNN)-and the coordination of the SINAP.<sup>91</sup> The PNN is the Government unit with the widest (and often the only) presence in and around ecosystem hotspots. It is charged with the often complex and dangerous task of defending the parks against encroachment and illegal deforestation.

Colombia actively supports the UN framework for REDD+ (Reduced Emissions from Deforestation and Forest Degradation) and the role of conservation, sustainable management of forests, and the enhancement of forest carbon stocks. In 2016, Colombia adopted a National REDD+ Strategy, "*Bosques Territorios de Vida*", the Strategy for Control of Deforestation and Forest Management.<sup>92</sup> The main objectives of the strategy are:

1. Consolidate the local governance of Indigenous communities.
2. Promote a forestry economy based on forest goods and services aimed at inclusive rural development and closing the agricultural frontier.
3. Decrease the degradation and deforestation through multisectoral management.

4. Generate reliable and trustworthy information about the offer, status, pressure, and dynamics of the forestry resources as an asset for decision-making processes.
5. Implement the necessary institutional, legal and financial adjustments that allow the state to have enough tools to manage forests and halt deforestation effectively.

The elements of this strategy can also be found in the policy goals of President Pedro's administration and it is expected the Government will accelerate implementation.<sup>93</sup>

There are several public-sector programs that convert Colombia's REDD+ Strategy into concrete activities and enable donors to support the country's effort to reduce deforestation. The Government implements the Amazon Vision (*Visión Amazonía*) as a results-based program supporting REDD+ in the Colombian Amazon.<sup>94</sup> Also in the Amazon, the Global Environment Facility's (GEF) Heart of the Amazon program (*Corazón de la Amazonía*) seeks to promote sustainability in and around an area of 11 million ha with the Chiribiquete National Park as its core.<sup>95</sup> In the Orinoquía region, the Government implements the Orinoquía Sustainable Integrated Landscape Program with the support of the World Bank-administered BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL).<sup>96</sup>

<sup>84</sup> Unidad de Planificación Rural Agropecuaria (UPRA) (n.d.). Funciones. Retrieved June 24, 2022, from <https://upra.gov.co/web/guest/upra/funciones>.

<sup>85</sup> República de Colombia - Transición presidencial. (2022). Síntesis de Recomendaciones del Empalme del Sector Agro: Informe técnico de empalme.

<sup>86</sup> Decree 2278 of 1953 on Forest Management, Retrieved September 1, 2022 from <https://www.suin-juriscal.gov.co/viewDocument.asp?ruta=Decretos/1430092>. Law 2 of 1959 on Forest Economy and Conservation of Renewable Natural Resources. Retrieved September 1, 2022 from [https://siatac.co/Documentos/estudios/zonificacion\\_ambiental\\_de\\_ley\\_segunda\\_de\\_1959\\_fases/resultados/Ley%202da%20de%201959.pdf?t=1596587450](https://siatac.co/Documentos/estudios/zonificacion_ambiental_de_ley_segunda_de_1959_fases/resultados/Ley%202da%20de%201959.pdf?t=1596587450). Decree 2811 of 1974 on the Economic Exploitation of Forests, Retrieved September 1, 2022 from <https://vlex.com.co/vid/codigo-naturales-renovables-proteccion-42846062>; Decree 1791 of 1996 on non-timber forest products. Retrieved from <https://vlex.com.co/vid/establece-aprovechamiento-forestal-407756957>. Decree 1390 of 2018 which regulates the compensatory rates on timber products from natural forests. Retrieved September 1, 2022 from <https://leap.unep.org/countries/co/national-legislation/decreto-no-1390-modifica-el-decreto-unico-reglamentario-del>.

<sup>87</sup> Traffic, WWF, IUCN, European Commission. (n.d.). Briefing on Timber Production in Colombia. Retrieved from <https://www.traffic.org/site/assets/files/8617/flegt-colombia.pdf>.

<sup>88</sup> República de Colombia. (2020). Documento 4021: Política Nacional Para El Control De La Deforestación Y La Gestión Sostenible De Los Bosques, CONPES: Consejo Nacional de Política Económica y Social. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/4021.pdf>.

<sup>89</sup> Corporación Autónoma Regional de Cundinamarca - CAR. (1993). Objetivos y Funciones. Retrieved August 25, 2022, from <https://www.car.gov.co/vercontenido/5>.

<sup>90</sup> RUNAP en cifras: Total de hectáreas protegidas en Colombia. (2021). RUNAP. Retrieved from <https://runap.parquesnacionales.gov.co/cifras>. The national SINAP includes the Regional System of Protected Areas (Sistema Regional de Áreas Protegidas, SIRAP) at the regional and local level.

<sup>91</sup> Parques Nacionales Naturales de Colombia. (n.d.). Organization. Gobierno de Colombia. Retrieved August 6, 2022, from <https://www.parquesnacionales.gov.co/portal/en/organization-2/>.

<sup>92</sup> Ministerio de Ambiente y Desarrollo Sostenible and IDEAM. (2018). Bosques- territorios de vida: Estrategia Integral de Control de la Deforestación y Gestión de los Bosques. Retrieved from [https://redd.unfccc.int/files/eicdgb\\_bosques\\_territorios\\_de\\_vida\\_web.pdf](https://redd.unfccc.int/files/eicdgb_bosques_territorios_de_vida_web.pdf).

<sup>93</sup> República de Colombia - Transición presidencial. (2022). Síntesis de Recomendaciones del Empalme del Sector Agro: Informe técnico de empalme.

<sup>94</sup> Ministerio de Ambiente. (n.d.). Visión Amazonía. Retrieved from <https://visionamazonia.minambiente.gov.co/>.

<sup>95</sup> ¿Qué nos proponemos? (n.d.). Corazón de la Amazonía. Retrieved August 4, 2022, from <https://www.corazondelaamazonia.org/cual-es-nuestro-marco-de-accion>.

<sup>96</sup> BioCarbon Fund ISFL. (n.d.). Orinoquía Sustainable Integrated Landscape Program. Retrieved August 3, 2022, from <https://www.biocarbonfund-isfl.org/-integrated-landscape-program>.

## 4. Ecosystem restoration policies

**Colombia is participating in multiple international restoration initiatives.** Under the Bonn Challenge, Colombia pledged to restore one million ha of forests, representing 0.9% of the country's total land area. However, implementation is lagging. As of 2022, the total area under restoration is only 130,000 ha or 0.12% of the pledged area.<sup>97</sup> In 1994, Colombia ratified the Convention on Biological Diversity (CBD) with a pledge to restore at least 15% of degraded ecosystems by 2020, and this goal has been reflected in subsequent national plans.<sup>98 99</sup> Colombia is also a signatory of the United Nations Conventions to Combat Desertification (UNCCD) under which restoration plays a significant role in reducing land degradation and conserving forest ecosystems.<sup>100</sup>

**To enhance restoration in the country, MADS established the National Plan of Ecological Restoration and Recuperation of Degraded Areas 2015-2035 (Plan Nacional de Restauración Ecológica, Rehabilitación y Recuperación de Áreas Degradadas, PNR).**<sup>101</sup> The PNR estimates that 73% of the deforestation in Colombia is caused by the expansion of the agricultural frontier and land colonization, while degradation is caused by illicit crop cultivation, illegal logging,

fragmentation of ecosystems, mining, forest fires, and disturbances to hydrology or other ecosystem functions, and seeks to address these drivers.<sup>102</sup> The PNR foresees ecological restoration, rehabilitation, and recuperation of degraded areas and identifies areas in each department for these three areas of work (see **Table 2**).<sup>103</sup> The PNR seeks to build on and strengthen activities identified in the 2012 National Policy of Integral Management of Biodiversity and Ecosystem Services (*Política Nacional para la Gestión Integral de la Biodiversidad y sus Servicios Ecosistémicos*, PNGIBSE).<sup>104</sup>

**The Law 2173 of 2021 creates new "Areas for Life" (Áreas De Vida) to restore forests in every municipality of the country, with a preference for restoration near water sources.** The Government also adopted the Respira Plan that aims, among other things, to create sustainable food systems through the ecological restoration of degraded lands. Respira seeks to restore 301,900 ha of degraded ecosystems by the end of 2022 and 942,615 ha by 2030. Five hundred million trees would be planted in this process.<sup>105</sup>

Table 2: Hectares in each department identified for recuperation, rehabilitation, and restoration under the PNR.<sup>106</sup>

Biomes	Department	Recuperation	Rehabilitation	Restoration	Total general
●	Amazonas	5,423.36	25,042.93	103,673.68	134,139.97
●	Antioquia	988,325.63	896,990.59	602,199.76	2,487,515.99
●	Arauca	5,197.78	154,284.19	150,739.60	310,221.57
●	Atlántico	17,657.87	48,507.18	36,131.50	102,296.55
●	Bolívar	267,942.12	369,512.08	236,847.95	874,302.16
●	Boyacá	447,085.39	232,806.73	342,717.42	1,022,609.53
●	Caldas	267,9226.47	106,073.88	66,013.58	439,313.92
●	Caquetá	790,020.29	631,045.95	427,031.12	1,848,097.36
●	Casanare	97,235.27	315,648.15	189,153.58	602,036.99
●	Cauca	522,024.27	302,522.87	242,124.02	1,066,671.17
●	Cesar	268,406.11	410,539.82	160,788.18	839,743.12
●	Chocó	127,601.74	216,228.93	266,144.59	609,975.25
●	Córdoba	136,477.52	544,658.25	187,554.25	868,690.01
●	Cundinamarca	293,012.99	349,048.52	264,666.34	906,727.85
●	Guainía	18,071.26	15,864.85	133,788.65	167,724.75
●	Guaviare	123,062.92	237,363.40	241,748.78	602,175.10
●	Huila	475,701.48	235,886.68	137,331.47	848,919.62
●	La Guajira	223,738.16	120,037.20	79,647.91	423,450.27
●	Magdalena	169,732.12	287,401.87	219,319.08	676,453.07
●	Meta	234,755.67	644,427.29	712,858.25	1,592,041.20
●	Nariño	262,556.87	393,637.72	432,076.59	1,088,271.17
●	Norte De Santander	438,663.51	180,547.54	235,221.95	854,433.00
●	Putumayo	155,964.89	241,247.82	222,524.22	619,736.93
●	Quindío	40,964.34	5,921.77	20,309.29	67,195.41
●	Risaralda	78,909.27	24,557.58	24,216.67	127,683.51
●	Santander	525,278.04	516,577.41	360,103.42	1,401,958.86
●	Sucre	49,905.04	237,423.85	102,330.35	389,659.24
●	Tolima	615,370.50	303,213.96	201,752.86	1,120,337.32
●	Valle Del Cauca	414,398.57	172,790.56	106,981.03	694,170.16
●	Vaupés	35,708.69	18,321.77	83,487.28	137,517.74
●	Vichada	20,431.25	179,446.75	215,940.20	415,818.21
	<b>Total general</b>	<b>8,116,849.37</b>	<b>8,417,578.07</b>	<b>6,805,450.58</b>	<b>23,339,878.01</b>

● Amazon ● Andes ● Caribe ● Orinoquía ● Pacifico

<sup>97</sup> IUCN International Union for Conservation of Nature. (2020). Colombia. Restore Our Future: Bonn Challenge. Retrieved June 24, 2022, from <https://www.bonnchallenge.org/pledges/colombia>.

<sup>98</sup> Instituto Humboldt. (2015). Restauración ecológica | Biodiversidad 2015. Retrieved June 29, 2022, from <http://reporte.humboldt.org.co/biodiversidad/2015/cap3/308/>.

<sup>99</sup> Ospina Arango, O. L., Vanegas Pinzón, S., Escobar Niño, G. A., Ramírez, W., & Sánchez, J. J. (2015). Plan Nacional de Restauración Ecológica, Rehabilitación y Recuperación de Áreas Degradadas - PNR. Retrieved August 4, 2022, from <https://archivo.minambiente.gov.co/index.php/bosques-biodiversidad-y-servicios-ecosistemicos/gestion-en-biodiversidad/restauracion-ecologica/>; Ministerio de Ambiente y Desarrollo Sostenible, Colombia. (2017). Plan de acción de biodiversidad para la implementación de la Política Nacional para la Gestión Integral de la Biodiversidad y sus Servicios Ecosistémicos 2016-2030. Retrieved from <https://www.cbd.int/doc/world/co/co-nbsap-v3-es.pdf>.

<sup>100</sup> Instituto Humboldt. (2015).

<sup>101</sup> Ospina Arango, O. L., et al. (2015).

<sup>102</sup> Ecological restoration, rehabilitation and recuperation- national plan for ecosystem restoration (Colombia: Restauración ecológica, rehabilitación y recuperación- plan nacional de restauración de ecosistemas) | Tropical Restoration Library. (2020). Tropical Restoration Library is hosted by the Environmental Leadership & Training Initiative (ELTI) at the Yale School of the Environment. Retrieved June 24, 2022, from <https://restoration.elti.yale.edu/resource/ecological-restoration-rehabilitation-and-recuperation-national-plan-ecosystem-restoration>.

<sup>103</sup> Ospina Arango, O. L. et al. (2015).

<sup>104</sup> Ospina Arango, O. L. et al. (2015).

<sup>105</sup> Ministerio de Ambiente y Desarrollo Sostenible (MADS). (2021). Respira, el plan para restaurar los ecosistemas de Colombia. Retrieved August 6, 2022, from <https://www.minambiente.gov.co/comunicaciones/respira-el-plan-para-restaurar-los-ecosistemas-de-colombia/>.

<sup>106</sup> Ospina Arango, O. L., et. al (2015).

## 5. Agriculture policies

The Colombian Government provides an average of USD 3.65 billion annually to the agriculture sector.<sup>107</sup> About 10% of this support is in the form of direct payments to farmers, which are predominantly for the purchase of inputs such as fertilizers and seeds and are typically tied to specific commodities.<sup>108</sup> The other 90% of the finance for agriculture is provided in the form of market price support, such as tariffs and taxes on specific products, that aim to stabilize prices.<sup>109</sup> Programs to stabilize prices include the Andean Price Band System (APBS) and the Price Stabilization Funds (PSFs). The APBS stabilizes the import prices of 13 commodities including maize, soya, wheat, soy and palm oils, sugar, milk, chicken, and pork, and the PSFs make payments to the producers of cotton, cocoa, palm oil, sugar, coffee, beef, and milk when prices fall below a set minimum.<sup>110 111</sup> Market price support results in higher prices for Colombian products than global averages.<sup>112</sup> Colombia also provides Value Added Tax (VAT) exemptions on agricultural inputs.<sup>113</sup> The Government further promotes market access strategies through cooperation between agro-industrial companies and smallholders.<sup>114</sup>

In 2021, MADR published the Sectorial Integral Plan for Climate Change Management (*Plan Integral de Gestión del Cambio Climático del Sector Agropecuario, PIGCCS*).<sup>115</sup> The PIGCCS seeks, among others,

to increase the productivity of the sector while conserving the natural ecosystems and channeling the required financial resources to manage climate change in the sector.<sup>116</sup> It complements several plans for promoting climate change mitigation and adaptation in the agricultural sector. The 2018-2022 National Development Plan (PND) includes climate-related measures for the agricultural sector. The PND promotes the design of financial instruments for implementing climate-smart agriculture practices and the flow of public and private finance towards sustainable growth. The PND also seeks to promote a balance between the conservation of natural resources and an increase in agricultural productivity.

Under Resolution 261 of 2018, UPRA and MADR created tools and methodologies to identify the Agricultural Frontier (*Frontera Agrícola*). The Agricultural Frontier describes the border between areas where agricultural activities can take place and protected areas or areas with special ecological relevance.<sup>117</sup> The Agricultural Frontier areas promote sustainable land management. It also identifies areas that should be preserved as conservation or community-owned land as well as areas that are at high risk of degradation, such as deforestation, erosion, or volcanic activity.<sup>118</sup> In 2017, MADR and UPRA estimated the Agricultural Frontier to be 36,685,402 ha, over 32% of the total national territory of Colombia. Colombia.<sup>119</sup> The National Planning online map tool allows users to layer land use types identified by UPRA over a map of Colombia.<sup>120</sup>

<sup>107</sup> Montaña, M. et al. (2021).

<sup>108</sup> Montaña, M. et al. (2021).

<sup>109</sup> Montaña, M. et al. (2021).

<sup>110</sup> OECD. (2020). 9. Colombia. In Agricultural Policy Monitoring and Evaluation. Agricultural Policy Monitoring and Evaluation 2020. Retrieved June 28, 2022, from [https://www.oecd-ilibrary.org/agriculture-and-food/agricultural-policy-monitoring-and-evaluation-2020\\_928181a8-en](https://www.oecd-ilibrary.org/agriculture-and-food/agricultural-policy-monitoring-and-evaluation-2020_928181a8-en).

<sup>111</sup> OECD. (2020).

<sup>112</sup> Montaña, M. et al. (2021).

<sup>113</sup> Montaña, M. et al. (2021).

<sup>114</sup> OECD. (2020).

<sup>115</sup> Cambio Climático del Sector Agropecuario. Retrieved from <https://www.minagricultura.gov.co/Normatividad/Resoluciones/RESOLUCI%C3%93N%20NO.%20000355%20DE%202021.pdf>.

<sup>116</sup> MADS (2021).

<sup>117</sup> MADR y UPRA. (2018). Identificación General de la Frontera Agrícola en Colombia. Retrieved from [https://www.minagricultura.gov.co/Normatividad/Projects\\_Documents/IDENTIFICACION%20GENERAL%20DE%20LA%20FRONTERA%20.pdf](https://www.minagricultura.gov.co/Normatividad/Projects_Documents/IDENTIFICACION%20GENERAL%20DE%20LA%20FRONTERA%20.pdf). República de Colombia.

(2020). Documento 4021: Política Nacional Para El Control De La Deforestación Y La Gestión Sostenible De Los Bosques, CONPES: Consejo Nacional de Política Económica y Social. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/4021.pdf>.

<sup>118</sup> MADR y UPRA. (2018).

<sup>119</sup> MADR y UPRA. (2018).

<sup>120</sup> Minagricultura. (n.d.). SIPRA. Retrieved July 5, 2022, from <https://sipra.upra.gov.co/>.



# The Nature-based carbon market landscape in Colombia

# 1. Carbon pricing and markets policies

**Colombia has a history of actively engaging in carbon markets.** It has supported international market-based mechanisms to achieve climate goals since the inception of the Kyoto Protocol and was an active supporter of the Clean Development Mechanism. Colombia has also participated in various international carbon market initiatives, most notably the World Bank's Program for Market Readiness that has supported the definition of market instruments, including a carbon tax. The country is also host to a great number of voluntary carbon market projects.

**In 2016 Colombia established a carbon tax.** As part of the Structural Tax Reform of 2016, Colombia adopted a tax on GHG emissions applicable to importers and producers of fossil fuels. In 2016 the price of the tax was set at COP 15,000 (around USD 3.43 in 2022), which is updated every year according to the inflation rate. The collected tax has been earmarked mainly to support the implementation of the Peace Agreement. Additionally, Decree 926 of 2017 created an offsetting mechanism where liable entities are permitted to offset 100% of the tax by cancelling carbon credits. Eligible carbon credits must comply with minimum quality criteria and be credited by approved carbon standards, including the UN's Clean Development Mechanism (CDM), Gold Standard (GS), and Verified Carbon Standard (VCS) and domestic standards BioCarbon Registry and Cercarbono. Between 2017 and July 2021, the carbon tax collected COP 166,578,568,000 (approximately USD 38 million), accounting for 66% of the total tax, meaning that only 33% was offset.<sup>121</sup> The gap between what is currently being paid and what could be offset

is an opportunity for the VCM. The carbon tax is to be complemented by an emissions trading system that is expected to enter a pilot phase in 2023 or 2024.<sup>122</sup>

**Colombia welcomes additional carbon market investments.** The 2021 Climate Action Law introduces a voluntary program on carbon neutrality, recognizing and promoting public and private sector efforts in reducing GHG emissions through carbon neutrality commitments by 2050.<sup>123</sup> The law calls for a study commission to be established to encourage and develop carbon markets in Colombia. In parallel, Colombia is in the process of designing and piloting accounting requirements for the private sector to incorporate into the National Registry for GHG Emissions Reductions (RENARE).<sup>124</sup> In addition, Colombia pledged to commit to the San José principles during COP25. At the time of writing, the concrete implication of this pledge, particularly the Government's position on Corresponding Adjustments, is unclear.

**Colombia has established a framework for payments for ecosystem services (PES).** Based on Decree 870 of 2017 and Decree 1007 of 2018, the PES system offers to enter into agreements between owners or managers of land with high ecosystem values. The National Program for PES aims to have one million ha under this scheme by 2030.<sup>125</sup> There are four activities covered under the scheme; i) water quality; ii) biodiversity conservation; iii) GHG emissions reduction; and iv) cultural and spiritual activities. With a particular focus on GHG and water services, a public-private partnership -BancO2- supports local communities who are contributing to the conservation of natural ecosystems and allows for private companies to mitigate their carbon footprint by financially supporting those communities who are contributing to the

conservation of natural ecosystems. BancO2 integrates private national and international stakeholders and public entities. So far, the scheme has conserved over 61,000 ha, benefitted 2,131 families, and included 107 companies.<sup>126</sup>

**In addition, Colombia has worked on the design of Nationally Appropriate Mitigation Actions (NAMAs) that, even though not implemented, contain valuable information for carbon project design.** The Government of Colombia has supported the development of NAMAs in for livestock, sugar cane, coffee and forest landscape restoration. The NAMA for livestock aims to increase the GHG removals by improving pasture management at the regional level, promoting conservation, and aligning public policies.<sup>127</sup> The sugar cane (*panela*) NAMA focuses on reducing GHG emissions and pollution by improving crop processes, upgrading mill technology, and using sub-products.<sup>128</sup> The forest landscape restoration NAMA was launched in 2018 under a strategy called "Forest Territories for Life," which integrates development and forest management policies.<sup>129</sup> The coffee NAMA planned to improve nitrogen fertilizer usage, implement agroforestry systems, optimize practices in the coffee post-harvest process and improve basic sanitation infrastructure on coffee farms.<sup>130</sup>

# 2. Nature-based carbon investments

**The country hosts multiple projects that seek to reduce deforestation and is engaged in jurisdictional REDD+ programs in the Amazon and Orinoquía biomes.** In 2019, Colombia submitted a Forest Reference Emissions Level (FREL) to the UNFCCC that covers a natural forest area of 60 million ha in 2018, with an annual average of 0.24% deforestation over the last 18 years.<sup>131</sup> Since Colombia supports both AD projects and REDD+ jurisdictional programs, the integration of different accounting levels is highly important. In 2018 the Colombian Government took its first steps towards a nesting approach through Resolution 1447, outlining the guidelines for project baselines and maximum mitigation potential. However, as of August 2022, further guidelines have yet to be published, and implementation is lagging.

**Colombia is an attractive location to invest in carbon market projects and programs.** Based on data collected from carbon project registries, there are 110 active NbS voluntary carbon market projects in Colombia as of May 2022. More than half of the projects are registered under the domestic carbon standards, Cercarbono and BioCarbon Registry Standard, and supply the domestic market, particularly the offset provision under Colombia's carbon tax. Most international projects are certified under the VCS (48 projects). In addition, there are four certified under the Gold Standard. Projects are equally divided between A/R and AD projects, with only a handful of IFM projects.

<sup>121</sup> Urrego, A. (2021, July 17). Desde su inicio en 2017, se han recaudado \$1,6 billones por el impuesto al carbono. La Republica. Retrieved August 25, 2022, from <https://www.larepublica.co/economia/desde-su-inicio-en-2017-se-han-recaudado-1-6-billones-por-el-impuesto-al-carbono-3202904>.

<sup>122</sup> Established on the basis of the Climate Change Law (Law 1931/18).

<sup>123</sup> Sullivan, K., Diemert, A., Cordova, C., & Hoekstra, J. (2021). Status and trends of compliance and voluntary carbon markets in Latin America. ICAP and IETA. Retrieved from [https://icapcarbonaction.com/system/files/document/201025\\_idb\\_compliancevoluntary\\_paper-rz.pdf](https://icapcarbonaction.com/system/files/document/201025_idb_compliancevoluntary_paper-rz.pdf).

<sup>124</sup> ¿Cómo registrar iniciativas de mitigación de gases efecto invernadero en RENARE? (n.d.). Ministerio de Ambiente y Desarrollo Sostenible. Retrieved September 1, 2022, from <https://www.minambiente.gov.co/cambio-climatico-y-gestion-del-riesgo/renare/>.

<sup>125</sup> MADS. (2021). Programa Nacional de Pago por Servicios Ambientales. Oficina de Negocios Verdes y Sostenibles. Retrieved from <https://www.minambiente.gov.co/wp-content/uploads/2021/11/Programa-Nacional-de-Pagos-por-Servicios-Ambientales-2021-.pdf>.

<sup>126</sup> ¿Qué hacemos en BancO2? (n.d.). BancO2. Retrieved July 5, 2022, from <https://banco2.com/que-hacemos-en-banco2/>.

<sup>127</sup> Colombia. (n.d.). NS-225 - Sustainable Bovine Livestock Colombia NAMA Seeking Support for Preparation, Application Page. Public NAMA, UNFCCC. Retrieved August 3, 2022, from [https://www4.unfccc.int/sites/PublicNAMA/\\_layouts/un/fccc/nama/NamaSeekingSupportForPreparation.aspx?ID=150&viewOnly=1](https://www4.unfccc.int/sites/PublicNAMA/_layouts/un/fccc/nama/NamaSeekingSupportForPreparation.aspx?ID=150&viewOnly=1).

<sup>128</sup> Colombia. (n.d.). NS-219 - Productive and Technological Reconversion of Colombia's Panela Sector. Public NAMA, UNFCCC. Retrieved August 4, 2022, from [https://www4.unfccc.int/sites/PublicNAMA/\\_layouts/un/fccc/nama/NamaSeekingSupportForPreparation.aspx?ID=146&viewOnly=1146&viewOnly=1](https://www4.unfccc.int/sites/PublicNAMA/_layouts/un/fccc/nama/NamaSeekingSupportForPreparation.aspx?ID=146&viewOnly=1146&viewOnly=1).

<sup>129</sup> Colombia. (n.d.). NS-300 - Forestry : Strategic framework for Forest Landscape Restoration. Public NAMA, UNFCCC. Retrieved August 25, 2022, from [https://www4.unfccc.int/sites/PublicNAMA/\\_layouts/un/fccc/nama/NamaSeekingSupportForImplementation.aspx?ID=204&viewOnly=1](https://www4.unfccc.int/sites/PublicNAMA/_layouts/un/fccc/nama/NamaSeekingSupportForImplementation.aspx?ID=204&viewOnly=1).

<sup>130</sup> Federación Nacional de Cafeteros, Centro Nacional de Investigaciones de Café, Comité Departamental de Cafeteros de Caldas, Ministerio de Ambiente y Desarrollo Sostenible, & Anthesis Lavola. (2017). Nama café de Colombia: Acción de Mitigación Nacionalmente Apropiada (NAMA) en el Sector Cafetero de Colombia (Low Emission Capacity Building Programme). Retrieved from <http://hdl.handle.net/10778/4255>

<sup>131</sup> MINAMBIENTE y IDEAM. (2019). Propuesta de nivel de referencia de las emisiones forestales por deforestación en Colombia para pago por resultados de REDD+ Bajo la CMUNCC. Retrieved from [https://redd.unfccc.int/files/02012019\\_nref\\_colombia\\_v8.pdf](https://redd.unfccc.int/files/02012019_nref_colombia_v8.pdf).

**The Andean biome alone hosts 40 voluntary carbon market projects.** At the department level, Antioquia located in the Andes regions, leads in terms of the number of projects, with predominantly A/R projects (see **Figure 7**). Overall, the Andean biome hosts 31 A/R and nine AD projects. It is followed by the Orinoquía region, which hosts 13 A/R, and six AD and IFM projects, which are mostly located in the Meta and Vichada department at the border of the Amazon biome. Not surprisingly, the Amazon and Pacific biomes host comparatively more AD projects. They each host seventeen AD projects and one A/R project. Lastly, the Caribbean biome has 14, which are mostly A/R projects.

**However, most credits are issued for projects in the Amazon biome.** The 15 registered projects in this biome have issued a total of 19.5 MtCO<sub>2</sub>e, 98.3% of which comes from AD and 1.7% from A/R projects. Of these volumes, a total of 6.7 MtCO<sub>2</sub>e have been retired, leaving 12.8 MtCO<sub>2</sub>e of non-retired credits corresponding entirely to AD activities.

**Although there are fewer AD projects than A/R projects, AD projects are larger and issue more credits (see Figure 9).** AD dominates Colombia's carbon market landscape as it is the activity with the most mitigation potential and aligns with the country's primary focus of tackling deforestation. Showing adequate progress in halting deforestation requires larger project areas, while A/R projects can be implemented in smaller sizes. A/R projects in Colombia have less realized mitigation benefits as well as potential, as they tend to be designed at a smaller scale. Yet, they are often easier to implement, particularly in areas with comparatively larger areas with clear land tenure (e.g., in parts of Antioquia).

<sup>132</sup> Climate Focus analysis, based on data from the following registries: VCS, Gold Standard, Cercarbono and Biocarbon Registry Standard. These projects are currently under different phases of their development (under development, registered, validated or verified).

<sup>133</sup> Climate Focus analysis based on data from the following registries: VCS, Gold Standard, Cercarbono, and Biocarbon Registry Standard. These include projects that are registered and undergoing validation.

Figure 7: Number of NbS projects in Colombia; Number of NbS projects based on activity type.<sup>132</sup>

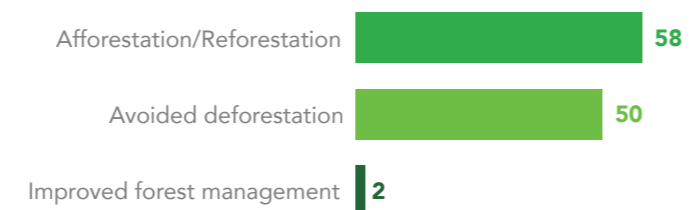
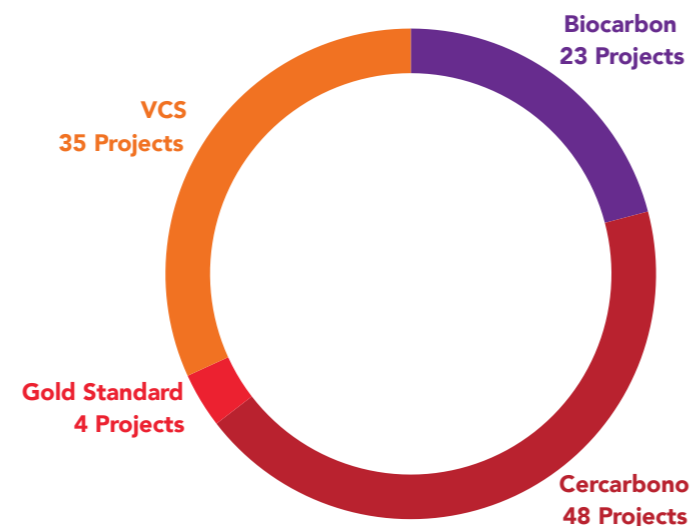


Figure 8: Total number of projects by activity type per biome.<sup>133</sup>

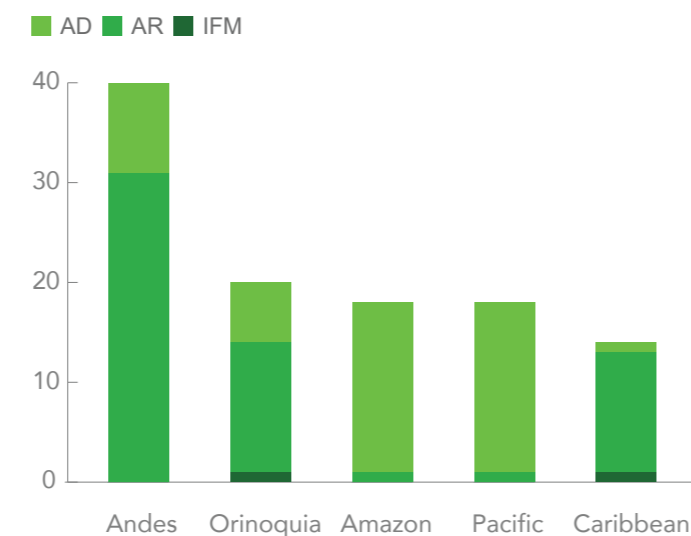


Figure 9: Top eight departments in terms of number of projects, by project type.

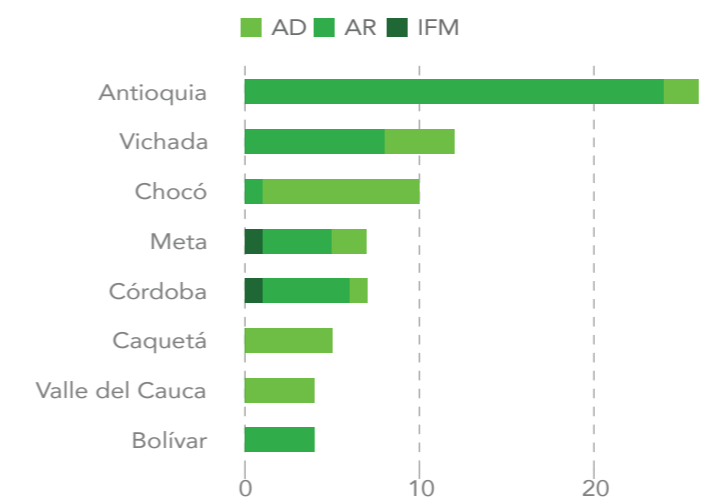
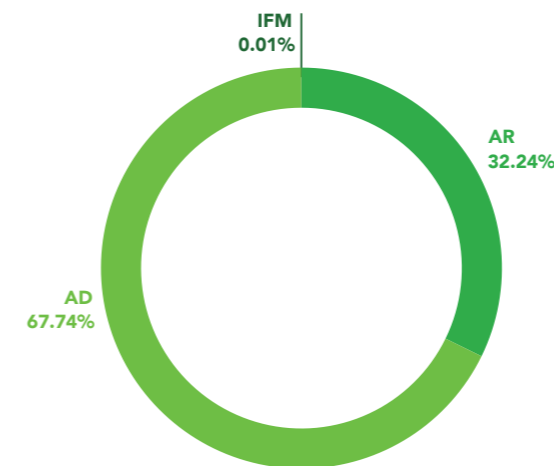


Figure 10: Percentage of VERs per activity type. Only registered projects with VER information were included in this analysis.



### 3. Carbon market enabling conditions

**While there is a gap between ambition and investment realities on the ground, Colombian Governments' have consistently expressed their support for carbon markets.** The Government seeks to attract carbon market investments actively, and in 2021 President Duque pledged to promote voluntary carbon offsets using forestry and marine protected areas.<sup>134</sup> The newly elected President Petro has reiterated this intent but is expected to emphasize smallholder participation, Indigenous rights, climate and social justice.

**Colombia has an open market economy that welcomes international and local investments, including into carbon projects.** The country is also a stable democracy with a history of peaceful transition of power, an educated and growing middle class, and a market of 50 million people. The country has a comprehensive legal framework for business and foreign direct investment. Colombia's legal and regulatory systems are generally transparent and consistent with international norms.<sup>135</sup>

**There are plenty of carbon market opportunities, partly due to existing carbon pricing instruments coupled with widespread local and international commitments to protect, restore and sustainably manage the country's natural capital.** National commitments to promote climate and conservation goals combined with an open investment policy, an active agriculture sector and an urgent need to halt deforestation opens opportunities for carbon market investments. Although the country's carbon accounting system is still not entirely up to speed, Colombia is considered a frontrunner in the region for integrating carbon markets into its climate strategies and enabling market conditions and institutional infrastructure.<sup>136</sup>

<sup>134</sup> Brooks, C. (2022, March 9). Colombia courts green investors with "new voluntary carbon market." IHS Markit. Retrieved August 31, 2022, from <https://cleanenergynews.ihsmarkit.com/research-analysis/colombia-to-court-worlds-green-investors-with-new-voluntary-ca.html>.

<sup>135</sup> MINAMBIENTE y IDEAM. (2019).

<sup>136</sup> Mercados de carbono, un objetivo de cara a la COP26 | Internacional | Portafolio. (2021, October 7). Portafolio. Retrieved August 4, 2022, from <https://www.portafolio.co/internacional/mercados-de-carbono-un-objetivo-de-cara-a-la-cop26-557105>.



**Colombia has high levels of national capacities, expertise, and signals high interest for carbon market development.** These national enabling conditions are complemented by continued support from international non-governmental organizations (NGOs) and multilateral development banks. Bilateral cooperation also supported A/R, REDD+ and PES activities, with key contributions coming from USAID, GIZ and Forest Carbon Partnership Facility (FCPF). For example, the World Bank's Partnership for Market Readiness (PMR) has been actively providing key technical and capacity building across the country, strengthening institutions. An active civil society, interested investors, and a presence of international and national project developers across the country help to identify and realize carbon market projects.

**Project investments could be free-standing or integrated into landscape-level programs.** Projects could be implemented in partnership with Governments. Where the Government supports project-level investments in more extensive public programs, private investment and public engagement could be synergistic, relying on the strength of public and private action. Public programs could create an enabling environment for investment by addressing the structural risks of engagement, such as weak land titles or lacking law enforcement. The Government could support sustainable production programs through land titling, technical assistance, extension services, and conservation and restoration commitments.

**Public-private programs could be developed under Article 6.2 of the Paris Agreement and integrate different programmatic and supply-chain activities.** Cooperative approaches under Art. 6.2 of the Paris Agreement could offer opportunities in the Northern Amazon to develop a program that combines carbon with supply-chain investment and donor support. Such a program would allow tapping and combining multiple sources of finance and carbon crediting schemes. However, it would

require high levels of Government involvement, measurement, reporting and verification (MRV) capacities, and a strengthening of local institutions; such programs offer significant mitigation opportunities but must overcome high implementation barriers.

## 4. Carbon market barriers

**While Colombia possesses comprehensive policy frameworks for climate change mitigation and NbS, implementation of policies is lagging.** Even where political will is present among environmental agencies and institutions, they tend to be underfunded and under-resourced.<sup>137</sup> The Government struggles with law enforcement, particularly in more remote areas. Geography, lack of infrastructure, and lack of state presence play a role, as does a general shortage of resources in national and regional institutions.<sup>138</sup> As a result, few national entities have a territorial presence across the country to ensure policy implementation, monitoring and follow-up.

**Colombia is a country emerging from one of the longest civil wars in history, with continued high levels of violence, particularly in areas key for conservation activities.** Continued security risks make investments, policy and project development and implementation challenging and, for many investors prohibiting. Colombia is one of the most dangerous countries for social and environmental leaders. As of April 2022, over 50 leaders have been murdered in areas including Cauca, Putumayo, Nariño, Arauca, and Chocó.<sup>139</sup> The absence of the state in former conflict regions also results in a lack of essential services and infrastructure, like health facilities, schools, roads, employment and income generating industries. Citizens have depended

on para-statal entities – such as the FARC – for the day-to-day goods and services. This is particularly true in the Pacific region in the north and the Amazon region in the south.

**Six years after signing the Peace Agreement, implementation of the accord is far from satisfactory.** The Peace Agreement foresees land reform and clarification of land titles, which would facilitate rural development and improve the local investment conditions. However, the Peace Agreement's implementation remains slow. Weak and contested land titles pose a significant barrier to investment, and the building of institutional presence in former conflict regions remains a complicated and lengthy endeavor. Investors must also account for high communication, transportation and logistical costs to ensure well-coordinated activities within a carbon project or program.

**There are operational barriers due to limited human resource capacity in many regions.** While Colombia has high levels of expertise in urban centers with well-developed educational programs and high-quality universities, the overall expertise and knowledge about the impacts of climate change and biodiversity loss, the opportunities that come with sustainable land use practices in rural sectors, as well as financial opportunities, remain low. This translates into a lack of local project development capacities. In addition, contracting labor can be challenging where agricultural job offerings compete with higher-paid legal or illegal activities. Overall, there is a substantial gap between the developed and secure urban centers with their educated middle class and access to markets and capital, and conflict regions that continue to suffer from violence, illicit cropping and markets, displacement and insecure livelihoods.

**The cultivation of illicit crops, illegal deforestation and land grabbing stand in the way of carbon and other land investments.** Despite decades of anti-narcotics efforts, Colombia remains one of the world's top cocaine producers. There has even been an increase in cocoa cultivation since 2016 and previously controlled FARC areas are plagued by conflict. Coca is mainly grown in areas with weak public institutions where armed groups control the territory.<sup>140</sup> The area taken up by coca cultivation covers 234,000 ha, mostly in the East (Andean biome) and South (Amazon biome) of the country.<sup>141</sup>

**Overall, Colombia offers significant carbon investment opportunities.** However, considering the multiple investment barriers, a concerted and coordinated effort of public agencies, donors, NGOs and private investors will be necessary to overcome these barriers.

<sup>137</sup> Botero, E. por R. (2020, July 27). Deforestación, acaparamiento y ganadería en la Amazonía colombiana. Razón Pública. Retrieved July 6, 2022, from <https://razonpublica.com/deforestacion-acaparamiento-ganaderia-la-amazonia-colombiana/>.

<sup>138</sup> United States Department of State. (n.d.). 2021 Investment Climate Statements: Colombia. United States Department of State. Retrieved August 4, 2022, from <https://www.state.gov/reports/2021-investment-climate-statements/colombia/>.

<sup>139</sup> Aumentó el asesinato de líderes sociales en Colombia en 2022. (2022, April 5). El Espectador. Retrieved August 4, 2022, from <https://www.elespectador.com/colombia/mas-regiones/aumento-el-asesinato-de-lideres-sociales-en-colombia-en-2022/>.

<sup>140</sup> Colombia Reports. (2021). Coca Cultivation. Retrieved August 31, 2022, from <https://colombiareports.com/amp/coca-cultivation-statistics/>.

<sup>141</sup> Colombia potential cocaine output fell to 972 tonnes in 2021 - White House. (2022, July 14). Reuters. Retrieved August 31, 2022, from <https://www.reuters.com/world/americas/colombia-potential-cocaine-output-fell-972-tonnes-2021-white-house-2022-07-14/>.



# 05

## Modelled nature-based solutions and carbon market potential in Colombia

**In the context of this study, the team modeled the role that carbon markets could play in the short- and mid-term in Colombia.**

There are no previous studies that assess the mitigation potential from carbon markets across a large range of NbS in Colombia. In addition, previous global studies and narratives do not consider supply constraints other than price nor account for the many other barriers across multiple dimensions that need to be addressed to unlock investment potential. Furthermore, a lack of spatially explicit data on where the mitigation potential for different NbS activities can be found presents an information barrier for both project developers and decision-makers.

### 1. Methodology

**According to existing models, Colombia has a yearly cost-effective NbS mitigation potential of 219 MtCO<sub>2</sub>e and an NbS technical potential of 464 MtCO<sub>2</sub>e between 2020 and 2050.**<sup>142</sup> The technical potential relates to the technical possible potential without cost constraints, while the cost-effective potential represents potential mitigation opportunities up to USD100/tCO<sub>2</sub>e.<sup>143</sup> However, these models do not consider context-specific barriers that could make tapping into these opportunities challenging. Barriers related to governance and security, but also geography, market access, and infrastructure are not considered. To develop a more realistic assessment of NbS carbon market opportunities, as a first step, the team designed a country-level model that explores how much mitigation potential could be unlocked by the NbS activities. In a second step, they assessed this potential against the specific circumstances

in Colombia's Amazon, Orinoquía, Caribbean, Pacific, and Andean biomes.

**Included in the model were the NbS activities AD, A/R, IFM, Agriculture (AG), and the conservation and restoration of Wetlands (WL).**<sup>144</sup> The model considers three different constraints to provide realistic estimates of Colombia's NbS mitigation opportunity (**Figure 12**). Firstly, the model accounts for the mitigation potentials of the five activities in Colombia (see **Box 3**) and a range of carbon market price scenarios over time.<sup>145</sup> The pricing scenarios are listed in **Table 3**. Prices are assumed to grow linearly between 2022 and 2025, 2025 and 2030, 2030 and 2040, and 2040 and 2050.

Secondly, feasibility barriers related to the ease of doing business, land tenure, and political factors are considered by comparing how a feasibility score with these elements compares with other countries.<sup>146 147 148</sup> Thirdly, on-the-ground restrictions or difficulties posed by previously existing land uses are also included in the model: the team considered mining concessions, oil and gas concessions, and protected areas as such "locked-in land use" (See **Figure 11**). While technically it is possible to develop carbon market projects in protected areas, numerous barriers exist in practice: protected areas are publicly owned land, and bureaucratic procedures may discourage the pursuit of carbon market activities; due to their legal status, protected areas may not pass the additionality requirements of carbon market standards; and finally, the Government may want to retain control over the areas and their environmental benefits.

<sup>142</sup> Roe, S., Streck, C., Beach, R., Busch, J., Chapman, M., Daioglou, V., et al. (2021). Land-based measures to mitigate climate change: Potential and feasibility by country. *Global Change Biology*, 27(23), 6025–6058.

<sup>143</sup> This number includes supply-side mitigation potentials but excludes mitigation that can be achieved via demand-side measures.

<sup>144</sup> The Agriculture activity includes mitigation potential from activities that reduce emissions and/or remove CO<sub>2</sub> from the atmosphere and store it in the soil and biomass.

<sup>145</sup> Roe et al. (2021).

<sup>146</sup> Business and investment freedom indexes from the Heritage Foundations were used as a proxy of "ease of doing business", reflecting the need for countries to remove barriers to external investments

<sup>147</sup> The International Property Rights Index was used to reflect land tenure.

<sup>148</sup> Political feasibility is retrieved from Roe et al., (2021) which includes World Bank indicators of Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption.

### Box 3: Activity types of nature-based solutions

**Afforestation/Reforestation (A/R)** refers to the planting of trees on non-forested land. Reforestation refers to the planting of trees on land that had recent tree cover, whereas afforestation refers to planting on land that had no previous tree cover, or has been without forest for a much longer period of time. A/R are expected to result in net greenhouse gas removals as their growth of additional plants sequester carbon in their biomass and soil.

**Improved Forest Management (IFM)** refers to avoided emissions and enhanced sequestration from activities such as reduced-impact logging, extended harvest rotations, increased post-harvest sequestration rates, and designation of set-aside areas for protection from logging activity.

**Avoided Deforestation (AD)** refers to activities that protect and enhance existing forests in areas that would otherwise be cleared, which in turn reduces or avoids the volume of GHGs entering the atmosphere.

**Agriculture (AR)** projects refer to activities targeting emissions reductions and removals in the agriculture sector. Emission reduction activities include enteric fermentation, manure management, nutrient management, and improved rice cultivation. Agricultural carbon sequestration activities include agroforestry, biochar from crop residues, soil organic carbon in croplands and soil organic carbon in grasslands.

**Wetlands (WL)** projects include activities such as reduced conversation of mangroves, coastalwetland restoration, reduced peatlands degradation and peatland restoration.

Table 3: Price scenarios used to model Colombia's NbS cost-effective mitigation potential. This refers to USD per CO<sub>2</sub>e tonne.

	2023	2024	2025	2030	2040	2050
Low scenario	\$7	\$4	\$20	\$30	\$40	\$50
Medium scenario	\$10	\$10	\$30	\$40	\$60	\$75
High scenario	\$10	\$10	\$40	\$60	\$80	\$100

Figure 11: Distribution of locked-in land uses, divided by activity.<sup>149</sup>

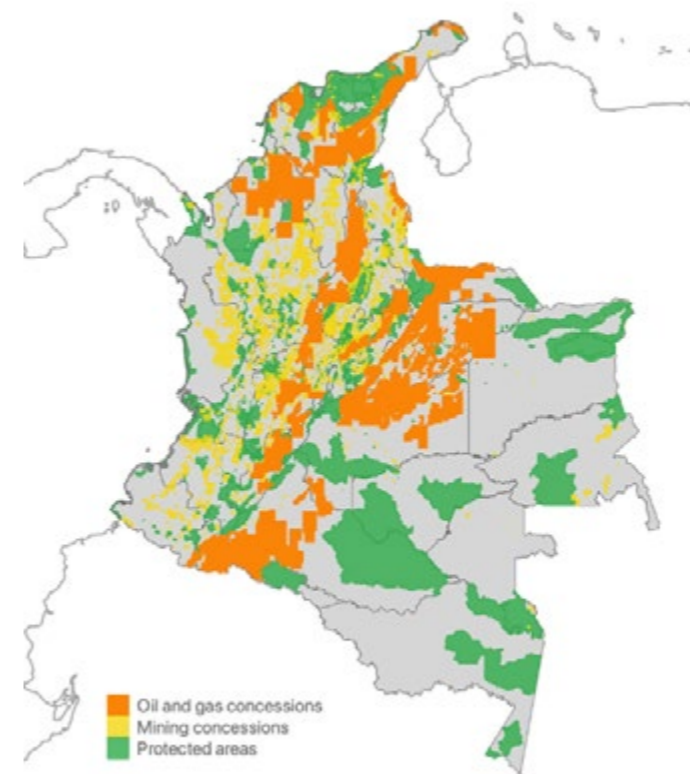
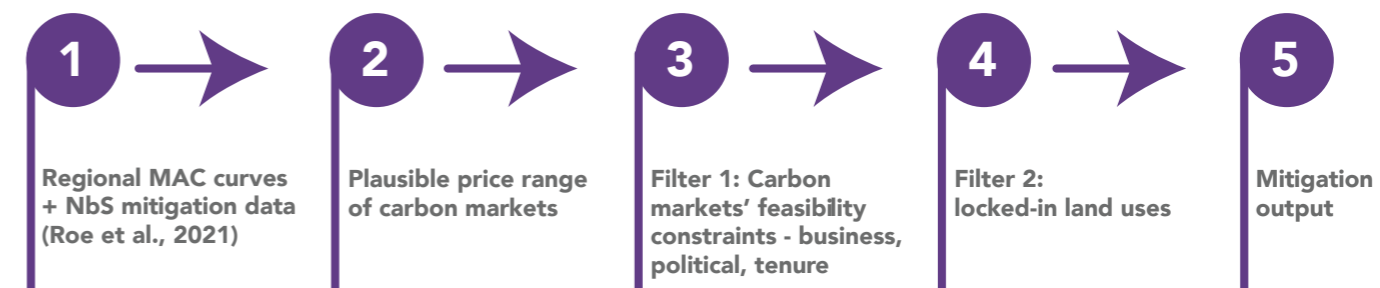


Figure 12: Schematic overview of the methodology applied to obtain the NbS mitigation potential from carbon markets in Colombia.



<sup>149</sup> Reproduced by Climate Focus based on data from Global Forest Watch. (n.d.). "Mining concessions." and "Oil and Gas Concessions". Retrieved from [www.globalforestwatch.org](http://www.globalforestwatch.org). Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>.

**The outcome of the model provides country-level estimates for the different NbS activities.** In the last step, these country-level estimates are disaggregated at the department and biome level through the support of secondary, spatially explicit data to determine higher priority areas for carbon market uptake in Colombia. **Figure 12** provides a schematic overview of the methodology applied to estimate the NbS mitigation potential from carbon markets in Colombia. A detailed overview of the model and the full description of the three constraints outlined above can be found in the **Technical Note** on Colombia's modeled carbon market potentials that accompanies this document.

## 2. Results

According to our model, carbon markets in Colombia could unlock 33.7- 46.8% of the country's modeled mitigation potential over three decades (2.2 GtCO<sub>2</sub>e (low price scenario) - 3.1 GtCO<sub>2</sub>e (high price scenario) of yearly 6.6 GtCO<sub>2</sub> cost-effective potential available after 30 years) (**Figure 13**). In terms of activity type, Avoided Deforestation dominates carbon markets in Colombia, with about 77.1% of total potential, followed by Agriculture (12.3%), A/R (7.1%), Improved Forest Management (1.9%), and the conservation and restoration of Wetlands (1.6%).

**Figure 13 shows a rapid increase of NbS carbon-market-driven mitigation in the first half of the 2020 decade in relation to historical vintages.**<sup>150</sup> During the second half of the decade (2025-2030) the graphic shows a slower increase in mitigation potential unlocked, in particular for the medium and high price scenarios. Towards the end of the modeling period, the yearly mitigation potential unlocked starts to level off, increasing at a slower rate. These growth dynamics are determined in part

by the regional cost assumptions (Marginal Abatement Cost Curves (MACC), which reflect decreasing amounts of mitigation unlocked as prices increase beyond a certain threshold. This is further elaborated on in the **Technical Note**.

**The model estimates an annual carbon market potential for AD in Colombia of 63 MtCO<sub>2</sub>e per year by 2030 under a medium price scenario of USD 40 per tonne (low-high range, 52.-77.3 MtCO<sub>2</sub>e per year).** The potential for this activity is estimated to be most relevant for the Amazon, the Orinoquía, and the Andean biomes, which account for 29.2%, 26.8%, and 26.2% of the potential, respectively (see **Table 4**). When considering instead boundaries of intervention at the department level, the mitigation potential for AD is led by Guaviare, Antioquia and Caquetá, accounting for 9.3.9%, 9.1.6%, and 8.9%, respectively (see **Table 5**).

**Carbon market mitigation potential for AG in Colombia reaches 9.3 MtCO<sub>2</sub>e per year by 2030 under the medium price scenario (7.3-12.6 MtCO<sub>2</sub>e per year).** The potential for this activity is most relevant for the Andean, Orinoquía, and Caribbean biomes, which account for 50.1%, 29.4%, and 11.7%, respectively (see **Table 4**). The mitigation potential for Agriculture is led by Vichada, Antioquia, and Meta, accounting for 13.1%, 12.4%, and 8.3%, respectively.

**Finally, the carbon market potential for A/R in Colombia is estimated to reach 5.5 MtCO<sub>2</sub>e per year by 2030 (4.4-7.2 MtCO<sub>2</sub>e per year).** The potential for this activity is most relevant for the Andean, Orinoquía and Caribbean biomes, which account for 51.7%, 19.7%, and 13.4%, respectively (see **Table 4**). The mitigation potential for A/R is led by Antioquia, Meta, and Caquetá, accounting for 13.3%, 8.4%, and 8%, respectively (see **Table 5**).

<sup>150</sup> Vintage refer to the year the emission reduction or removal that result in an eventual carbon credit are generated. Historical vintages (production years) serve as proxy for the mitigation potential unlocked per year until 2021. The vintage year of a carbon credit different from its issuance year, as project developers do not always verify the emission reductions and issue the corresponding carbon credits in the same year that the emission reductions take place.

Figure 13: Carbon markets' mitigation potential for NbS measures in Colombia (AD, AG, A/R, IFM, WL) for three price scenarios (high, medium, low). Phased cost-effective mitigation potential (CEMP) over the 2020-2050 period is shown for reference.<sup>151</sup> For past years, vintages are presented instead of issuances.

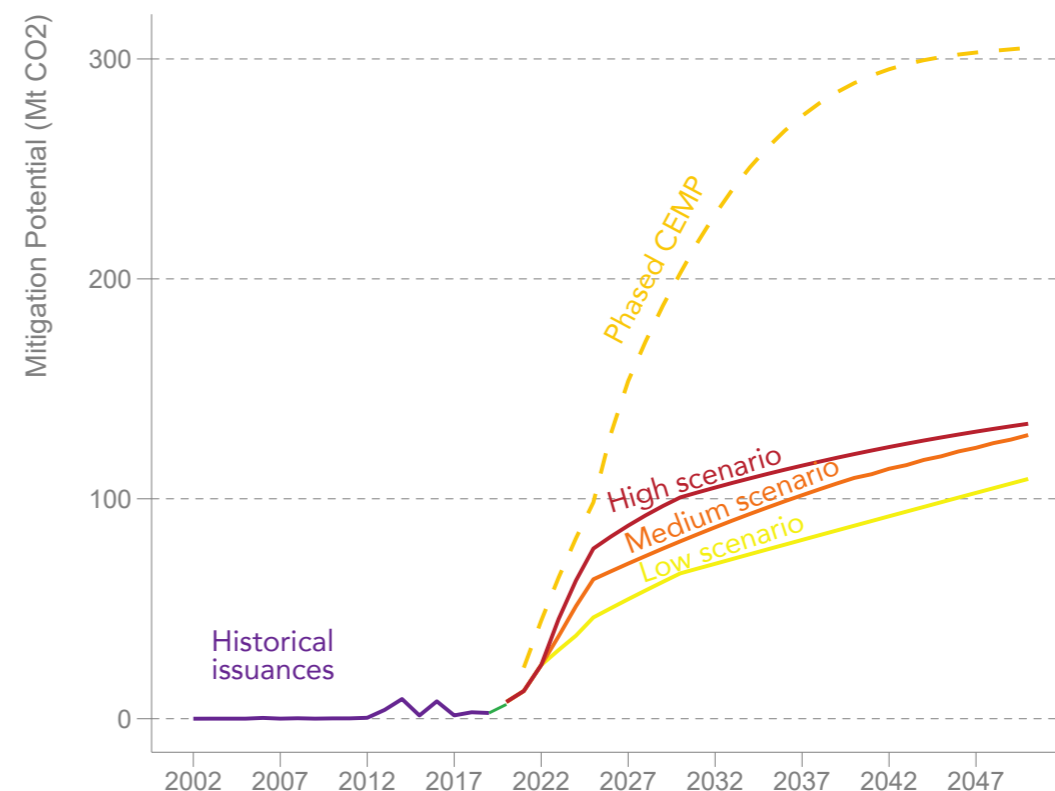
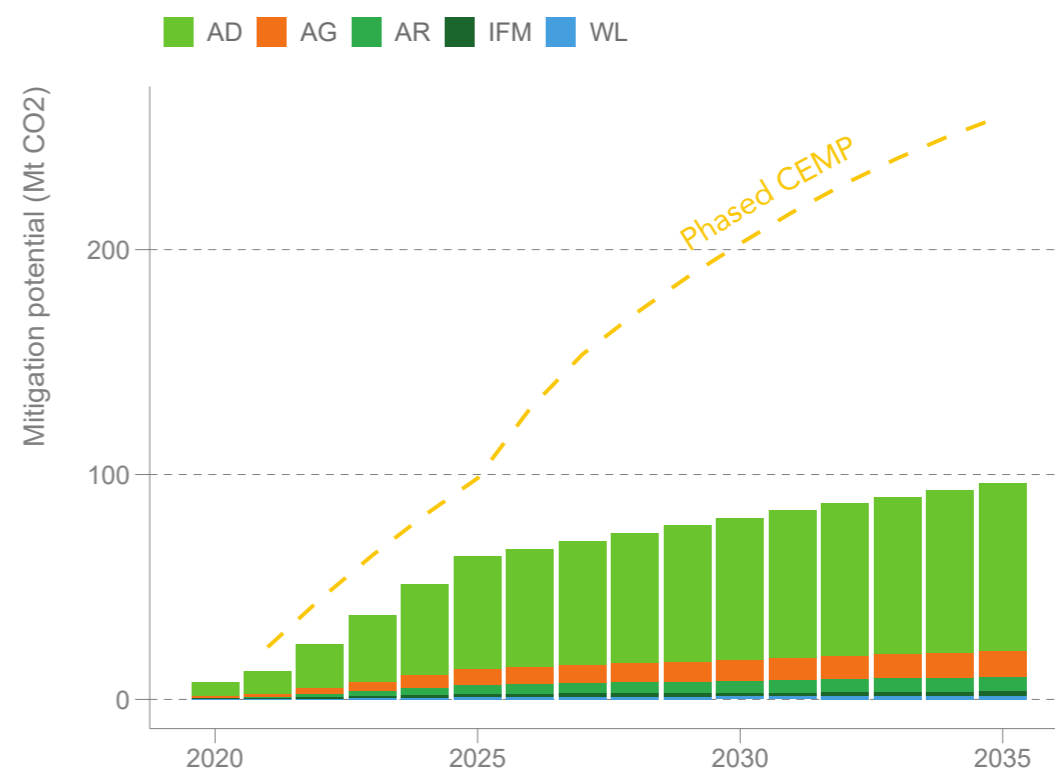


Figure 14: Carbon market mitigation potential by NbS measure in Colombia (AD, AG, A/R, IFM, WL) for a medium price scenario. Average CEMP over the 2020-2050 period is shown for reference.<sup>152</sup>



<sup>151</sup> Roe, S., et al. (2021).

<sup>152</sup> Roe, S., et al. (2021).

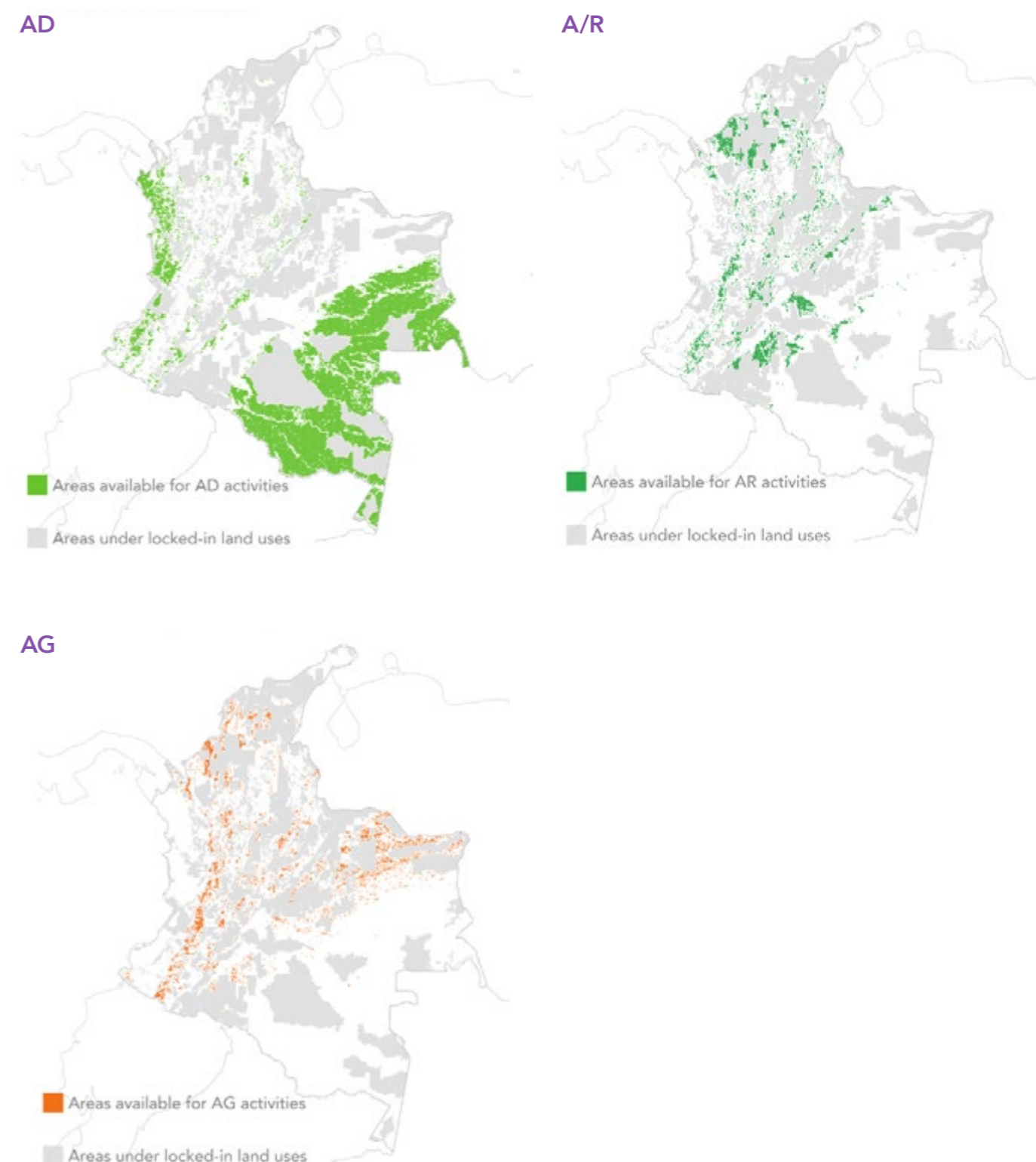
Table 4: Breakdown of mitigation potential for AD, A/R and AG, total mitigation potential (Total %) and number of projects (Projects %) by biome.

Biomes	AD (%)	AR (%)	AG (%)	Total (%)	Projects (%)
Amazon	29.2	10.4	5.5	14.7	15.9
Andes	26.8	51.7	50.1	45.6	36.3
Caribe	9.5	19.7	11.7	16.8	12.4
Orinoquia	26.2	13.4	29.4	17.4	20.4
Pacífico	8.4	4.7	3.3	5.5	15.0

Table 5: NbS mitigation potential by biome at the department level for AD, A/R and AG.

Biomes	Department	AD (%)	AR (%)	AG (%)	Total (%)	Projects (%)
●	Amazonas	8.2	0.1	0.1	2.1	1.4
●	Antioquia	9.1	13.3	12.4	12.4	22.4
●	Arauca	0.5	1.5	1.8	1.3	2.8
●	Atlántico	0.0	0.0	0.1	0.0	0.0
●	Bogotá	0.1	0.1	0.1	0.1	0.0
●	Bolívar	3.7	5.8	3.3	5.2	3.5
●	Boyacá	1.3	3.0	3.5	2.7	2.1
●	Caldas	1.3	1.8	2.3	1.7	2.1
●	Caquetá	8.9	8.0	4.2	8.1	2.8
●	Casanare	0.9	1.5	4.8	1.6	2.1
●	Cauca	2.9	5.0	4.5	4.6	1.4
●	Cesar	0.5	2.1	1.1	1.7	0.0
●	Chocó	2.6	3.7	1.2	3.3	8.4
●	Córdoba	1.4	6.3	2.8	5.0	4.9
●	Cundinamarca	2.4	3.7	4.9	3.5	1.4
●	Guainía	8.5	0.0	0.7	2.1	2.8
●	Guaviare	9.3	4.1	1.5	5.3	2.1
●	Huila	0.8	3.1	2.2	2.5	1.4
●	La Guajira	0.1	0.1	0.2	0.1	0.0
●	Magdalena	0.2	1.0	1.5	0.8	0.7
●	Meta	7.4	8.4	8.3	8.2	9.8
●	Nariño	7.4	4.5	4.6	5.3	1.4
●	Norte De Santander	1.7	3.6	2.9	3.1	0.0
●	Putumayo	1.1	0.7	0.8	0.8	0.7
●	Quindío	0.2	0.3	0.6	0.3	0.7
●	Risaralda	0.4	0.6	0.9	0.6	0.7
●	Santander	2.5	5.3	4.6	4.6	2.8
●	Sucre	0.2	0.9	0.9	0.8	0.7
●	Tolima	2.1	4.4	3.6	3.9	1.4
●	Valle Del Cauca	1.9	4.3	4.5	3.8	4.2
●	Vaupés	5.9	0.1	0.2	1.5	2.1
●	Vichada	6.2	1.6	13.1	3.3	13.3

Figure 15: Distribution of mitigation potential in Colombia for AD, A/R, and AG.<sup>153</sup> Locked-in land uses such as mining, oil and gas concessions, and protected areas have been removed from the original datasets. The difference between the initial potential and final potential, after accounting for these areas removed, is recorded and provides the second feasibility filter (%) that is applied to our country-level model estimates. The previous table presents the disaggregated potential by biomes.



<sup>153</sup> Reproduced by Climate Focus with data based for AD based on Koh, L. P., Zeng, Y., Sarira, T. V., & Siman, K. (2021). Carbon prospecting in tropical forests for climate change mitigation. *Nature Communications*, 12(1), 1271; Cook-Patton, S. C., Leavitt, S. M., Gibbs, D., Harris, N. L., Lister, K., Anderson-Teixeira, K. J., et al. (2020). Mapping carbon accumulation potential from global natural forest regrowth. *Nature*, 585(7826), 545–550. Griscom, B. W., Adams, J., Ellis, P. W., Houghton, R. A., Lomax, G., Miteva, D. A., et al. (2017). Natural climate solutions. *Proceedings of the National Academy of Sciences*, 114(44), 11645–11650; and agriculture data from Food and Agriculture Organization (FAO), United Nations. (2022). Global Soil Sequestration Potential (GSOSeq) Map. Retrieved from <https://www.fao.org/soils-portal/data-hub/soil-maps-and-databases/global-soil-organic-carbon-sequestration-potential-map-gsocseq/en/>.

**A sizable amount of potential cannot be unlocked due to existing locked-in land uses – oil and gas concessions and mining concessions.** The model also excluded protected areas from carbon market potentials, as it is unclear whether carbon market projects would be possible in protected areas. Specifically, 36.8% of the AD mitigation potential overlaps with other land uses and would be hard to target through carbon markets. This overlap particularly affects A/R and AG carbon activities (41.9% and 38.5%, respectively).

**There is no spatially explicit secondary data on mitigation potential for IFM and WL activities, which constitute less than 3.5% of NbS potential in Colombia.** For these activities, we only present model results at a country level, and do not attempt to disaggregate spatially by biome or department. For IMF, we assume a similar distribution of locked-in land uses as for AD, and hence, the same percentage of restriction is applied for this activity at the country level. For WL we assume an average distribution of locked-in areas from the other three activities.

**Accounting for all three activities, the Andean biome shows the highest carbon market potential at 45.6%, followed by Orinoquía, Caribbean and Amazonas (at 17.4%, 16.8%, and 14.7%, respectively).** The Pacific biome holds the remaining 5.5%. We find a disproportionately low number of projects in the Andean (36.3%) and Caribbean (12.4%) biomes when compared to their mitigation potential (45.6% and 17.8%, respectively) (see **Table 4**). By contrast, a larger share of projects is located in the Pacific (15.0%) and Orinoquía (20.4%) biomes in relation to their mitigation potential (5.5% and 17.5%, respectively).

**Considering project distribution at an administrative unit level, we find that nearly two-thirds of departments have a disproportionately low number of projects in relation to their mitigation potential (see **Table 4**), which is particularly problematic for some high potential departments.** For instance, Caquetá, Nariño, Guaviare, and Cauca, which respectively account for 8.1%, 5.3%, 5.3%, 4.6% of Colombia's NbS potential, only

host 2.8%, 2.1%, 1.4%, and 1.4% of projects respectively (**Table 4**). At the other end of the spectrum, Antioquia, Vichada, and Chocó present a disproportionately larger number of projects (22.4%, 13.3%, 8.4%, respectively) in relation to their department potential (12.4%, 3.3%, and 3.3%, respectively).

**Finally, there are more A/R (55.2%) projects in Colombia than AD (43.4%) projects, but the majority of mitigation volumes are provided by the latter.** Assessing historic issuances, AD activities dominate, accounting for 92.5% of mitigation, compared to only 6.1% from A/R. There are two possible explanations for this: firstly, mitigation density (tCO<sub>2</sub>e per ha) is >2.5 times higher for the AD activity, and, secondly, each deforestation project tends to occupy larger spatial boundaries compared to A/R projects.

**The modeling results highlight the risks of assessing NbS mitigation potential from a price-centric perspective alone.** On the one hand, to fully leverage carbon market's NbS mitigation potential, it is important to remove barriers for investors and project developers. However, even when measures are taken to facilitate carbon market investments, it is clear that carbon markets alone are insufficient to fully deliver Colombia's NbS mitigation potential, and there is a need to leverage other instruments in parallel. The modeling effort includes not only a measure of NbS implementation feasibility across other dimensions (e.g. political, land tenure, ease of doing business), but also spatial restrictions in the form of locked-in land uses such as mining concessions or protected areas.

**The qualitative analysis underlying these sections provides an overview of Colombia's political and economic landscape, and the constraints and on-the-ground limitations project developers face.** By assessing the Colombian five eco-regions, this analysis identifies specific carbon market investment opportunities and lists barriers that need to be addressed to realize them, complementing our modelling results by contrasting them with the Colombian context.



06

## Assessing opportunities in Colombia's eco-regions: The Andean biome

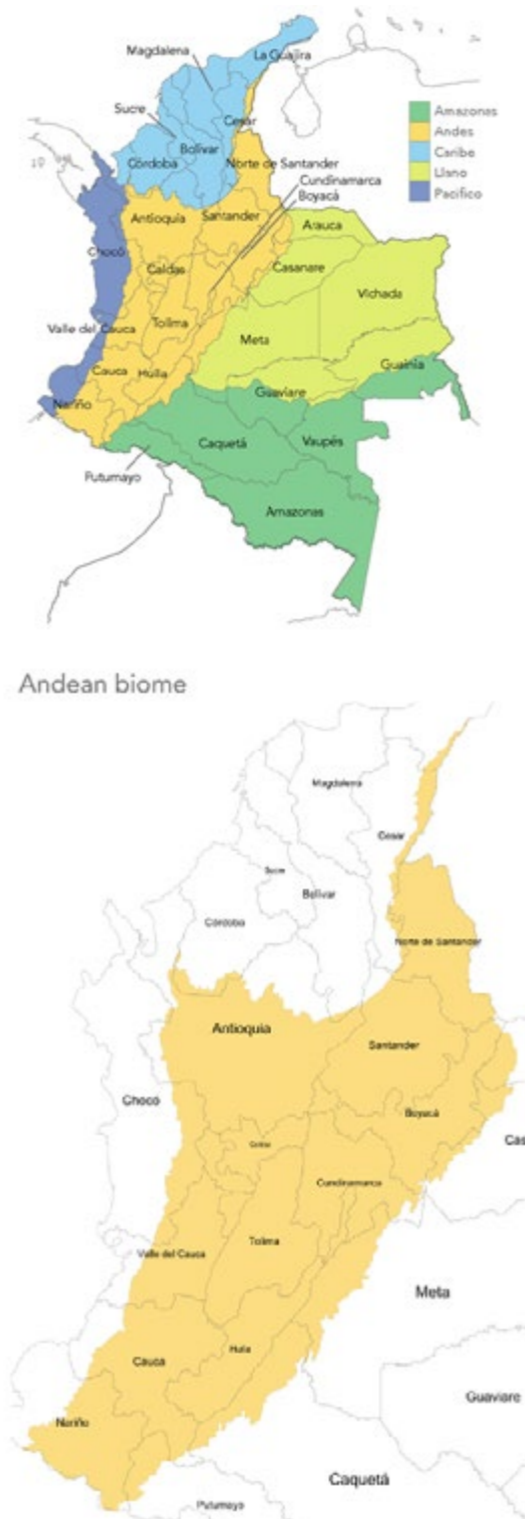


Covering over 282,000 km<sup>2</sup> (approx. 30% of Colombian continental territory), the Andean region is Colombia's central region, spanning the western, central and eastern Andean Mountain ranges. The region is characterized by a complex topography of undulating valleys and canyons and a large diversity of microclimates and ecosystems. The biome comprises the following departments either fully or partially: Antioquia, Bolívar, Boyacá, Caldas, Cauca, Cesar, Cundinamarca, Huila, Nariño, Norte de Santander, Quindío, Putumayo, Risaralda, Santander, Tolima, and Valle del Cauca. It includes the capital city Bogotá and the cities of Cali, Medellín and Bucaramanga. Over 77% of the Colombian population, around 34 million people, inhabits this biome.<sup>154</sup>

The Andean biome includes high, middle, and lower Andean forests, paramos, wetlands, deserts, periglacial snowfields, and a diverse array of agroecosystems. The Andean geography also includes high altitude wetlands (paramos), and the rivers Cauca and Magdalena, the longest and most important rivers in the country, providing important water supply to urban and rural populations.<sup>155</sup> Seventeen percent of the Andean biome is covered by forest.<sup>156</sup> It is estimated that less than 30% of the region's original forest cover remains.<sup>157</sup> These forests are located between 1,000 and 3,000 meters above sea level. The Andean forests are divided into three main ecosystems:

- Sub-Andean rainforest (between 1,200 and 2,000 meters above sea level),
- High Andean rainforest (between 2,000 and 3,300 meters above sea level),
- Paramo (altitudes above 3,300 meters).

Figure 16: Biomes of Colombia and Political and administrative division in the Colombian Andean biome.<sup>158</sup>



<sup>154</sup> ¿Cómo vamos en las regiones? Región Andina. (2015). Universidad del Rosario. Retrieved August 4, 2022, from <https://www.urosario.edu.co/Home/Principal/boletines/Ediciones-OPIP-Regionales/Edicion01-Regiones/Como-vamos-en-las-regiones/>.

<sup>155</sup> Llambí, L. D., & Becerra, M. T. (2019). Monitoring Biodiversity and Ecosystem Services in Colombia's High Andean Ecosystems: Toward an Integrated Strategy. *Mountain Research and Development*, 39(3). Retrieved August 4, 2022, from <https://bioone.org/journals/mountain-research-and-development/volume-39/issue-3/MRD-JOURNAL-D-19-00020.1/Monitoring-Biodiversity-and-Ecosystem-Services-in-Colombias-High-Andean-Ecosystems/10.1659/MRD-JOURNAL-D-19-00020.1.full>.

<sup>156</sup> MinAmbiente & IDEAM. (2021).

<sup>157</sup> <https://impulsoverde.org/community-projects/restoration-and-reforestation/the-paramo-and-andean-forest-ecosystems/?lang=en>.

<sup>158</sup> Reproduced by Climate Focus with data from Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>.

Páramos are unique high-mountain wetlands located mainly in the north of South America between the upper limit of the high-Andean forests and the lower limit of perpetual snow. Colombia has more than half of the world's Páramos, amounting to 2.9 million ha.<sup>159</sup> Páramos are an important source of the water used to produce electricity and provide drinking water to urban areas. The Páramo of Sumapaz which supplies Bogotá with water covers over 333,000 ha.<sup>160</sup> Additionally, paramos are ecosystems home of endemic flora and fauna.<sup>161</sup> Paramos are crucial for mitigating climate change, they hold among the highest levels of soil carbon measured in mountain ecosystems (up to 2,100 MgC per ha in paramo peatlands).<sup>162</sup> Only 45% of the paramos existing in Colombia are protected under the SINAP. An estimated 15% of the total area of paramos has been replaced by pastures, crops, and exotic tree plantations.

The Andean forests have undergone a historic process of transformation, mainly due to cattle grazing, agriculture, illicit crops, hydropower, transport infrastructure, wood extraction and rapid urbanization. Deforestation in this region is concentrated in the department of Antioquia, which is the department with the fifth highest deforestation rate in the country, mostly due to pastures conversion, fires, and illegal mining.<sup>163</sup> Between 2015 and 2020, over 193,000 ha of forest were deforested in the Andes. In 2020 alone, over 28,000 ha of natural forest were cleared, amounting to 17% of the national total.<sup>164</sup>

The Catatumbo region in Norte de Santander is also a deforestation hotspot in the Andes biome. The Catatumbo has suffered from the internal conflict in Colombia. It has been a territory of constant conflict amongst different armed groups due to its strategic location along the border with Venezuela. Deforestation in this area is caused mainly by illegal crops, land grabbing and tenure conflicts and is affecting conservation efforts at the Catatumbo Barí National Natural Park. Fires are among the main driver of deforestation in departments including Valle del Cauca, Cauca, Antioquia, Nariño, Tolima, Cundinamarca and Norte de Santander.<sup>165</sup> In the sub-Andean forests, deforestation has been driven mainly by coffee and sugarcane crops.<sup>167</sup> Higher parts of the Andean mountains, including paramos, have been deforested due to cattle ranching, dairy production and cereals and potato crops.<sup>168</sup>

The region is the country's most important agricultural hotspot. The diversity of ecosystems and altitudes allows for the production of an ample variety of crops including coffee, cocoa, fruits, legumes, potato, and maize. The region is characterized by subsistence agriculture on hillsides.<sup>169</sup> Coffee is the most important cash crop for the region and the country, and is harvested in Antioquia, Caldas, Cauca, Huila, Risaralda, Quindío, Tolima, and Cundinamarca. Sugarcane, soybeans, rice, and sorghum are produced in Valle del Cauca, Tolima and Huila and their production requires a high degree of mechanization. Agribusinesses like livestock for dairy production and cut flower

<sup>159</sup> DANE. (2014). Censo Nacional Agropecuario. Retrieved June 28, 2022, from <https://www.dane.gov.co/files/images/foros/foro-de-entrega-de-resultados-y-cierre-3-censo-nacional-agropecuario/CNATomo3-Mapas.pdf>.

<sup>160</sup> ¿Páramos? La Respuesta es Colombia. (2015, August 31). Marca País Colombia. Retrieved July 26, 2022, from <https://www.colombia.co/pais-colombia/geografia-y-medio-ambiente/paramos-la-respuesta-es-colombia/>.

<sup>161</sup> WWF. (2018, August 1). Ley de páramos: comienza la implementación. Retrieved July 18, 2022, from <https://www.wwf.org.co/?332290/Ley-de-paramos-comienza-la-implementacion>.

<sup>162</sup> Thompson, J., Zurita-Arthos, L., Müller, F., Chimbolena, S., & Suárez, E. (2021). Land use change in the Ecuadorian páramo: The impact of expanding agriculture on soil carbon storage. *Arctic, Antarctic, and Alpine Research*, 53(1). Retrieved August 26, 2022, from <https://www.tandfonline.com/doi/full/10.1080/15230430.2021.1873055>.

<sup>163</sup> Rojas, G. P., & Mora, J. E. (2017).

<sup>164</sup> IDEAM. (2021). Resultados del Monitoreo de la Deforestación: Año 2020 y Primer Trimestre 2021. Retrieved from [http://www.ideam.gov.co/documents/10182/113437783/Presentacion\\_Deforestacion2020\\_SMBYc-IDEAM.pdf/8ea7473e-3393-4942-8b75-88967ac12a19](http://www.ideam.gov.co/documents/10182/113437783/Presentacion_Deforestacion2020_SMBYc-IDEAM.pdf/8ea7473e-3393-4942-8b75-88967ac12a19).

<sup>165</sup> Parque Catatumbo Barí, asfixiado por la deforestación y los cultivos ilegales. (n.d.). Retrieved July 26, 2022, from <https://www.semana.com/medio-ambiente/articulo/parque-catatumbo-bari-asfixiado-por-la-deforestacion-y-los-cultivos-ilegales/58115/>.

<sup>166</sup> Rojas, G. P., & Mora, J. E. (2017).

<sup>167</sup> Región Andina solo conservaría solo una tercera parte de bosque. (2021, January). *Semana*. Retrieved August 5, 2022, from <https://www.semana.com/actualidad/articulo/region-andina-solo-conservaria-solo-una-tercera-parte-de-bosque--noticias-hoy/59720/>.

<sup>168</sup> Región Andina solo conservaría solo una tercera parte de bosque. (2021).

<sup>169</sup> World Bank, CIAT, & CATIE. (2014). Climate Smart Agriculture in Colombia. Retrieved from <https://assets.publishing.service.gov.uk/media/57a089dde5274a31e0002d6/CSA-in-Colombia.pdf>.

are in production in the high plateaus of Bogotá and Rionegro in Antioquia.<sup>170</sup>

**According to our analysis, the Andean region offers the highest carbon market potential for all mitigation activities, accounting for almost half of the country's total potential (43.5%).** It is therefore not surprising that as of August 2022, the region hosts 41 carbon projects, representing over one-third of the country total, of which 31 are A/R projects. The Andean biome has the highest potential for A/R activities in the country, at 51.4%, overshadowing all other biomes. The highest potential is concentrated in Antioquia (13%), followed by Santander (5.8%) and Bolívar (5.4%). Additionally, the Andean region also offers the highest potential for agricultural activities, at 47.6%, again primarily concentrated in Antioquia (11.9%). This high potential presents an opportunity to incorporate carbon market activities in the country's most important agricultural region. Finally, the Andean region accounts for 24.2% of the country's potential for A/D activities.

**The Andean biome hosts 40 carbon projects, more than any other biome of Colombia (Figure 4).** Most are A/R projects, followed by Avoided Deforestation projects. Most projects are located in Antioquia, which is one of the departments with the highest rates of deforestation in the country (Figure 3).<sup>171</sup>

The following sections describe the associated carbon market opportunities of the Andean biome.

## Opportunities for carbon investments

**The Andean region is the leading region for agricultural production, and implementing sustainable practices holds significant mitigation potential.** Support for climate-smart agricultural practices that combine productivity increases, climate resilience, and mitigation combined local and global benefits. Supporting the implementation of climate-smart agriculture will reduce the impact of agricultural production on the ecosystems while improving the livelihoods of smallholders.

**Since the Andean biome has been the scene for large-scale historical ecosystem transformation, there is an opportunity for reforestation activities.** According to Colombia's Humboldt Institute, the Andes is the region with the highest reforestation priorities in the country. Departments such as Valle del Cauca, among others, could benefit from reforestation efforts, especially in protected areas such as the Natural National Park Los Farallones de Cali. Reforestation can also be furthered by implementing agroforestry models in crops such as coffee and cocoa. If agricultural projects are combined with forest restoration and conservation these practices also remove pressure from natural ecosystems and reduce deforestation. The promotion of silvopastoral and agroforestry practices offer opportunities for bundled A/R projects.

**There are also opportunities to support local communities in the management of forests.** Enhancing knowledge and awareness of local communities combined with payments for ecosystem services that reward conservation may help to halt the agricultural frontier.<sup>172</sup> This is the case for the project, "Strengthening Forest Governance in Apartadó, Antioquia," an initiative led by WWF Colombia which seeks to develop forest inventories and censuses to build community forest management plans

while enhancing timber use and management.<sup>173</sup> The project also aims to reduce the impact of harvesting techniques and strengthen the connectivity and financial capacities of local organizations.

**Existing carbon projects can provide models for further engagement but need to be scaled to have a transformational impact.** For instance, the coffee company Biodiversal has proven that the carbon removal capacity of its coffee plantations has increased following a transition from sun-exposed crops to agroforestry systems.<sup>174</sup> Those additional removals combined with efficient use of fertilizer have not only contributed to mitigating GHG emissions; but have also lowered the overall costs of coffee production. Another example is chocolate companies that – with the support of the International Finance Corporation – transition to regenerative and climate-smart business models. This will help farmers increase their income, reduce their carbon footprint, and guarantee that companies have stable and sustainable supply chains.<sup>175</sup>

### Box 4: miPáramo, Páramos para la Vida and Bosques y Páramos initiatives

**miPáramo** is a public-private initiative aimed at catalyzing finance towards the conservation of Páramos. The project has four main elements: i) conservation, ii) restoration, iii) supporting sustainable production, and iv) promoting the signing of voluntary conservation agreements. The initiative is the result of a collaboration between civil-society organizations (*Alianza Biocuenca*), Switzerland's embassy in Colombia, GIZ and Good Stuff International and private sector entities. So far, the initiative

has managed to protect 2,259 ha of high-mountain ecosystems and support 541 families.<sup>176</sup>

**Páramos para la Vida** is an initiative led by UNDP aimed at conserving paramos by promoting sustainable systems for the conservation of biodiversity, ecosystem services and agriobiodiversity.<sup>177</sup> The project will be covering 16 paramos systems: Chili-Barragan; Chiles-Cumbal; Chingaza; Cruz-Verde Sumapaz; Guanacas-Puracé-Coconuco; Guerrero; Jurisdicciones Santurbán Berlín; La Cocha- Patascoy; Las Hermosas; Los Nevados; Nevado de Huila-Moras; Pisba; Rabanal y Río Bogotá; Sierra Nevada del Cocuy; Sotará; and Tota-Bijagual-Mamapacha. Páramos para la vida aims at protecting over 1 million ha of paramo, restore 4,400 ha and benefit 5,800 people. This initiative is supported by the CARs of several departments, local Governments, the research institute Alexander von Humboldt, IDEAM, local utilities water providers and the private sector.

**Bosques y Páramos** is an initiative financed by USAID with the purpose of supporting the Government of Colombia in the implementation of policies and strategies that support economic growth and environmental management. In Valle del Cauca, the project is furthering sustainable tourism initiatives to improve communities' livelihoods and help conserve the natural ecosystem. So far, the project has supported ten local businesses, trained 255 people in sustainable tourism, and trained nine local guides.<sup>178</sup>

<sup>170</sup> World Bank et al. (2014).

<sup>171</sup> IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021). Tercer Informe Bienal de Actualización de Colombia a la Convención Marco de las Naciones Unidas para el Cambio Climático (CMNUCC). Retrieved from <https://unfccc.int/sites/default/files/resource/BUR3%20-%20COLOMBIA.pdf>.

<sup>172</sup> World Bank et al. (2014).

<sup>173</sup> Colombia Sostenible. (2022). Gobernanza Forestal en Apartadó-Antioquia. Retrieved August 17, 2022, from <https://www.colombiasostenible.gov.co/prensa/gobernanza-forestal-en-apartado-antioquia>.

<sup>174</sup> Biodiversal - Agricultura Regenerativa. (n.d.). Biodiversal. Retrieved August 30, 2022, from <https://biodiversal.com/>. IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>175</sup> Requejo S., & Parizat, R. (2021, February). The future of Colombian cocoa is sustainable, climate-smart, and oh so sweet. World Bank Blogs. Retrieved July 27, 2022, from <https://blogs.worldbank.org/climatechange/future-colombian-cocoa-sustainable-climate-smart-and-oh-so-sweet>.

<sup>176</sup> miPáramo – Protección del bosque alto andino y Páramo de Santurbán. (n.d.). Retrieved August 2, 2022, from <https://miparamo.org/>.

<sup>177</sup> Programa de las Naciones Unidas para el Desarrollo – PNUD. (n.d.). Páramos para la Vida. Retrieved August 31, 2022, from <https://www.undp.org/es/colombia/projects/paramos-para-la-vida>.

<sup>178</sup> USAID. (2021). Programa Páramos y Bosques. Retrieved August 31, 2022, from <https://www.programaparamosybosques.org/>.



There are also opportunities for furthering reforestation and conservation activities to protect fragile ecosystems such as the **Paramos**. Paramos are under threat and have, per area, higher emission reduction potential than, for instance, the Amazon Forest.<sup>179</sup> A good example of this type of activity is the VCS-registered project that supports carbon sequestration, restoration, conservation and sustainable production in the Guerrero, Sumapaz and Rabanal paramo systems. Implemented by Terra Integrity with the support of Soci ete de Gestion de Projets Ecotierra Inc. (Ecotierra), the project aims to increase forest cover over 1,500 ha of non-forest land on the Colombian high Andes through sustainable agroforestry systems and reforestation activities for conservation purposes.<sup>180</sup> **Box 4** includes some public-private initiatives currently implemented in paramos that have the aim to conserve and restore ecosystems, while supporting the livelihoods of rural communities.

## Barriers to carbon investments

**As in other regions, issues of land tenure and violence could get in the way of investments in forests, paramos, and agricultural land.**

For instance, the highest potential for Avoided Deforestation projects is in deforestation hotspot areas, which in turn, are the most violent and insecure in the region. For example, the Catatumbo in Norte de Santander, there is a strong presence of armed groups and illegal activities such as the cultivation of illicit crops, land grabbing, and timber extraction.

**Land tenure and conflicts are barriers to both agriculture and reforestation projects.** The department with the highest rates of informal tenure are Boyac a, Antioquia, Cundinamarca, and Nari o, all located in the Andean biome. In the rice value chain, the informality in the region is 49% in the centrally located departments and 27% in Santander and Norte de Santander.<sup>181</sup> In the case of dairy products, the main produce of high-Andean departments, is 44% in Antioquia, 51% in Cundinamarca and 50% in Boyac a.<sup>182</sup>

**Farmers must be convinced of the value of climate-smart agriculture practices.**

Initiatives funded by international donors include awareness campaigns on the economic, environmental, and social benefits these practices can bring. However, barriers persist and changing farming practices without clear economic incentives are prone to failure. There is a lack of adequate finance for supporting smallholders in the transition to climate-smart agriculture practices, and the financial system historically does not offer many viable solutions for smallholders. The country also has a very low provision of technical extension services: only 15% of smallholders currently receive them and investments in research and development are very low.<sup>183</sup>

### Box 5: Solidaridad and Rabobank make carbon markets work for smallholder farmers

Despite the significant potential of smallholders to help mitigate GHG emissions, the costs of verification and knowledge needed to transact individual carbon credits have prevented smallholders benefitting from carbon markets. The international NGO Solidaridad promotes the implementation of climate-smart agriculture practices in coffee plantations and uses a satellite-based verification system for the generation of credits.<sup>184</sup> Solidaridad and the Norwegian Initiative for Forests and Climate (NICFI), is implementing a series of pilot projects in Colombia and Per u to provide financial incentives for farmers to adopt climate-smart practices and switch their farms to agroforestry systems.<sup>185</sup> As a result, the initiative has supported over 6,000 farmers with inputs, technical assistance and finance to reduce their carbon footprint.

The project is reducing emissions through better soil management and efficient fertilizer usage. For instance, in Colombia, the farms went from carbon positive (1.1 tCO<sub>2</sub>e per ha) to carbon negative (0.5 tCO<sub>2</sub>e per ha) within three years of implementation.<sup>186</sup> Additionally, the project has increased quality and consistency of the coffee beans; and increased resilience to adverse climate phenomena. Productivity has also increased by 15-20% in the participating farms, and farmers' income has increased by 20%, increasing overall well-being and behavioral changes for future generations.

**Three quarters of the Colombian population live in the Andes and the agricultural plot sizes in the region are the smallest in the country.** The size of the farms means that in order to implement a climate-smart agriculture or reforestation project, a significant number of smallholders must be grouped in order for the project to be profitable and impactful. This, combined with the informality in land tenure, presents a problem for projects to be implemented in the region. However, implementing projects through producer associations can help to overcome the size barrier, and projects themselves can support the formalization of land by supporting producers to access formalization programs offered by the Government. **Box 5** includes an example of how coffee smallholders are benefitting from carbon projects, despite the size of their plots.

<sup>179</sup> Ambiente y Sociedad. (2017, February). Colombia Usar a Sus P amos Para Vender Bonos De Carbono | Asociaci n Ambiente Y Sociedad. Retrieved July 27, 2022, from <https://www.ambientesociedad.org.co/colombia-usara-sus-paramos-para-vender-bonos-de-carbono/>.

<sup>180</sup> Yagual - carbon sequestration grouped project for the restoration, conservation and sustainable production in the guerrero, sumapaz and rabanal paramo systems. (n.d.). Retrieved from <https://registry.terra.org/app/projectDetail/VCS/1869>.

<sup>181</sup> UPRA. (2021). An alisis de la informalidad en la tenencia de la tierra en las cadenas productivas priorizadas. Retrieved July 27, 2022, from [https://upra.gov.co/documents/10184/220705/DTR\\_INFORMALIDAD.pdf/1e469baa-bbdb-40ed-b8be-2f4c06b9a091](https://upra.gov.co/documents/10184/220705/DTR_INFORMALIDAD.pdf/1e469baa-bbdb-40ed-b8be-2f4c06b9a091).

<sup>182</sup> UPRA. (2021).

<sup>183</sup> Monta o, M. et al. (2021).

<sup>184</sup> Solidaridad and Rabobank make carbon markets work for smallholder farmers. (2021, June). Solidaridad Network. Retrieved August 5, 2022, from <https://www.solidaridadnetwork.org/news/solidaridad-and-rabobank-make-carbon-markets-work-for-smallholder-farmers/>.

<sup>185</sup> Solidaridad and Rabobank make carbon markets work for smallholder farmers. (2021, June). Solidaridad Network. Retrieved August 5, 2022, from <https://www.solidaridadnetwork.org/news/solidaridad-and-rabobank-make-carbon-markets-work-for-smallholder-farmers/>.

<sup>186</sup> Solidaridad and Rabobank make carbon markets work for smallholder farmers. (2021).



07

## Assessing opportunities in Colombia's eco-regions: The Amazon biome



The Colombian Amazon covers approximately 45.9 million ha – 40% of Colombian total land area – and harbors 67% of the country's total forests.<sup>187</sup> Over 80% of Colombia's Indigenous territories can be found in the Amazonia-Orinoquía region, and more than half (62) of the 85 identified Indigenous Peoples or ethnic groups have their ancestral areas in the Amazon biome, which include Indigenous Peoples in voluntary isolation.<sup>188 189</sup>

Until recently, a vast area of the Colombian Amazon biome was relatively untouched by the economic drivers of deforestation present in neighboring countries. This has been attributed to the presence of Indigenous communities and territories as well as the presence of guerrilla groups, which controlled the territory and discouraged extractive industries from entering the forests.<sup>190</sup> However, these dynamics have changed in the last decade. Between 2000 and 2018, five departments, four in the Amazon biome, represented 63% of cumulative national deforestation: Caquetá (22%), Meta (16%), Guaviare (11%), Antioquia (8%) and Putumayo (7%).<sup>191</sup> During the past years (2019-2020) the Colombian departments with the highest deforestation were Meta with 35,500 ha, Caquetá with 32,500 ha, Guaviare 25,500 ha, and Putumayo with 13,100 ha of forest lost.<sup>192</sup>

The Colombian Amazon is home to seven National Parks, two Forest Reserves, and other ecologically important areas (e.g. Ramsar sites). The largest area is the Chiribiquete National Natural Park, which is the largest tropical rainforest national park in the world and occupies about 4.3 million ha, including the Serranía de Chiribiquete and surrounding areas. However, their status as

Figure 17: Political and administrative division in the Colombian Amazon biome.<sup>193</sup> Colombia's Amazon biome is comprised of the following administrative departments: Amazonas, Caquetá, Guainía, Guaviare, Putumayo, and Vaupés. Four other departments partially fall in the Amazon biome: Cauca, Meta, Nariño, and Vichada.



<sup>187</sup> Solidaridad and Rabobank make carbon markets work for smallholder farmers. (2021).

<sup>188</sup> República de Colombia. (2020). Documento 4021: Política Nacional Para El Control De La Deforestación Y La Gestión Sostenible De Los Bosques, CONPES: Consejo Nacional de Política Económica y Social. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/4021.pdf>.

<sup>189</sup> Guio Rodríguez, C. A., & Rojas Suarez, A. (2019). Amazonia colombiana - Dinámicas territoriales, Ideas Verdes: Análisis Político, No. 22. Retrieved from [https://co.boell.org/sites/default/files/2020-01/IDEAS%20VERDES%20web%20\\_1.pdf](https://co.boell.org/sites/default/files/2020-01/IDEAS%20VERDES%20web%20_1.pdf).

<sup>190</sup> Guio Rodríguez, C. A., & Rojas Suarez, A. R. (2019).

<sup>191</sup> República de Colombia. (2020). Documento 4021: Política Nacional Para El Control De La Deforestación Y La Gestión Sostenible De Los Bosques, CONPES: Consejo Nacional de Política Económica y Social. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/4021.pdf>.

<sup>192</sup> IDEAM, Fundación Natura, PNUD, MADS, DNP, & CANCELLERÍA. (2021).

<sup>193</sup> Reproduced by Climate Focus with data from Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>. Guio Rodríguez, C. A., & Rojas Suarez, A. R. (2019).

protected areas does not mean an absence of threats. Protected areas in the Colombian Amazon biome are exposed to conflicts associated with encroachment, inappropriate land uses, and both legal and illegal economic activities. The challenge of confronting these threats goes beyond the capabilities of the State, which does not have sufficient budget, institutional capacities, or human resources to ensure political, legal, and operational presence in the region.<sup>194</sup>

**The Amazon Vision (Visión Amazonía) is a public program that seeks to halt deforestation in the Colombian Amazon by supporting activities that protect forests and promote sustainable development in the region.**<sup>195</sup> The Amazon Vision was developed in 2015 in cooperation with the Governments of Norway, the United Kingdom, and Germany and established an initial goal of zero deforestation by 2020. It received results-based payments from the REDD Early Movers (REM) Program and additional climate finance of 86 million dollars between 2016 and 2021, but failed to achieve the stated objectives.<sup>196</sup> The program is structured around five activities: i) forest governance; ii) land planning and sectorial sustainable development; iii) promoting the development of sustainable value chains; iv) environmental governance of indigenous communities; v) enabling conditions.<sup>197</sup> Critics claim that the REM/Amazon Vision fails to address the drivers of deforestation in the region, including land grabbing, illicit crop production (and eradication policies), alongside Governmental economic development policies.<sup>198</sup>

**The Amazon biome can be divided into areas characterized by different land-use dynamics.** The additional land use context of these areas determines the nature of carbon market opportunities in the region. The largest

share of the biome consists of remote forest areas with little access, infrastructure, and low rates of deforestation – mainly in the Southeastern part of the biome. In contrast, some of the municipalities with the highest deforestation rates in the country can be found in the Northwestern part of the biome, where the Amazon meets the biomes of the Orinoquía and Andes. Most deforested departments, such as Caquetá, Guaviare, and Putumayo, are located in the Northwestern part of the biome, comprising altitudes between 4,000 and 400 meters. In contrast, most conserved jurisdictions, such as Vaupes, Guainía, and Amazonas, are located in the Southeastern part of the biome and have lower altitudes.

**According to our analysis, the Amazon biome offers the second-lowest carbon market potential for all mitigation activities in Colombia, at 15.7% (Table 4).** Only the Pacific biome has a lower carbon market potential. However, the Amazon biome has the highest potential for AD activities (32%). The highest potential for reducing deforestation can be found in Guaviare, Caquetá, and Guainía, with the lowest potential found in the intact forests of Putumayo. The high potential for reduced deforestation aligns with the presence of 17 AD projects in the biome, with Guaviare, Caquetá, Guainía hosting eleven of them (Table 5). The Amazon biome has low A/R (9.8%) and agricultural (5.1%) potentials compared to AD and other biomes, scoring the second lowest in both categories, only slightly greater than the Pacific biome, specifically in A/R activities.

The following sections describe the different pressures on ecosystems and associated carbon market opportunities in these two sub-regions of the Colombian Amazon.

## 1. The core of the Amazon

**The Southern and Southeastern parts of the Colombian Amazon are carbon-dense and largely intact forest areas that meet the definition of a high-forest, low deforestation area.** This area covers the departments of Amazonas, Guainía and Vaupés, as well as the south-eastern parts of Caquetá and Guaviare. Bordering Perú, Brazil, and Venezuela, this area also includes the national parks of Chiribiquete, Amacayacu, Cahuinari, Río Puré, and Yaigojé-Apaporis. Compared to the northern parts of the biome, the core of the Colombian Amazon has limited road infrastructure and transportation is primarily on rivers. The area also has the lowest population density of the country.

**Most of the forests in this core area of the Colombian Amazon are held and managed by Indigenous communities.** In the Colombian Amazon, approximately 26.9 million ha of forests are owned by Indigenous peoples, divided into 222 indigenous reservations with a total Indigenous population of 215,000.<sup>199</sup> These territories are the best-conserved areas of the Amazon biome.

**In contrast to the forest frontier in the North, forest loss dynamics in the core of the Colombian Amazon are sporadic, smaller in scale, and follow the transportation lines along rivers and illegally constructed roads.** Forest disturbance is being driven by groups of migrants who clear small parcels of forest areas to engage in diverse illegal and legal productive practices such as mining of coltan and gold, pastures, coca cultivation, land grabbing and speculation. Recent data shows that there is a growing number of groups entering from Venezuela, Brazil and other Colombian regions to illegally mine in Amazon Forest areas.<sup>200</sup>

This makes it increasingly difficult for Indigenous communities and their AATIs to manage their land sustainably.

Figure 18: Map of Indigenous Territories in the Amazon biome.<sup>201</sup>



**The GEF's Heart of the Amazon (Corazón de la Amazonía) is a cornerstone public sector initiative program in the region.** There project is funded by the GEF and forms part of the Amazon Sustainable Landscapes (ASL) Program of the World Bank. The program seeks to promote sustainability in and around an area of 11 million ha with the Chiribiquete National Park as its core, connecting with La Paya, Macarena, Tinigua, Cahuinari, Yaigojé-Apaporis National Parks, and the Nukak National Natural Reserve.<sup>202</sup> The Heart of the Amazon is part of

<sup>194</sup> Botero García, R., López, F., Ospino, H., & Ponce de Leon y Chau, E. (2019). Áreas protegidas amazónicas y sus servidores como víctimas del conflicto armado. Retrieved from <https://fcds.org.co/wp-content/uploads/2019/06/libro-areas-protegidas-amazonicas.pdf>.

<sup>195</sup> Visión Amazonía (n.d.). Retrieved July 5, 2022, from Guio Rodríguez, C. A., & Rojas Suarez, A. (2019). Amazonia colombiana - Dinámicas territoriales, Ideas Verdes: Análisis Político, No. 22. Retrieved from [https://co.boell.org/sites/default/files/2020-01/IDEAS%20VERDES%20web%20\\_1.pdf](https://co.boell.org/sites/default/files/2020-01/IDEAS%20VERDES%20web%20_1.pdf). Visión Amazonía. (n.d.). Retrieved from <https://visionamazonia.minambiente.gov.co/>.

<sup>196</sup> Visión Amazonía. (n.d.).

<sup>197</sup> Ministerio de Ambiente, V. A. (2018). Qué es REM Visión Amazonía? Retrieved from <https://visionamazonia.minambiente.gov.co/que-es-vision-amazonia/>.

<sup>198</sup> Rodríguez de Franciso, J. C., Del Cairo, C., & Gallego, D. O. (2021). Post-conflict transition and REDD+ in Colombia: Challenges to reducing deforestation in the Amazon - ScienceDirect. Forest Policy and Economics, 127. Retrieved August 5, 2022, from <https://www.sciencedirect.com/science/article/pii/S1389934121000563?via%3Dihub>.

<sup>199</sup> Rodríguez, M., & Valdés, M. F. (Eds.). (2022). Colombia País De Bosques (1st ed.).

<sup>200</sup> Sánchez, C. (2021, August 24). Illegal mining in Colombia's Amazon threatens Indigenous communities. Mongabay Environmental News. Retrieved September 2, 2022, from <https://news.mongabay.com/2021/08/illegal-mining-in-colombias-amazon-threatens-indigenous-communities/>.

<sup>201</sup> Reproduced by Climate Focus with data from RAISG: Amazon Network of Georeferenced Socio-Environmental Information. (2020). Territorios Indígenas. Retrieved from <https://www.raisg.org/en/>. Guio Rodríguez, C. A., & Rojas Suarez, A. (2019).

<sup>202</sup> GEF Trust Fund. (2015). GEF-6 PROGRAM Framework Documents. Retrieved from [https://wwfgef.org/gef/wp-content/uploads/2017/03/Amazon-Sustainable-Landscapes\\_Program-Framework-Documents.pdf](https://wwfgef.org/gef/wp-content/uploads/2017/03/Amazon-Sustainable-Landscapes_Program-Framework-Documents.pdf).

the initial implementation activities of Amazon Vision with the purpose of enhancing the governance, promoting the sustainable usage of the land, reducing deforestation, and increasing conservation of biodiversity.

**Developing projects and programs depends on building trust among Indigenous communities and committing to long-term engagement.** As such, any carbon market investors are advised to rely on NGOs that maintain long-term and trusted relationships with Indigenous communities as intermediaries in such transactions. NGO partners can also ensure that communities are fully informed about the opportunities and risks associated with carbon markets, and that transactions are structured to reflect Indigenous management regimes. The free, prior, and informed consent (FPIC) and full inclusion of all community members are fundamental to the effectiveness and longevity of carbon initiatives.

## Opportunities for carbon investments

**There is an opportunity to support carbon market conservation projects that promote good Indigenous stewardship of Amazonian forests.** Indigenous communities could be supported to seize the opportunity to generate and commercialize carbon credits in support of their Life Plans to continue protecting their traditional knowledge, strengthening Indigenous governance structures, developing local community capacities, and protecting the forest. This requires well defined, understood, and accepted structures for governance, operations, and financial management, and a robust agreement between different project partners. This is especially important for any carbon market activities that involve large areas of land where more than one Indigenous authority or AATI is involved.

<sup>203</sup> Jurisdictional and Nested REDD+ (JNR). (n.d.). Verra. Retrieved August 4, 2022, from <https://verra.org/project/jurisdictional-and-nested-redd-framework/>.

<sup>204</sup> TREES: The REDD+ Environmental Excellence Standard. (n.d.). ART Architecture for REDD+ Transactions. Retrieved August 4, 2022, from <https://www.artredd.org/trees/>.

<sup>205</sup> Federal Ministry for Economic Affairs and Climate Action (BMWK). (n.d.). Cooperative action under Article 6 - Carbon Mechanisms.

**Considering the low levels of deforestation, carbon investments should cover large areas of forest.** The high-forest low-deforestation context of the Colombian Amazon makes it ideal for the development of large-scale or jurisdictional programs. Such programs could be developed using Verra's JNR, ART/TREES carbon credit issuing methodologies, or Article 6.2 of the Paris Agreement as guiding crediting scheme. All three standards provide opportunities for larger-scale conservation projects but differ in the demands and involvement of the Colombian Government.

- 1. Verra's Jurisdictional and Nested REDD+ (JNR) allows the nesting of projects in a larger jurisdictional program.**<sup>203</sup> Under JNR, projects are embedded in a jurisdictional accounting framework that avoids double counting and ensures credible baseline scenarios. JNR provides an opportunity to integrate existing Avoided Deforestation projects in a larger accounting framework.
- 2. The Architecture for REDD+ Transactions The REDD+ Environmental Excellence Standard (ART/TREES) allows the Government to monetize GHG reductions from national and larger jurisdictional programs.**<sup>204</sup> ART/TREES is a Government-centric jurisdictional REDD+ standard that seeks to incentivize public policies and governance regimes that support forest conservation. ART/TREES also allows jurisdictions that qualify as High-Forest Low-Deforestation areas to claim additional carbon credits. In contrast to JNR, ART/TREES does not allow for the direct crediting of individual projects and provides no direct investment incentives for private actors.
- 3. The Government of Colombia could also decide to develop a GHG crediting programs under the cooperative approaches under Article 6.2 of the Paris Agreement.**<sup>205</sup> This modality for crediting mitigation benefit allows

Governments to design and define the rules for a local or national carbon crediting program. Such a program could involve public and private investments and consider different carbon crediting schemes.

While JNR requires least Government involvement, ART/TREES demands Government leadership but offers a private carbon crediting standard and, finally, Article 6.2 requires the Government to define – possibly in cooperation with another country party to the Paris Agreement – a national carbon crediting program.

**Projects could also support the management of protected areas, including the creation of economic opportunities in buffer zones around such areas.** The buffer zones around protected areas with higher levels of forest loss or degradation would make suitable areas for project-level carbon investments. Such projects would support the effective conservation of protected areas. However, to enable project investment the allowable use of such areas would need to be clarified. In addition, the project activities would need to be aligned with public sector policies. The Government would have to formalize the ownership of rural land. Projects could provide agricultural technical assistance, and carbon credits could benefit rural inhabitants in the buffer areas that carry out forest restoration and conservation activities. This would minimize land use conflicts and promote the maintenance of ecosystem services.

## Barriers to carbon investments

**Developing carbon programs in the Colombian Amazon require a long-term vision.** Working with Indigenous communities demands building trust that allows AATIs and Indigenous Councils to understand, manage

Retrieved August 4, 2022, from <https://www.carbon-mechanisms.de/en/introduction/the-paris-agreement-and-article-6>.

and own their carbon projects. This requires a long-term commitment from investors and project developers. Mechanisms that rely on quick monetary deals and the transfer of rights to carbon may be at odds with Indigenous worldviews and ways of life. Currently, local communities are often approached by entities seeking quick wins from carbon markets who offer cash for the long-term transfer of Indigenous rights to forest carbon – a behavior that creates confusion, suspicion, and tends to lead to poor project performance.

**Jurisdictional projects depend on high-level political will and require significant up-front resources.** To be successful, jurisdictional REDD+ programs have to address the underlying drivers of deforestation, such as weak institutions, absent land titles, conflict and land grabbing. This will take significant time, even when political will is strong and the allocation of finance cover multiple year budget cycles. Carbon projects can help to address deforestation at hotspots of forest loss, while Governments work on implementing jurisdictional programs.

**Implementing carbon credit-generating activities in remote areas with low deforestation is challenging.** The financial returns are limited, and operational and legal insecurities abound. Low levels of deforestation mean that carbon credit yields and payments are limited. As in the Pacific biome, the areas for promising Avoided Deforestation projects are limited, and the development of projects and programs requires significant investments. Projects will depend on public-private cooperation.

**The lack of rules for nesting projects in the Government's FREL, developed in the context of the Amazon Vision, creates further risks for investors.** Overlapping reference levels and lacking guidance on how to nest Avoided Deforestation projects in Government-led programs creates significant investment risks. The Government of Colombia started to work on rules on how to nest projects in larger accounting areas almost a decade ago, but such rules have yet to be adopted.

## 2. The forest frontier of the Colombian Amazon

**The forest frontier of the Colombian Amazon is located at the edge of the biome, which transitions northwestwards into the Andean Mountain range.** At the forest frontier, an arch of deforestation spans from Putumayo, Caquetá, across Guaviare to the Meta department. In 2020, 72% of national deforestation took place in 25 municipalities; 9 out of 10 of the top deforested municipalities are located in the Amazon forest frontier. The most deforested municipalities are San Jose del Guaviare, San Vicente Caguán, and La Macarena. Four of the five most deforested departments are in this frontier: Meta (35,556 ha), Caquetá (32,522), Guaviare (25,553), and Putumayo (13,141).<sup>206</sup>

**The development of jurisdictional programs requires a long-term policy commitment and significant up-front investment.** Jurisdictional programs are most successful if they address the structural drivers of deforestation, such as weak institutions, absent land titles, conflict and land grabbing. This takes significant investments and high-level and continuous political commitment. Carbon projects can bridge the time and reduce deforestation while jurisdictional programs are being developed.

**The Northern Amazon is characterized by high levels of deforestation that continues to expand southwards into forested lands.** The relative proximity of infrastructure and agricultural supply chain access facilitates deforestation. The highest levels of deforestation recorded are in areas closest to the human settlements in Caquetá, Guaviare, and Putumayo. The lack of state and institutional presence results in internal migrants and

settlers seeking to establish rights over land by fencing it and grazing cows to demonstrate productive use (practices called *praderización* or *potrerización*).<sup>207</sup>

**High levels of violence continue to plague the region.** Agriculture, and mostly livestock, driving deforestation has increased after the signing of the Peace Agreement due to legal and illegal road construction, legal and illegal mining, illegal logging, and extensive cattle ranching, all combined with weak institutions and a lack of Government presence.<sup>208</sup> In recent years, the region has seen increased land colonization associated with new armed groups, made of FARC dissidents or groups associated with drug cartels, in areas where there is no land registry.

**Another, albeit smaller, driver of deforestation is the cultivation of illicit crops.**<sup>209</sup> By clearing only small patches of lands, these groups avoid detection by remote-sensing monitoring. Drug-trafficking groups offer cocoa cultivation to forest-dependent communities as a lucrative activity, which is often attractive in the absence of any other economic opportunities.

**The lands and soil in the Amazon biome are less fertile than in other areas of the country, and suited for a limited set of crops.** For instance, only 0.3% of land in the Department of Guaviare is suitable for agriculture, 0.2% for cattle ranching, and 4.8% for agroforestry. Yet, 3% of lands in Guaviare are used for agriculture and 7.1% for cattle ranching.<sup>210</sup> A similar pattern of overutilization for agriculture and cattle ranching is observed in Caquetá: 1% of land is classed as suitable for agriculture, yet 4% of land is actually used for agriculture; and while only 0.1% is classed as suitable for cattle ranching, in reality 13% is being used

for these activities.<sup>211</sup> While rubber, cacao, dry rice and other crops are suited for Amazon soils, careful consideration of crop selection is important. Regenerative agricultural practices and agroforestry provide opportunities for rural development at the forest frontier.

## Opportunities for carbon investments

**Carbon investments at the forest frontier can help prevent further expansion into primary forests and protected areas.** They can support a transition to sustainable land use that is characterized by a mix of tree crops and agriculture which help farmers and settlers shift away from the extractive rural economy. The conservation of cultural and production practices of Indigenous communities – as well as the transition of migrated settlers to sustainable agricultural management practices – can be stimulated by carbon finance. Relevant practices include the promotion of sustainable agriculture and sustainable forest management through the promotion of aquaculture, silvopastoral and agroforestry systems, sustainable forest production of timber and non-timber forest products, and improvements in supply chain logistics for these products. This, combined with forest conservation, will require an injection of finance which carbon revenues can provide, if provided within a well-defined reference framework. To enable such investments, the regional environmental authorities (e.g. CAR) will need to regulate land use, as well as define areas (or percentages of areas) that can be used for reforestation or agroforestry.

**Investments can target the secondary and degraded forests at the forest frontier.** The local research organization, *Instituto Amazónico de Investigaciones Científicas (SINCHI)*, and

*Universidad de la Amazonía* have identified productive systems that can be a combination of agroforestry, silvopasture, and forest conservation and/or restoration. These systems might include forest and fruit species suitable for the region including Colombian mahogany (*Cariniana pyriformis*), cedrorana (*Cedrelinga cateniformis*), arenillo (*Hymenolobium sericeum*), arazá (*Eugenia stipitata*), and biriba (*Rollinia mucosa*).<sup>212</sup> Another example is the use of PES to complement forest conservation in Guaviare (see **Box 6**).

### Box 6: PES to promote conservation and sustainable production in Guaviare

This is a public sector initiative funded by the European Union, FAO, and the Italian Agency for Development Cooperation, which, in partnership with WWF Colombia and Fundación Natura, support the Government in Guaviare in negotiation agreements between rural smallholders and the National Park administration to agree on a Farm Planning Process in buffer areas of national parks. This initiative aims to use payment-for-environmental services (PES) as complementary instrument for environmental management and sustainable rural development. It seeks to support land-use planning, while improving the quality of life for inhabitants, implement conservation contracts including the establishment of actions and sustainable production systems at the farm level, and avoid the expansion of the agricultural frontier. Private carbon investments can be explored to scale these efforts, focusing on the promotion of sustainable agricultural value chains, relying on agroforestry systems and various non-timber forest products and sustainable timber, while protecting the areas covered by the PES.<sup>213</sup>

<sup>206</sup> IDEAM. (2021). Resultados del Monitoreo de la Deforestación: Año 2020 y Primer Trimestre 2021. Retrieved from [http://www.ideam.gov.co/documents/10182/113437783/Presentacion\\_Deforestacion2020\\_SMBByC-IDEAM.pdf/8ea7473e-3393-4942-8b75-88967ac12a19](http://www.ideam.gov.co/documents/10182/113437783/Presentacion_Deforestacion2020_SMBByC-IDEAM.pdf/8ea7473e-3393-4942-8b75-88967ac12a19).

<sup>207</sup> Rodríguez de Franciso, J. C., Del Cairo, C., & Gallego, D. O. (2021). Post-conflict transition and REDD+ in Colombia: Challenges to reducing deforestation in the Amazon - ScienceDirect. Forest Policy and Economics, 127. Retrieved August 5, 2022, from <https://www.sciencedirect.com/science/article/pii/S1389934121000563?via%3Dihub>.

<sup>208</sup> Jiménez Castelblanco, J. G. (2019). Portafolio de productos y servicios financieros finagro y su aplicación en la amazonia: Caso Caquetá y Guaviare. Retrieved from <https://sinchi.org.co/files/PUBLICACIONES%20DIGITALES/Documentos%20de%20debate/04.pdf>.

<sup>209</sup> Morales. (2022, May 19). "Mitad coca, mitad comida", estrategia perversa de grupos ilegales en deforestación de la Amazonía. RCN Radio. Retrieved August 4, 2022, from <https://www.rcnradio.com/recomendado-del-editor/mitad-coca-mitad-comida-la-estrategia-perversa-de-grupos-ilegales-en>.

<sup>210</sup> Jiménez Castelblanco, J. G. (2019). Portafolio de productos y servicios financieros finagro y su aplicación en la amazonia: Caso Caquetá y Guaviare. Retrieved from <https://sinchi.org.co/files/PUBLICACIONES%20DIGITALES/Documentos%20de%20debate/04.pdf>.

<sup>211</sup> Jiménez Castelblanco, J. G. (2019).

<sup>212</sup> SINCHI y MINAMBIENTE. (2013). Investigación en sistemas productivos sostenibles en la Amazonia norte colombiana (arreglos agroforestales, arreglos de enriquecimiento forestal). Retrieved from <https://sinchi.org.co/files/publicaciones/publicaciones/pdf/agroforesteria%20tomo%202%20baja.pdf>.

<sup>213</sup> El Espectador. (2022, June). Pagos por servicios ambientales para promover la conservación y producción sostenible. Retrieved August 5, 2022, from <https://www.elespectador.com/ambiente/bibo/pagos-por-servicios-ambientales-para-promover-la-conservacion-y-produccion-sostenible/>.

**There is an opportunity for programmatic carbon investments that integrate a high number of farms.** At the agricultural frontier, such carbon investments require the aggregation of a considerable number of farms into a grouped project. Participating farms would be offered a similar technological package and activities for improving farm productivity, while enhancing restoration and conservation activities. Farm investment and technology transfer would be granted in exchange for continuous monitoring, a long-term commitment to sustainable practices and transfer of carbon rights. The commercial proposal for farm owners would center on the improvement of productivity and improved livelihoods in exchange for restoration and conservation of forest areas. These carbon investments require upfront funding and trustworthy partners with operational capacity as well as the ability to act as aggregators of farms. For instance, these investments could complement conservation efforts such as the Amazon Forest Incentive (**Box 6**), which has been working with thousands of smallholders in the region on sustainable production and establishing legal and profitable businesses. However, additional investment incentives would be required to overcome the region's investment barriers, such as blended finance that combine public and private investments.

**To ensure the sustainability of projects, the involvement of social organizations, such as the *juntas de acción comunal*, is essential.** These community councils are recognized by Colombian law (Law 743 of 2002 and Decree 890 of 2008) as institutions of participative democracy in support of local development. The involvement of these institutions helps to ensure local support while strengthening local governance. This is particularly relevant for community projects, such as community forestry projects, that depend on the effective participation of local communities.

#### **Box 7: The Amazon Forest Incentive (*Incentivo Forestal Amazónico, IFA*)**

The IFA is an economic incentive equal to about USD 250 per quarter, offered to families who reside in active deforestation hotspots and who have signed conservation agreements to keep the forest standing.

This incentive is temporary, offered for up to one year while they convert their production systems to sustainable ones. The IFA complements households' incomes with funds derived from sustainable production. On a quarterly basis, IDEAM's Forest and Carbon Monitoring System reports compliance with conservation agreements to Vision Amazonia to proceed with the payments. Compliance with the conservation agreements is high, reaching about 90% of the agreements.

## **Barriers to carbon investments**

**Investments have more risk when there is little institutional state presence and security.** As in other former conflict regions, the Northern Amazon is characterized by low state presence, which facilitates the territorial control of illegal and armed groups. High levels of corruption among local agencies or protracted and prolonged bureaucratic processes, such as obtaining environmental licenses, further complicate investments in the area. Risks can be mitigated through cooperation with existing public institutions and coordination with donor-led programs.

**The lack of formalization of rural property and land tenure creates barriers to reaching agreements on carbon rights and eventual benefit-sharing schemes.** The absence of formal titles makes it difficult to establish clear land rights. Risks can be mitigated by focusing on areas where land cadasters exist and rights about seeking contractual agreements on the rights to carbon payments are certain. Benefit-sharing agreements with land managers should be transparent and disclosed to public institutions.

**Like other frontier regions, it lacks human capacity and skilled labor.** The volatility of frontier settlements and the lack of educational and work opportunities leads to an exodus of potential professionals and experts. There are limited project development capacities in the region and few organizations that could lead the implementation of projects.



08

## Assessing opportunities in Colombia's eco-regions: The Orinoquía biome



Figure 19: Political and administrative division in the Colombian Orinoquía biome.<sup>214</sup>



piedmont area, the extensive tropical dry savannas of the Altillanura, and the low-lying and seasonally flooded savannas between the Meta and Arauca rivers, and the area that marks the transition to the Amazon biome. In the Orinoquía biome, the landscapes of the Andes meet the extensive eastern plains and the Guiana Shield.

**The heterogeneity of the Orinoquía biome is defined by the different characteristics of its soil, hydrologic systems, and regional climate and rain patterns.** Rivers and the areas they occupy in dry and rainy seasons determine the type of forest diversity in this biome. In its entirety, the Orinoquía encompasses approximately 156 types of ecosystems with 32 kinds of savannas.<sup>215</sup> Median annual precipitation is 1,260 mm. There are two strongly marked seasons: the rainy season, which lasts 7-8 months, and the dry season, which lasts 4-5 months, though recently, this pattern has been less predictable. During the rainy season, significant rivers overflow, and savannah inundations are common, making agricultural and forestry planning more complex. In contrast, recent inundations in the piedmont region result from the poor state of the Andean watersheds. During the dry season, savannah rivers are dry, and the remaining vegetation has adapted to these variations.

**The Orinoquía region hosts 20% of Colombia's cattle population.** Casanare (1.99 million heads) and Meta (1.94 million heads) have the highest cattle concentrations in the country, followed by Arauca (1.16 million heads) and Vichada (258,000 heads). Cattle ranching is unequally distributed across 14.5 million ha, which represents 55% of the overall territory of Orinoquía, following an expansive and loosely managed French model.<sup>216</sup> Yet, despite the reliance on the cattle industry, Orinoquía has one of the lowest livestock productivity rates in the country.<sup>217</sup> The introduction of cattle to

**The Orinoquía region in Colombia's east covers 25.3 million ha of land and a significant portion of the Orinoco basin.** Its borders to the north and east are with Venezuela, to the south the Amazon biome, and to the west the Andean biome. The region encompasses a vast array of ecosystems, including the foothills of the Andes, the

<sup>214</sup> Reproduced by Climate Focus with data from Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>.

<sup>215</sup> Rodríguez Becerra, M., & Andrade Pérez, G. I. (2022). Orinoquía Forestal. Los Bosques en la Heterogeneidad geográfica de la Orinoquía,. In M. F. Valdés Valencia (Ed.), Colombia País De Bosques.

<sup>216</sup> García, N. (n.d.). Ganadería Sostenible En La , Una Apuesta Para Salvar una Tradición Llanera. Retrieved from [https://ceo.uniandes.edu.co/images/CPEO/PDFs/Ganadera\\_sostenible\\_en\\_la\\_Orinoquia\\_una\\_apuesta\\_por\\_salvar\\_una\\_tradicin\\_llanera\\_6.pdf](https://ceo.uniandes.edu.co/images/CPEO/PDFs/Ganadera_sostenible_en_la_Orinoquia_una_apuesta_por_salvar_una_tradicin_llanera_6.pdf).

<sup>217</sup> Ruden, A., Castro, J. P., Gutiérrez, J. F., Koenig, S., Sotelo, M., & Arango, J. (2020). GANSO: Nuevo modelo de negocios y de asistencia técnica para la profesionalización de la Ganadería Sostenible en la Orinoquía colombiana. Retrieved from [https://cgspace.cgiar.org/bitstream/handle/10568/110369/GANSO%20Info%20note\\_JLU.pdf?sequence=3&isAllowed=y](https://cgspace.cgiar.org/bitstream/handle/10568/110369/GANSO%20Info%20note_JLU.pdf?sequence=3&isAllowed=y).





third-highest potential in the country for AD activities, at 26.2%, second the Amazon Biome, with most of the potential concentrated in Meta and Vichada. AG mitigation activities account for 13.4% of the country's potential, concentrated in Vichada (13.1%), Meta (8.3%) and Casanare (4.8%). Vichada has the highest potential for AG in the entire country, followed closely only by Antioquia (12.4%) (see **Table 5**). Surprisingly, Orinoquía presents low potential for A/R practices, totaling 13.4%, except for Meta (8.4%) of the total percentage of the country. This stands in contrast to the comparatively higher number of A/R projects in the Orinoquía region, especially in Vichada.

**The Orinoquía biome can be divided into the Andean piedmont region and the flooded plains on one hand, and the Altilanura region on the other.** Both landscapes are characterized by extensive cattle ranching, however, they differ in their environmental composition, hydrology, altitude, population distribution, infrastructure, and land use dynamics.

## 1. The flooded plains and the Andean Piedmont region

**The socio-economic development of the Piedmont and the flooded plains has been driven by the recent expansion of the oil and gas sector, in addition to the traditional livestock sector.** The Piedmont has been the most transformed and affected landscape in Orinoquía, mostly due to the high concentration of human settlements, the cattle sector, oil and gas industry, and associated (planned and unplanned) road infrastructure in the region's flood plains. These developments threaten

native vegetation and put a strain on soil and water resources. In addition, the overuse of agrochemicals in areas of high flooding creates soil and water contamination, affecting natural habitats, and decreasing agricultural productivity.<sup>231</sup> There are also mining operations that use mercury to extract gold, coltan and diamonds, contaminating rivers and fish.

**The northeast of the Orinoquía biome – the Arauca and Casanare departments – harbor the flooded plains and Piedmont, the landscape at the Andean foothills.** The flooded plains north of the Meta River and occupy over 4,8 million ha, delimited by the Arauca River in the north and the Meta River in the south. The subregion occupies 12.5% of the Orinoco basin and has 20% of the region's population. Grasslands predominate and wetland ecosystems with high productivity of endemic species and seasonally flooded swampy areas in the middle basin of the Casanare River.<sup>232</sup> After the Cerrado of Brasil, the Colombian savannas, called the *Llanos Orientales*, constitute the second largest savanna system in South America. They are particularly relevant to Colombia as they contain a significant portion of the country's water resources and serve as biological corridors for migratory species. Flooded savannas are transition zones between forests, extensive riparian forests, and areas with extreme climates and little rainfall.<sup>233</sup> The most significant transformation of flooded plains occurred between 1987 and 2007 due to an increasing interest in oil palm, rice, and extensive livestock farming.<sup>234</sup> The mechanization of tillage causes soil compaction, and the introduction of fertilizers and agrochemicals has impacted soil water balance reducing infiltration and health.<sup>235</sup>

**The Piedmont subregion covers the northeastern parts of Arauca, Casanare, and some of Meta and is contiguous to the Andean corridor.** This sub-region consists of Andean and sub-Andean forests, although the predominant land composition is open grasses for livestock, mainly to the east of the department of Casanare and north of Arauca. This subregion is the most developed and hosts significant socio-economic activity around urban centers where infrastructure and public services are concentrated.<sup>236</sup>

**The largest sources of land GHG emissions in the northeastern parts of the Orinoquía region area come from land-based activities, followed by emissions related to the energy sector.** Casanare is responsible for 28% of the total emissions from Orinoquía, and Arauca is responsible for 10%. Land use activities in Casanare represent 62% of its emissions and represent 89% of emissions from Arauca. The high percentage of emissions coming from the energy sector in Casanare is attributed to the region's higher levels of economic activity in urban centers. Nonetheless, the cattle industry is still the primary source of land-based emissions.<sup>237</sup>

**Forest fires due to droughts and dry seasons have become more frequent in the past decade, especially during the dry months of January, February, and March.** In 2010, forest fires affected 22,056 ha in Arauca and 12,278 ha in Casanare, leading to significant forest cover loss.<sup>238</sup> There is a traditional practice of setting unproductive grasslands on fire during the dry season so that grass sprouts can provide better nutrition for livestock.

## Opportunities for carbon investments

**Mitigation opportunities exist in the introduction or the improvement of sustainable production practices in existing value chains, most notably in the livestock sector.** Carbon projects and programs in certain areas of the Piedmont can be structured around livestock intensification, and freed-up land could be used to plant suitable tree crops or restore the landscape. A shift in practices toward climate-smart beef production would include introducing tree crops and fodder trees, including commercial species that are compatible with the conditions of flooded plain conditions. Silvopastoral systems could contribute to soil health and biodiversity enhancement.<sup>239</sup> Such species could include *Tithonia diversifolia* and *Urochloa* grasses.<sup>240</sup> Silage and endemic pasture renewal could be a viable solution for improving the nutrition and productivity of cows and preventing cattle weight loss during the dry season. One example of an intervention for promoting sustainable cattle production is the GEF-funded Mainstreaming Sustainable Colombian Livestock project (see **Box 9**).

**To leverage existing infrastructure, interventions should concentrate on developing agroforestry and regenerative agriculture projects near urban areas where there is access to markets and services.** There is significant opportunity to collaborate with local communities to implement climate-smart business models and create sustainable supply chains for rice, cocoa and possibly suitable timber species. Agroforestry practices have the potential to improve and increase farm productivity and profitability, while also

<sup>231</sup> USAID. (2019).

<sup>232</sup> USAID. (2019).

<sup>233</sup> WWF. (2018). The 332,000 ha of the Cinaruco floodable grasslands in Colombia have been declared a new protected area. Retrieved August 5, 2022, from [https://wwf.panda.org/wwf\\_news/?332253/The332000hectaresoftheCinarucofloodablegrasslandsinColombiahaverebeen-eclaredanewprotectedarea](https://wwf.panda.org/wwf_news/?332253/The332000hectaresoftheCinarucofloodablegrasslandsinColombiahaverebeen-eclaredanewprotectedarea).

<sup>234</sup> Romero-Ruiz, M. H., Flantua, S. G. A., Tansey, K., & Berrio, J. C. (2012). Landscape transformations in savannas of northern South America: Land use/cover changes since 1987 in the Llanos Orientales of Colombia. *Applied Geography*, 32(2), 766–776.

<sup>235</sup> Romero-Ruiz, M.H. et. al (2012).

<sup>236</sup> USAID. (2019).

<sup>237</sup> CIAT & CORMACARENA. (2017). Plan Integral Regional de Cambio Climático para la Orinoquía ( No. CIAT publicación N. 438.) (No. CIAT publicación N. 438.). Retrieved August 5, 2022, from [https://issuu.com/juanpablomaringarcia/docs/evidencia\\_5.compressed](https://issuu.com/juanpablomaringarcia/docs/evidencia_5.compressed).

<sup>238</sup> Ospina Arango, O. L., Vanegas Pinzón, S., Escobar Niño, G. A., Ramírez, W., & Sánchez, J. J. (2015). Plan Nacional de Restauración Ecológica, Rehabilitación y Recuperación de Áreas Degradadas - PNR. Retrieved August 4, 2022, from <https://archivo.minambiente.gov.co/index.php/bosques-biodiversidad-y-servicios-ecosistematicos/gestion-en-biodiversidad/restauracion-ecologica/>.

<sup>239</sup> Zapata Cadavid A. & Silva Tapasco B.E. (2020). *Sistemas Silvopastoriles: Aspectos Teóricos y Prácticos* CARDER, CIPAV. Editorial CIPAV. Segunda edición. Cali, Colombia. Retrieved August 31, 2022, from <http://cipav.org.co/wp-content/uploads/2020/08/sistemas-silvopastoriles-aspectos-teoricos-y-practicos.pdf>

<sup>240</sup> Chará, J., Reyes, E., Otte J., & Arce. (2019). Silvopastoral Systems and their Contribution to Improved Resource Use and Sustainable Development Goals: Evidence from Latin America. Retrieved from <http://cipav.org.co/wp-content/uploads/2020/08/silvopastoral-systems-contribution-improved-resource-use-and-sustainable-development-goals.pdf>.

sequestering carbon and contributing to adaptation and mitigation in the context of climate change. Incorporated trees could be endemic or suitable commercial species, which could create an additional revenue stream while enhancing soil nutrient content, controlling erosion and enhancing carbon sequestration. However, when designing such projects environmental impact assessments are essential to limit the conversion of natural savannahs that are harbor of local biodiversity and correspond to the culture and history of local populations.

**Investment in forest fire management and prevention plans offers another mitigation opportunity.** Climate change is expected to lead to even hotter temperatures in dry months, endangering existing value chains. This creates an opportunity for carbon-credit-oriented forest management in the fire-prone areas of Arauca and Casanare where wildfires caused substantial losses to forest cover and value chains in recent decades. Implementing forest management plans and capacity building could be beneficial in the region and ensure the resilience of value chains and the permanence of potential carbon projects.

### Box 9: Mainstreaming Sustainable Cattle Ranching in Colombia

Since its launch in 2009 and closing date in 2020, the Mainstreaming Sustainable Cattle Ranching project has supported over 4,100 family farms in five distinct zones of Colombia, including the piedmont in the Meta department. The objective of the interventions was to promote the adoption of environment-friendly silvopastoral production systems for cattle ranching, improve natural resource management, enhance the provision of environmental services (biodiversity, land, carbon, and water), incentivized the use of PES schemes, and raise the productivity in participating farms.

Like shade-grown coffee, shade-grown cows are more productive and sustainable than cows raised in open fields: the shade lowers the animals' heat stress, producing less methane. At the same time, the diversified vegetation improves their diet and productivity. The Project demonstrated an increase in productivity (17% increase in milk production/ha) and profitability (production costs were USD 127/ha lower on average) while removing 1.13 MtCO<sub>2</sub>e in 2020 and avoiding 0.433 MtCO<sub>2</sub>e emissions from avoided deforestation. The piedmont in Meta experienced a 37% reduction in degraded lands, the most significant reduction of all the other regions. The Project was implemented by Colombia's Federation of Cattle Ranchers (FEDEGAN) in partnership with TNC, CIPAV, and Fondo Acción, with financial support from the GEF and the UK Government.

Source: World Bank. (2020). Mainstreaming Sustainable Cattle Ranching Implementation Completion Report Review.

## Barriers to carbon investments

**Farmers and investors may be reluctant to invest in untested business models.** Compared to business-as-usual livestock operations, a shift towards more sustainable practices may require comparatively high upfront and operational costs before the investments pay off. Farmers may be particularly reluctant to engage in practices without knowledge of historical performance data. Pilot projects (see **Box 9**) are essential reference cases. Technical assistance and communications should focus on highly motivated cattle ranchers and organizations, aiming for a clustered approach to scaling operations to landscape level.

**The design of carbon projects and programs requires a local presence and investment in capacities.** Opportunities for carbon investments depend on existing infrastructure to enable the development of carbon projects. Projects will need to rely on extension services, the aggregation of multiple farms, and investments that allows programs to move beyond their demonstration phase. Ideally, these investments will be supported by public policies and activities that nourish an enabling environment, e.g. through extension services, law enforcement, and support for forest restoration.

## 2. The Altillanura region

**The Altillanura is a region suitable for agricultural and forestry but is currently mainly consists of grassland and livestock production. It is an area of approximately 13.6 million ha,** extending through seven municipalities of Meta (Puerto Lopez, Puerto Gaitán, Mapiripán) and Vichada (Santa Rosalía, Cumaribo, La Primavera, Puerto Carreño). There is a network of human settlements around the Meta River, and economic activities associated with the palm and afforestation have proliferated in this region, with Vichada focusing on cashew and rubber crops.<sup>241</sup> This subregion is occupied by herbaceous vegetation and subject to intense droughts. Forest cover in the sub-region is made up of flooded and non-flooded gallery forests and small forest formations that grow in the middle of the savannahs, called *matas de monte*.<sup>242</sup>

**Although Meta and Vichada have similar ecological characteristics, their land use and socio-economic dynamics vary.** Meta is the wealthiest department in Orinoquía, responsible for producing 50% of oil and 73% of natural gas in Colombia.<sup>243</sup> Meta is also the most populated department in Orinoquía, with over one million inhabitants, of which only 1.3% are Indigenous peoples.<sup>244</sup> Most economic activity is concentrated in Meta's capital Villavicencio and the surrounding areas within the Puerto Gaitán and San Martín municipalities.

**By contrast, Vichada is characterized by low population density and one of the highest levels of poverty in the country.**<sup>245</sup> Of the department's population, 44% are Indigenous peoples (38,100).<sup>246</sup> Vichada, including its capital Puerto Carreño, lacks road infrastructure, mainly relying on transportation along the Meta river and infrequent flights for connectivity to the economic centers and major markets

<sup>241</sup> USAID. (2019).

<sup>242</sup> Translated into English as shrubs from the bush.

<sup>243</sup> USAID. (2019).

<sup>244</sup> Colombia Reports. (2019, June). Meta. Retrieved August 5, 2022, from <https://colombiareports.com/amp/meta-colombia/>.

<sup>245</sup> República de Colombia. (2020). Documento 4021: Política Nacional Para El Control De La Deforestación Y La Gestión Sostenible De Los Bosques, CONPES: Consejo Nacional de Política Económica y Social. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/4021.pdf>.

<sup>246</sup> USAID. (2019).

elsewhere in the country. In Vichada, south of the municipality of Puerto Carreño, the El Tuparro National Natural Park can be found, which comprises 40 indigenous reservations occupying 36% of the land area.<sup>247</sup>

**Meta contributes around 52% of the emission for the Orinoquía region, compared to Vichada, which is responsible for only 11%.** Land-sector emissions for Meta represent 85% and 99% for Vichada, led by deforestation activities, followed by the cattle sector.

## Opportunities for carbon investments

**Public investments can build and support a forestry sector in Vichada and Meta.** This could help to build a biobased economy that relieves pressure from forests. The Altillanura is an area with high potential for afforestation and commercial forestry projects. Most of the existing A/R projects are based in Vichada and Meta, which offer the opportunity to promote economically attractive restorative practices, as well as sustainable forest management activities. The Government has already established policies to increase commercial forest plantations, through plans like Plan Colombia Siembra, which aims to support a growing forestry sector. However, public subsidies continue to be necessary for making these projects attractive and competitive with investments in extractive industries. An example of a successful afforestation project in Vichada which includes commercial species such as *Eucalyptus* and *Acacia* is the Afforestation of Degraded Grasslands case, Vichada, further developed in **Box 11**. Additionally, TFCA (**Box 8**) has also promoted the use of native species, especially in Vichada.

### Box 10: Reforestation of Grazing Lands Hacienda El Manantial in Puerto Lopez, Meta

The A/R CDM project “Reforestation of Grazing Lands Hacienda El Manantial in Puerto Lopez, Colombia” is a sustainable reforestation project of 3,664 ha. The reforestation takes place on degraded former pasture lands with no or little former management inputs, typical for extensive grazing across four farms (El Jardin, El Manantial, El Manantial II and Maracaibo III).

Extensive grassland management for livestock ranching defines the baseline land-use. The project consists in setting up a long-term sustainable forestry plantation, applying native and exotic species, including *Eucalyptus*, *Acacia*, pines and rubber tree species while achieving Forest Stewardship Council (FSC) certification. The project has achieved 61,807 tCO<sub>2</sub>e removals from 2013 to 2020 and has contributed to job creation in the region. This is an example of a successful and sustainable A/R project in the region, as it illustrates how private investment has leveraged the Meta landscape and carbon finance for low-carbon restoration activities.

Source: CDM- UNFCCC Adaptation Fund. Reforestation of Grazing Lands Hacienda El Manantial in Puerto Lopez, Colombia.

**Carbon investments could support tree crops, such as cocoa, and rubber.** As in the Amazon biome, cocoa is an appealing agroforestry species for the Andean Allianura region as it has a low need for agrochemicals and can contribute to job creation in the region. Additionally, cocoa trees have high mitigation potential due to their high ability to remove and store carbon.<sup>248</sup> Another suitable species is the rubber tree, a native to the Amazon, which can help to restore soils, sequester carbon and also contribute to job creation. Vichada already sees an increasing number of afforestation and reforestation projects, especially in La Primavera. Cocoa or rubber plantations also qualify for CIF subsidies, which can help to reduce upfront costs. An example of a successful afforestation project that supports, among others, rubber trees is the project “Reforestation of Grazing Lands Hacienda El Manantial, Puerto Lopez”, further developed in **Box 10**.

**Carbon and climate investments could also support Indigenous forest management, governance, and empowerment.** Given the high number of *resguardos indígenas* (See **Figure 18**) in the Vichada region, there are opportunities to integrate Indigenous communities through participatory approaches in support of projects that support Indigenous livelihoods. Projects could provide technical assistance to deploy strategies such as aggregating lands to carry out climate-smart agricultural projects. While donor support may be necessary for these projects, carbon finance may provide additional revenue to support alternative livelihoods and build local capacities.

### Box 11: Afforestation of Degraded Grasslands, Vichada

Centered in municipalities of Puerto Carreño and La Primavera in Vichada, the project developed by Forest First Colombia SAS is based on changing the use of land from extensive cattle ranching, of low productivity and which use prescribed burns to encourage the regrowth of degraded grassland to sustainable forest production systems, based on good forestry practices. The grouped project encompassing 46 farms is a commercial afforestation project, which has planted *Eucalyptus* and *Acacia* timber species to produce wood chips and generate wood energy.

These impacts include the mitigation of climate change, regulation of water flows, expansion of habitat and conservation of the flora and fauna in the zone and the Orinoco region. By increasing forest cover and sequestration of carbon in their biomass, the project is estimated to contribute to removing 139,489 tCO<sub>2</sub> per year.

Source: Forest First Colombia (2021) Resumen Plan de Manejo Forestal.

<sup>247</sup> USAID. (2019).

<sup>248</sup> Andrade, H. J., Figueroa, J., & Silva. (2013). Almacenamiento de Carbono en Cacaotales (*Theobroma cacao*) En Armero-Guayabal. *Scientia Agroalimentaria*, 1. Retrieved from <http://infocafes.com/portal/wp-content/uploads/2017/02/RIUT-LI-spa-2013-Almacenamiento-de-carbono-en-cacaotales-Theobroma-cacao-en-Armero-Guayabal-Tolima-Colombia.pdf>.

## Barriers to carbon investments

**Challenges include aggregating lands for projects and the impact of historical and current land tenure conflicts.** In 1994, Law 160 which created the Agrarian Reform System, established Family Agricultural Units (*unidades agrícolas familiares*, UAFs) which grant access to unclaimed and unused public lands (*baldíos*) to farmers. The UAFs vary according to municipalities and their size depends on the production potential of the land granted. In the Altillanura, due to the low productivity of the soils and limited infrastructure, a much larger area is considered necessary for production and UAFs awarded fall between 1,800 and 3,000 ha (compared to the average 450 ha in the rest of the country). By law, UAFs can only be transferred from one small farmer to the other, to avoid land being accumulated by third parties.

**Plans to develop large-scale agriculture in the Altillanura and a potential inflow of private capital for land acquisition has caused speculation.** This has resulted in a significant increase in the price of land. The lack of institutional capacity to protect property rights of smallholders and Indigenous communities, state land adjudication processes, and a rapid appreciation of land prices, have led to tenure conflicts which could present a challenge when developing carbon projects.

**The remoteness of certain areas, especially in Vichada, creates several barriers to economic development, such as labor shortages, insufficient infrastructure, and limited access to electricity and materials.** But to make Vichada and Meta leading producers of sustainable forest products, infrastructure is needed which can lower costs and facilitate

connections between remote producers and markets, which can also help to attract private investors. Resources and costs for services, transport and goods are high compared to the rest of the country. Although plans to connect the region with the Pacific coast via railway were announced in 2020, it may take years before such connection is established.<sup>249</sup> As Vichada borders Venezuela and Brazil, it has also become a strategic corridor for outgoing traffic of legal and illegal products (ie. drugs, arms, supplies, food, fuel and persons).

**Agricultural projects need significant resource inputs due to poor soil conditions in these regions.** The agricultural potential of the Altillanura clay soils is constrained by problems of high acidity, low organic matter and nutrients, and increased drainage, which contributes to runoff. Additionally, the soil is prone to high compaction and erosion, which accelerates its physical degradation.<sup>250</sup> Suitable activities should be deployed which are compatible with the type of soil. This includes the conservation of natural savannah where it is a hotspot of biodiversity.

**Across the Orinoquía region, the oil and gas industries have a vested interest in Meta and Vichada, which in turn can offer higher wages to local populations.** Puerto Gaitan has become an important hub for oil and gas extraction.<sup>251</sup> One of the largest oil fields in Colombia is in the Casanare Piedmont, Caño Limón, east of Arauca. These sectors offer higher-paying job opportunities, attract local labor and public interest. In general, oil exploitation and mining opportunities have caused the depopulation of rural areas and migration of local populations to urban centers near oil and gas exploration and production sites, in the process generating a shift away from traditional livelihoods.<sup>252</sup>

<sup>249</sup> Ardila Arias, N. (2020). Megaobras viales que se empezarían a construir en el Meta. El Tiempo. Retrieved from <https://www.eltiempo.com/colombia/otras-ciudades/megaobras-viales-que-se-empezarian-a-construir-en-el-meta-459556>.

<sup>250</sup> Delgado-Huertas, H., Rangel, J. A., & Silva-Parra, A. (2018). Caracterización de la fertilidad química de los suelos en sistemas productivos de la altillanura plana, Meta, Colombia. *Revista Luna Azul*, (46), 54-69.

<sup>251</sup> Aumenta la producción de petróleo en la Orinoquia. (2019, May 28). El Tiempo. Retrieved August 5, 2022, from <https://www.eltiempo.com/colombia/otras-ciudades/produccion-de-petroleo-en-la-orinoquia-367970>.

<sup>252</sup> Oxfam. (2013). Divide and Purchase: How land ownership is being concentrated in Colombia. Retrieved from <https://oxfamilibrary.openrepository.com/bitstream/handle/10546/302323/rr-divide-and-purchase-land-concentration-colombia-211013-en.pdf;jsessionid=6A0782B97376FC0BCEA344E98613DB55?sequence=5>.



## Assessing opportunities in Colombia's eco-regions: The Caribbean biome



Figure 20: Political and administrative division in the Colombian Caribbean biome.<sup>253</sup>



**The Caribbean region in the north of Colombia covers a terrestrial area of 132.244 km<sup>2</sup>, accounting for almost 12% of the country's surface.<sup>254</sup>** This region comprises island territories, continental plains, as well as higher altitudes in the Sierra Nevada de Santa Marta and lower highlands such as Perijá and Micolones. Furthermore, the delta of the Magdalena River adds marshlands (*ciénagas*)

and estuarine ecosystems. The political administration of the region is covered by eight departments: Atlántico, Bolívar, Cesar, Sucre, Córdoba, Magdalena, La Guajira and the islands of San Andrés and Providencia. The main capital port cities are Cartagena, Santa Marta, and Barranquilla.

**The Caribbean biome harbors tropical dry forests, mangrove forests, marshlands, and coastal marine ecosystems.** It is also home to seven National Parks, two Forest Reserves, and other protected areas. The Sierra Nevada de Santa Marta Natural Park occupies approximately 3,830 km<sup>2</sup>; and is the world's most elevated coastal mountain formation, with peaks of 5,774 meters. Because of its variety of ecosystems, topography, natural wealth and beauty, and historical and cultural wealth, it was declared Biosphere Reserve by UNESCO in 1979. The area of the park overlaps with the indigenous reservations of Kogui-Malayo-Arhuaco, Arhuaco de la Sierra, and Kankuamo.<sup>255</sup> Other terrestrial and marine protected areas include the Rosario and San Bernardo Coral reefs, Tayrona National Natural Park, Old Providence McBean Lagoon, and Los Flamencos Fauna and Flora Sanctuary. There are also areas with unique biological features, such as the Macuira National Natural Park designated as an Important Bird and Biodiversity Area by Birdlife International and Los Colorados Flora and Fauna Sanctuary containing one of the best-preserved relict dry forests in the region. The region is also characterized by marshlands -in particular, the estuary of the Magdalena River that forms Santa Marta marshlands (*Ciénaga Grande de Santa Marta*)- that are regulated by river flows and important habitats and ecosystems. The region hosts 82% of the marshlands of the country, and a quarter of all water-covered areas of the country.<sup>256</sup>

<sup>253</sup> Reproduced by Climate Focus with data from Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>.

<sup>254</sup> Mesa, L. M., Santamaría, M., García, H., & Aguilar-Cano, J. (Series Ed.). (2016). Catálogo de la biodiversidad para la Región Caribe / editado por Lina María Mesa, Marcela Santamaría, Hernando García y José Aguilar-Cano; , volumen 3 -- Bogotá: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt; Ecopetrol S.A., 2016.

<sup>255</sup> Mesa, L. M., Santamaría, M., García, H., & Aguilar-Cano, J. (Series Ed.). (2016). Catálogo de la biodiversidad para la Región Caribe / editado por Lina María Mesa, Marcela Santamaría, Hernando García y José Aguilar-Cano; , volumen 3 -- Bogotá: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt; Ecopetrol S.A., 2016.; El Parque Nacional Natural Sierra Nevada de Santa Marta - Ubicación geográfica. (n.d.). Retrieved August 17, 2022, from <https://www.parquesnacionales.gov.co/portal/es/ecoturismo/parques/region-caribe/parque-nacional-natural-sierra-nevada-de-santa-marta-2/como-llegar/>.

<sup>256</sup> Mesa, L. M., et. al. (2016).

**The economy of the Caribbean region is diverse, and the region is comparatively wealthy.** The region's GDP, at USD 27,726, per capita, is more than five times the national average.<sup>257</sup> The economy depends on tourism, services, manufacturing, logistics and shipping, agriculture and mining. Mining, mostly coal, represents around 13% of the regional GDP. Livestock, which is the predominant land-use activity in the region, extends over half of the total territory, but contributes only 3.7% of the regional GDP; conversely, agricultural activity contributes 3.8% of the regional GDP, but occupies only 6% of the territory.<sup>258</sup> Cattle ranching activities in the Caribbean biome are mostly linked with wealthy landowners with large farm operations, yet the region continues to see high rural poverty rates.<sup>259 260</sup> The main agricultural crops are bananas, palm oil, mango, yuca, and rice.

**The Caribbean region is a highly fragmented landscape, vulnerable to desertification.**

Lower areas exhibit a mosaic structure constituted by grasslands and agricultural areas in combination with floodplains. Forest cover is also fragmented, with dense areas in the Sierra Nevada de Santa Marta and the southern part of the department of Bolívar. In general, the region is under extreme pressure due to the expansion of agriculture – as well as other potential activities (mining, oil and gas, and infrastructure), which continuously threaten remaining terrestrial and marine ecosystems. Seven out of eight departments of the Caribbean biome are undergoing erosion (soft to moderate), with severe erosion indicators seen in Magdalena, Cesar, and La Guajira.<sup>261</sup>

<sup>257</sup> Ministerio de Comercio. (2022). Información: Perfiles Económicos Regionales. Retrieved from <https://www.mincit.gov.co/CMSPages/GetFile.aspx?guid=cd8fcb6a-24cf-4524-9687-49e88b910134>.

<sup>258</sup> García, H., & González-M., R. (Eds.). (2019). Bosque seco Colombia: biodiversidad y gestión. Retrieved from <http://repository.humboldt.org.co/handle/20.500.11761/35427>.

<sup>259</sup> Pobreza multidimensional [DANE: Información Para Todos]. (n.d.). Retrieved August 4, 2022, from <https://www.dane.gov.co/index.php/estadisticas-por-tema/pobreza-y-condiciones-de-vida/pobreza-multidimensional>.

<sup>260</sup> Necesidades básicas insatisfechas (NBI). (n.d.). DANE - Información Para Todos. Retrieved August 4, 2022, from <https://www.dane.gov.co/index.php/estadisticas-por-tema/pobreza-y-condiciones-de-vida/necesidades-basicas-insatisfechas-nbi>.

<sup>261</sup> IDEAM. (2012). Mapa de Zonificación de los suelos por grado de erosión. Retrieved from <http://www.ideam.gov.co/documents/10182/512114/Erosion+de+los+Suelos+en+Colombia+Linea+Base+Periodo+2010-2011.pdf/06439b90-366d-4a5e-adae-8e1b53f13243?version=1.0>.

**According to our analysis, the Caribbean biome represents the third-lowest carbon market potential for all mitigation activities in Colombia, totaling 16.8%.** The biome mostly scores low across AD activities, which account for 9.5% of the total, A/R, for 4.7%, and agriculture for 11.7%. Nonetheless, the region still offers the second highest mitigation potential for A/R projects in the country. Currently, there are 14 mitigation projects implemented in the region, mainly A/R activities, found in Córdoba. Córdoba has the highest A/R potential within the region, at 6.3%. Relevant project examples include the "Grouped Project for Restoration of Degraded Lands in Jaguar Corridors" (**Box 12**) and a blue carbon project, implemented by CI in the Morrosquillo Gulf (Córdoba and Sucre) (**Box 13**).

**The Sierra Nevada de Santa Marta offers opportunities to carbon investors to support Indigenous communities that act as stewards of unique mountain ecosystems.**

The Sierra Nevada is an ecological island surrounded by dry tropical forests. What is left of the tropical forests in lower altitudes is fragmented and largely degraded. The tropical forest gives way to cloud forests and paramos in higher altitudes. The national parks of the Sierra Nevada de Santa Marta and Tayrona cover some of the area, which in its entirety forms part of the Indigenous territories of the Kogui, Arhuaco and Arhuaco. Considering the prevailing ecosystem pressures, the Sierra Nevada provides opportunities to strengthen the ability of Indigenous communities to protect remaining forests and restore forest ecosystems.

In the following section we provide further detail on tropical dry forests and wetland ecosystems, which provide significant carbon investment potentials.

## Box 12: Grouped Project for the Restoration of Degraded Lands in Jaguar Corridors

The “Project for the Restoration of Degraded Lands in Jaguar Corridors” covers an area of 4,320 ha in the departments of Córdoba and Santander. The project’s aim is to recover lands degraded due to livestock by promoting alternative practices, such as timber plantations, agroforestry systems, and assisted natural regeneration. Throughout its lifetime, the project will sequester almost 200,000 tCO<sub>2</sub>e. The project is expected to provide employment opportunities in an area historically affected by violence and poverty, and promote the regeneration of natural biodiversity habitats, such as jaguar corridors.

The Tierralta I project, located in an area known as El Loro (Córdoba), close to the Paramillo National Park, encompasses 675 ha of an agroecosystem that includes crops and livestock, as well as natural ecosystems of humid, sub-Andean, and gallery forests. This project reforests degraded areas caused by unsustainable livestock practices. It contributes to the recovery of approximately 200 ha of native timber species. Land recuperation is focused on commercial reforestation and enrichment with *Ceiba tolúa* (*Pachira quinata*), and agroforestry systems with cocoa and abarco. The forest enrichment and assisted regeneration improve the forest connectivity in the buffer zone of the National Park.

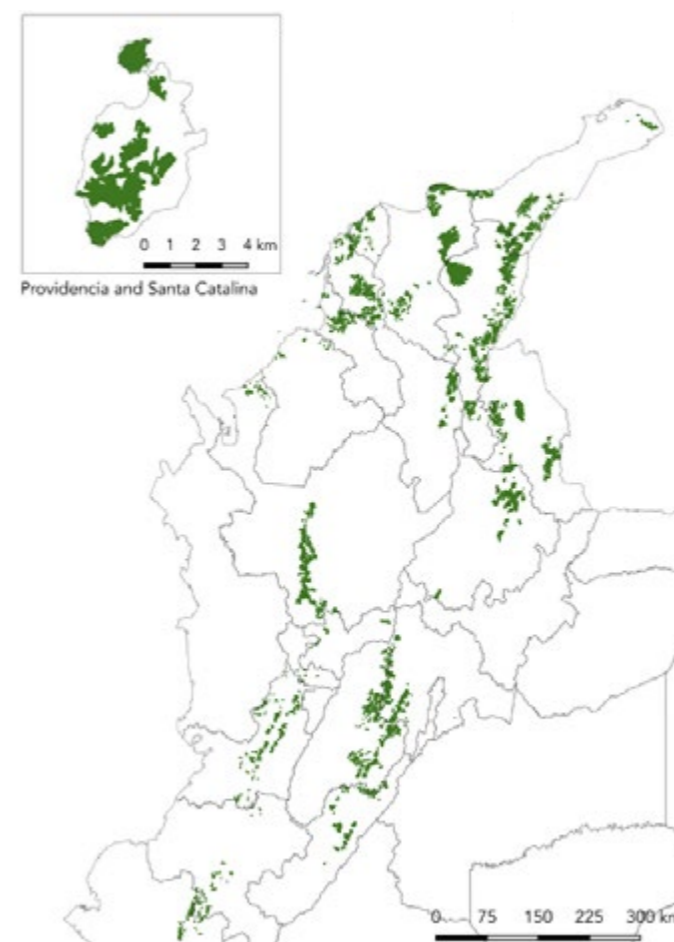
Source: Verra. (2019). Project 1769: Grouped Project for Restoration of Degraded Lands in Jaguar Corridors, Colombia P. VCS.

# 1. Tropical dry forests

Caribbean dry forests are one of the most, if not the most degraded ecosystems of Colombia.<sup>262</sup> Almost half of the country’s remaining dry forests can be found in the Caribbean biome, in the departments of La Guajira, Magdalena, Cesar, Atlántico, Sucre, Córdoba y Bolívar.<sup>263</sup> Dry forests can be found between zero and 1,000 m above sea level, where rainfall ranges between 700 and 2,000 mm per year. These ecosystems are home to 60 types of mammals, most of them endangered species, including the Titi Cabeciblanco.<sup>264</sup> They also host 6% of the country’s amphibian diversity and over 2,500 types of plants.

Of the nine million ha suitable for hosting dry forests, only 8% of the original natural cover forest remains.<sup>265</sup> (Figure 21) Livestock, extensive agricultural activities, logging, mining, and infrastructure have all driven land conversion in the Caribbean biome. Dry forests burn easily and, without great effort, can be converted into crops and pastures. Former forest areas are now being used mainly for cattle ranching (accounting for 65% of deforested areas). Colombian dry forests are highly fragmented and poorly connected – the majority of the remaining forest can be found in patches of less than 500 ha. Due to the variation in soil, climate conditions, and the varying anthropogenic pressures on them, tropical forests exist at various successional stages: no-forest, early, intermediate, and late (based on their physiognomy and structural data).<sup>266</sup> Dry forests in the Caribbean biome are currently in a critical condition: 52.4% of the area is in an early stage of degradation.<sup>267</sup>

Figure 21: Tropical Dry Forests in the Caribbean biome.<sup>268</sup>



The Government of Colombia has adopted several policies to protect dry forests, but many have yet to be implemented. Overall, deforestation and degradation of the region’s ecosystem remain high. The Integral Management Program for Dry Forests (2020-2030) (*Programa Nacional Para La Conservación Y Restauración Del Bosque Seco Tropical En Colombia*, PNCBST) proposes an action plan with targets, actions, indicators and responsible parties.<sup>269</sup> The dry forests are also included in the PNGIBSE.

## Opportunities for carbon investments

Projects can help to enhance biological corridors and the connectivity between forest relicts and protected areas in the region. Considering the fragmentation of remaining forest ecosystems, restoring forests that connect remaining forest patches is essential. At a landscape level, these production systems can be combined with forest conservation and restoration (riparian forests, secondary forests) of degraded areas.<sup>270</sup> Projects such as United Nations Development Programme’s (UNDP) the “Sustainable Use and Conservation of Biodiversity of Dry Ecosystems,” funded by the GEF, hold important lessons. The project aimed to reduce deforestation and desertification of dry ecosystems by establishing protected areas, promoting the implementation of REDD+ pilot projects, and encouraging sustainable land management in the Caribbean region and the Inter-Andean Valley of the Magdalena river. By 2019, the UNDP-implemented project identified 31,9 million ha of dry forest for conservation located Civil Society Private Reserves, Complementary Conservation Strategies, Conservation Corridors and Regional Protected Areas.<sup>271</sup> Even though the project has not been developed as carbon project, it claims to have reduced 1,066,550,7 tCO<sub>2</sub>e emissions since it began in 2014.

Rehabilitation of degraded areas through restoration, silvopastoral systems, and forest conservation can generate multiple benefits. The highly transformed and degraded soils of the Caribbean biome can be regenerated into more productive areas through rehabilitation processes. Silvopastoral practices can improve

<sup>262</sup> Márquez, G. (2001). De la abundancia a la escasez: la transformación de ecosistemas en Colombia. Retrieved from [http://documentacion.ideam.gov.co/openbiblio/bvirtual/019812/abund\\_escasez.pdf](http://documentacion.ideam.gov.co/openbiblio/bvirtual/019812/abund_escasez.pdf).

<sup>263</sup> García Martínez, H., González-M., R., de Investigación y monitoreo del bosque seco tropical en Colombia (Red BST-Col), R., Pizano, C., López, R., Jurado, R. D., et al. (2019). Bosque seco Colombia: biodiversidad y gestión. Retrieved from <http://repository.humboldt.org.co/handle/20.500.11761/35427>.

<sup>264</sup> García Martínez, H. et al. (2019).

<sup>265</sup> García Martínez, H. et al. (2019).

<sup>266</sup> González-M, R., et al. (2018). Disentangling the environmental heterogeneity, floristic distinctiveness and current threats of tropical dry forests in Colombia. *Environmental Research Letters*, 13(4), 045007.

<sup>267</sup> García Martínez, H. et al. (2019).

<sup>268</sup> Reproduced by Climate Focus with data from Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. (2014). *Bosques secos tropicales en Colombia*. Retrieved August 31, 2022, from <http://www.humboldt.org.co/en/research/projects/developing-projects/item/158-bosques-secos-tropicales-en-colombia>. Ministerio de Ambiente y Desarrollo Sostenible. (2020). Programa nacional para la conservación y restauración del bosque seco tropical en Colombia. Plan de Acción 2020-2030. Retrieved from [https://archivo.minambiente.gov.co/images/BosquesBiodiversidadyServiciosEcosistemicos/pdf/Zonas-Secas/PROGRAMA\\_BOSQUE\\_SECO\\_TROPICAL\\_EN\\_COLOMBIA.pdf](https://archivo.minambiente.gov.co/images/BosquesBiodiversidadyServiciosEcosistemicos/pdf/Zonas-Secas/PROGRAMA_BOSQUE_SECO_TROPICAL_EN_COLOMBIA.pdf). García Martínez, H. et al. (2019).

<sup>269</sup> MADS (2020) Programa Nacional Para La Conservación Y Restauración Del Bosque Seco Tropical En Colombia. Retrieved from [https://archivo.minambiente.gov.co/images/BosquesBiodiversidadyServiciosEcosistemicos/pdf/Zonas-Secas/PROGRAMA\\_BOSQUE\\_SECO\\_TROPICAL\\_EN\\_COLOMBIA.pdf](https://archivo.minambiente.gov.co/images/BosquesBiodiversidadyServiciosEcosistemicos/pdf/Zonas-Secas/PROGRAMA_BOSQUE_SECO_TROPICAL_EN_COLOMBIA.pdf)

<sup>270</sup> Bermúdez W., L. (2012). Mesa Ambiental Guajira - SIRAP Caribe Sistemas Regionales y Locales de Áreas Protegidas. Retrieved from [https://guajira360.org/wp-content/uploads/2018/09/SIRAP\\_Caribe\\_-\\_Sistemas\\_Regionales\\_y\\_Locales\\_de\\_areas\\_Protegidas.pdf](https://guajira360.org/wp-content/uploads/2018/09/SIRAP_Caribe_-_Sistemas_Regionales_y_Locales_de_areas_Protegidas.pdf).

<sup>271</sup> GEF (N/A) Conservation and Sustainable Use of Biodiversity in Dry Ecosystems to Guarantee the Flow of Ecosystem Services and to Mitigate the Processes of Deforestation and Desertification. Retrieved from <https://www.thegef.org/projects-operations/projects/4772>

degraded soils and increase productivity (see **Box 9**). Investments should integrate alternatives that can help to improve local livelihoods; for example, projects can improve the technical skills of local community members by providing technical capacity building in the principles and practices of silvopastoral systems and regenerative agriculture, as well as in forest restoration and conservation. In addition, capacity building in farm management of crops with better market (and income) potential can be part of a local capacity-building strategy; this might include the crops casava, rice, cashews, and fruits (avocado, citrus, pineapple, mango, and coconut). The implementation of plant nurseries is another important activity, which can also be an additional source of employment.

## Barriers to carbon investments

**Effective implementation of silvopastoral systems is hindered by a range of technical, financial, and cultural barriers.** Silvopastoral systems need to be adapted to specific local conditions and require technical characteristics that demand specialized knowledge, thus investing in technical extension services for implementation purposes is essential. At the same time, cattle ranching is traditionally seen as a low-investment activity (excluding the cost of land), and as such there are cultural and financial barriers preventing the implementation of new management strategies and avenues for initial investment. Initiatives such as the GEF's Mainstreaming Sustainable Cattle Ranching Project (**Box 9**) provide implementation models that could be replicated.

<sup>272</sup> Martínez M.C., 2022. Los bosques secos tropicales de Colombia In: Colombia: País de bosques. Editores: Manuel Rodríguez Becerra y María Fernanda Valdés Valencia. Foro Nacional Ambiental. Alpha Editorial.

<sup>273</sup> García, H., Corzo, G., Isaacs-Cubides, P. J., & Etter, A. (2014). Distribución y estado actual de los remanentes del bioma de Bosque Seco Tropical en Colombia: insumos para su gestión. Retrieved from [https://www.researchgate.net/publication/265964227\\_Distribucion\\_y\\_estado\\_actual\\_de\\_los\\_remanentes\\_del\\_bioma\\_de\\_Bosque\\_Seco\\_Tropical\\_en\\_Colombia\\_insumos\\_para\\_su\\_gestion](https://www.researchgate.net/publication/265964227_Distribucion_y_estado_actual_de_los_remanentes_del_bioma_de_Bosque_Seco_Tropical_en_Colombia_insumos_para_su_gestion).

<sup>274</sup> García, H., et. al. (2014).

<sup>275</sup> IDEAM, INVEMAR, IIAP e IAvH. (2016). Informe del Estado del Ambiente y de los Recursos Naturales Renovables 2016. Retrieved from <https://www.andi.com.co/Uploads/Informe%20del%20estado%20del%20ambiente%20y%20los%20recursos%20naturales%20renovables..pdf>.

<sup>276</sup> Villegas Editores. (n.d.). Distribución de los manglares en Colombia | Capítulo del libro Manglares. Retrieved August 26, 2022, from <https://villegaseditores.com/manglares-distribucion-de-los-manglares-en-colombia>.

<sup>277</sup> Villalba Malaver, J. (2006). Los manglares en el mundo y en Colombia: estudio descriptivo básico. Retrieved from [https://www.researchgate.net/publication/336767657\\_Los\\_manglares\\_en\\_el\\_mundo\\_y\\_en\\_Colombia\\_estudio\\_descriptivo\\_basico](https://www.researchgate.net/publication/336767657_Los_manglares_en_el_mundo_y_en_Colombia_estudio_descriptivo_basico).

### Restoration processes in tropical dry forest areas are slow and resource intensive.

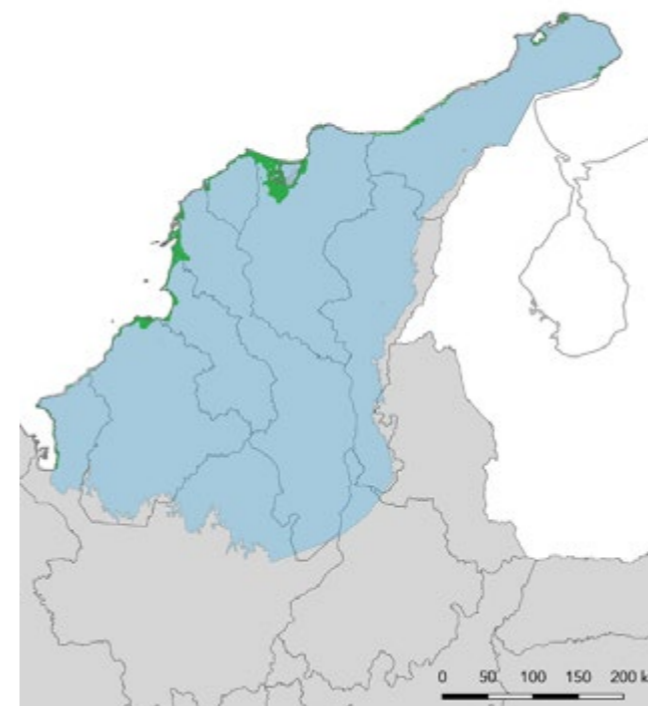
Regeneration processes in dry forests are much slower than in tropical humid forests. A dry forest takes on average 85 years to recover 83% of the biomass above ground and soil and can take 80 years to recover only around 50% of its biomass (compared to an undisturbed forest).<sup>272</sup> Therefore, passive restoration models in dry forests take longer to reach economically attractive biomass growth compared to other ecosystem types in Colombia. The soil in dry forest areas is susceptible to intensive uses. For instance, 27% of areas under desertification in Colombia are in former dry forests lands where more than 65% of transformed soils are under desertification (as of 2014).<sup>273</sup> In some cases, desertification in dry forest lands can be irreversible as soils can easily lose their productive qualities, making it difficult to undergo restorative processes.<sup>274</sup>

## 2. Mangroves in the Caribbean biome

### The Caribbean biome contains 62,245 ha of the 294,636 ha of mangroves in Colombia.<sup>275</sup>

The most relevant mangrove areas are found on the Providencia Island, in the Ciénaga Grande de Santa Marta, the Canal del Dique, the Barbacoas bay and the mouth of the Sinú river and the Rosario and San Bernardo Coral reefs.<sup>276</sup> In terms of areas hosting mangroves, the departments in order of size are Magdalena, Sucre, Córdoba, Bolívar, La Guajira and Atlántico.<sup>277</sup>

Figure 22: Mangroves in the Caribbean biome.<sup>278</sup>



**Mangroves differ in composition, structure and type of ecosystem services they provide.**<sup>279</sup> They are classified into deltaic, estuarine, lagoonal, and open coast mangroves.<sup>280</sup> Coast mangroves buffer the effects of rainfall and tide dynamics and protect beaches from erosion. Fishing and collection of crustaceans and mollusks, extraction of timber, firewood, and medicinal plants, are some of the common activities facilitated by mangrove ecosystems. In the last 50 to 70 years, mangroves in the Caribbean biome have endured the significant adverse impacts of timber extraction, illegal logging, unsustainable fishing practices, and pollution.<sup>281</sup>

<sup>278</sup> Reproduced by Climate Focus based on data from Caribbean Marine Atlas. (2019). Bosque de manglar, Colombia. Retrieved August 31, 2022, from [https://www.caribbeanmarineatlas.net/layers/geonode:tm\\_col\\_manglar1#more](https://www.caribbeanmarineatlas.net/layers/geonode:tm_col_manglar1#more). IDEAM, IAvH, IIAP, INVEMAR, SINCHI. (2010). Parte 4: Informe del Estado Del Medio Ambiente y Los Recursos Naturales Renovables. Retrieved from <http://documentacion.ideam.gov.co/openbiblio/bvirtual/022166/PARTE4.pdf>.

<sup>279</sup> Mancera, J. E. (2022). Bosques de Manglar. In M. Rodríguez Becerra & M. F. Valdés Valencia (Series Ed.), Foro Nacional Ambiental. Friedrich Ebert Stiftung En Colombia. Colombia: País de bosques. Editores: Manuel Rodríguez Becerra.

<sup>280</sup> Worthington, T. A., zu Ermgassen, P. S. E., Friess, D. A., Krauss, K. W., Lovelock, C. E., Thorley, J., et al. (2020). A global biophysical typology of mangroves and its relevance for ecosystem structure and deforestation. *Scientific Reports*, 10(1), 14652.

<sup>281</sup> Abarca, S. C., Serrano, M. C., Bolívar-Anillo, H. J., Daza, D. A. V., Moreno, H. S., & Anuso, G. (2020). Bosques de manglar del Caribe Norte Colombiano: Análisis, evolución y herramientas de gestión. *Revista Latinoamericana de Recursos Naturales*, 16(1), 31–54.

<sup>282</sup> MinAmbiente. (2021). Anexo 1. Términos de referencia para la formulación, complementación o actualización de los estudios de caracterización, diagnóstico y zonificación del manglar. Retrieved from <https://www.minambiente.gov.co/wp-content/uploads/2021/10/Anexo-1.-Terminos-de-referencia-para-la-formulacion-estudios.pdf>.

<sup>283</sup> MinAmbiente. (2021). Anexo 3. Términos de referencia para los estudios de rezonificación de áreas de manglar en el marco del desarrollo de proyectos de utilidad pública, interés nacional y estratégico o interés social. Retrieved from <https://www.minambiente.gov.co/wp-content/uploads/2021/10/anexo-3-TDR-estudios-rezonificacion-areas-de-manglar.pdf>.

**Other impacts relate to infrastructure development, inadequate hydraulic works in coastal areas (e.g. relating to groins), the expansion of human settlements, and unsustainable economic practices upstream.** For example, in the past century, the Ciénaga Grande de Santa Marta and Salamanca Island were affected by the construction of roads and embankments for expanding cattle ranching in flooding areas; these interventions modified the salt/freshwater ratio, causing hyper salinization of waters and massive mangrove loss. In the department of Atlántico, mangroves have been affected by water contamination due to waste from Barranquilla city and accumulated contamination from the Magdalena River. Cases such as the Canal del Dique demonstrate the impacts of unsustainable practices upstream. For example, the intensive use of agrochemicals and overexploitation of lands has caused siltation and contamination, and subsequently ecosystem degradation and the loss of biodiversity. Other factors affecting mangroves are associated with environmental conditions and extreme climate events; for example, in La Guajira, intense solar exposure and water deficits limited vegetation growth and caused massive mortality to mangroves ecosystems.

**Colombia has made progress in the development of legislation and guidelines for mangrove conservation and restoration projects.** In 2002, the Government of Colombia released the National Program for the Sustainable Use, Management, and Conservation of Mangrove Ecosystems. In 2018, this was updated with Resolution 1263 which presented additional information on mangrove diagnosis,<sup>282</sup> land-use planning studies,<sup>283</sup> a portfolio of potential areas of restoration of

mangroves,<sup>284</sup> sustainable resource use in mangrove areas,<sup>285</sup> and mangrove restoration<sup>286</sup> guidelines as well as mangrove monitoring.<sup>287</sup> The Government has made progress in zoning 290,700 ha of mangroves in the country. It has formulated management plans for more than a third of the mangroves, and new areas have been declared under national (*El Corchal el Mono Hernández* Flora and Fauna Sanctuary, in Sucre and Bolívar), regional (Regional District of Integrated Management Gulf of Tribugá-Cabo Corrientes, in Chocó) and local (*Bazán-Bocana* Special Natural Reserve, in Buenaventura) protected figures. The MADS has also led the restoration of more than 2,500 ha of degraded mangroves, engaging to local communities that have been involved and have been able to obtain new sources of income. However, the restoration of larger mangrove areas remains outstanding.

### Box 13: *Vida Manglar* project in Gulf of Morrosquillo

A the first “blue carbon” project of its kind, “*Vida Manglar*” has been implemented in the Gulf of Morrosquillo covering 7,561 ha, with the intention of promoting mangrove conservation, generating employment, and reducing GHG emissions. In partnership with communities in the departments of Córdoba and Sucre, the project aims to avoid 939,296 tCO<sub>2</sub>e over the next 30 years. “*Vida Manglar*” is the result of a the collaborations between the Government of Colombia, regional

environmental authorities, the Institute for Marine and Coastal Research *Instituto de Investigaciones Marinas y Costeras*, INVEMAR), *Fundación Omacha*, and CI.

The project seeks to implement strategic activities including adequate anagement of the mangroves in the area, generation of institutional capacities, strengthening of local governance, and the creation of communication and dissemination channels. The project is also supported by enabling activities such as the propagation of vegetative material, capacity building, maintenance of mangrove channels, property characterization, the establishment of conservation agreements with farmers, and the strengthening of business plans for community production projects (ecotourism, meliponiculture and community gardens).

Progress indicates that so far 12,000 inhabitants have benefited from the ecosystem services provided by these mangroves, and 435 families have benefited from the incentive programs and capacity building for sustainable alternative economic activities. Between 2015 and 2018, the project reported 69,027 tons of CO<sub>2</sub>e avoided emissions as well as improvements in adaptation and resilience to effects of climate change (river and marine floodings, coastal erosion).<sup>288</sup>

## Opportunities for carbon investments

**Mangroves offer opportunities for ‘blue carbon projects’ as they remove and store significant amounts of carbon for long periods.** Several investigations have quantified the mangroves’ potential for capturing carbon and shown that it could be up to five times higher than that of tropical forests. Investments need to address the deforestation and degradation of mangroves (planned and unplanned) together with forest management practices. Mangroves are subject to a variety of illegal uses, such as logging. At the same time, they are also formally recognized as productive ecosystems (Resolution No. 1263). Projects can, in line with existing policies, combine conservation with compatible economic use of mangroves. INVEMAR’s website on “Priorities for mangrove restoration” serves as useful tool for investment projects to identify potential areas of intervention.<sup>289</sup> In the map provided, areas for conservation are differentiated from areas for restoration. Areas of mangrove restoration are also considered potential areas for projects of environmental compensation according to the “Manual for compensations”, published in 2018. INVEMAR also developed the Information System for Mangrove Management in Colombia (*Sistema de Informacion para la Gestión de Manglares*, SIGMA) as a tool for promoting knowledge and research in mangroves ecosystems and, at the same time, a practical tool for decision-making processes oriented to promote the sustainable use and conservation of mangroves in Colombia.<sup>290</sup>

**Projects should also consider afforestation, reforestation and revegetation activities which can recover degraded mangroves and restore the ecosystem services they provide**

**to support the social, cultural, and economic development of coastal communities.** These services include the provision of fuelwood and biodiversity for fishing activities. Mangrove conservation can prevent coastal erosion and mitigate the impacts of extreme weather events. The characteristics of mangroves (aerial roots and associated biota) dissipate wave energy, facilitating sediment deposition and retention. In Colombia, the Ecosystem-based Risk Reduction approach identifies mangroves as one of the four key ecosystems for preventing hazards such as storms, tsunamis, cyclones, floods and mass land movements.<sup>291</sup> In the Regional District of Integrated Management of the Bay of Cispatá, La Balsa and Tinajoes, the rehabilitation of more than 6,000 ha is expected to maintain water connectivity and therefore serve as a barrier against storms and windstorms, prevent coastal erosion, provide food services and operate as a carbon reservoir, at the same time. For a example of a blue carbon project see **Box 13**.

## Barriers to carbon market investments

**Conservation and restoration of mangrove ecosystems requires detailed and careful planning.** Mangroves are fragile ecosystems that are extremely sensitive to changes in their physical environmental, anthropogenic processes, and climate change. Project activities may alter the ecosystem’s composition, biodiversity, and the geomorphological setting of mangroves.<sup>292</sup><sup>293</sup> Projects must be carefully planned and executed to preserve the ecological and ecosystem functions of mangroves. Recent studies have found that

<sup>284</sup> Gómez-Cubillos, C., Licero, L., Perdomo, L., & Rodríguez. (2015). Portafolio: Áreas de arrecifes de coral, pastos marinos, playas de arena y manglares con potencial de restauración en Colombia.

<sup>285</sup> MinAmbiente. (2021). Anexo 2. Términos de referencia para la formulación de los lineamientos de manejo integral para las unidades de uso sostenible del sistema socioecológico de manglar. Retrieved from <https://www.minambiente.gov.co/wp-content/uploads/2021/10/Anexo-2.-TDR-formulacion-lineamientos-sistema-socioecologico-manglar.pdf>.

<sup>286</sup> MinAmbiente. (2021). Anexo 4. Guía de restauración de ecosistemas de manglar en Colombia. Retrieved from <https://www.minambiente.gov.co/wp-content/uploads/2021/10/Anexo-4.-Guia-de-restauracion-de-ecosistemas-de-manglar-en-Colombia.pdf>.

<sup>287</sup> MinAmbiente. (2021). Anexo 5. Lineamientos nacionales para el monitoreo del manglar en Colombia. Retrieved from <https://www.minambiente.gov.co/wp-content/uploads/2021/10/Anexo-5.-Lineamientos-nacionales-para-el-monitoreo-del-manglar-en-Colombia.pdf>.

<sup>288</sup> *Vida Manglar*. (n.d.). Proyecto y Lineas Estrategicas. Retrieved August 5, 2022, from [https://www.vidamanglar.co/indexEn.html#lineas\\_estrategicas](https://www.vidamanglar.co/indexEn.html#lineas_estrategicas).

<sup>289</sup> INVEMAR. (2020). Mapa de prioridades de restauración de manglar. Insumo técnico para la meta de 180 millones de árboles sembrados en Colombia. Retrieved August 26, 2022, from <https://storymaps.arcgis.com/stories/128c2a7258d74383a47617b313079829>.

<sup>290</sup> Invemar. (n.d.). El Sistema de Información para la Gestión de los Manglares en Colombia (SIGMA). Retrieved August 5, 2022, from <http://sigma.invemar.org.co/inicio>.

<sup>291</sup> Nieto M., O., & MinAmbiente. (2021). Enfoque de Reducción de Riesgo de Desastre basado en Ecosistemas - Eco RDD - Aproximación conceptual y metodológica para su implementación en Colombia. Retrieved from [https://www.minambiente.gov.co/wp-content/uploads/2021/12/DOC-Conceptual\\_metodologicoEco-RRD\\_2021\\_comp.pdf](https://www.minambiente.gov.co/wp-content/uploads/2021/12/DOC-Conceptual_metodologicoEco-RRD_2021_comp.pdf).

<sup>292</sup> Wang, Y.-S., & Gu, J.-D. (2021). Ecological responses, adaptation and mechanisms of mangrove wetland ecosystem to global climate change and anthropogenic activities. *International Biodeterioration & Biodegradation*, 162, 105248.

<sup>293</sup> Ward, R. D., Friess, D. A., Day, R. H., & MacKenzie, R. A. (2016). Impacts of climate change on mangrove ecosystems: a region by region overview. *Ecosystem Health and Sustainability*, 2(4), e01211.



the mangroves are particularly sensitive to changes in sea level and increases in sediment supply.<sup>294</sup> As such, it is important to establish long-term monitoring of projects which can allow continuous assessment of evolving climate change impacts and can provide an information basis for strategic management decisions.

**Public management of coastal areas, including mangrove forests, is missing.** The absence of a clear coastal policy makes it difficult to align investments with public policies and creates investment risks. In the absence of national action on coastal management, a number regional environmental authorities have taken action, but overall uncertainties on the role and priorities of the public sector prevail.



## Assessing opportunities in Colombia's eco-regions: The Pacific biome



<sup>294</sup> Ellison, J. C. (2015). Vulnerability assessment of mangroves to climate change and sea-level rise impacts. *Wetlands Ecology and Management*, 23(2), 115–137.

Figure 23: Political and administrative division in the Colombian Pacific biome.<sup>295</sup>



**The Pacific biome covers 8.4 million ha, spanning from the northern part of Ecuador to the border with Panama.**<sup>296</sup> The region has a vast diversity of ecosystems including mangrove forest, marshlands, high-land forests and tropical rainforests. These forests are among the most diverse areas in the world and host over 5,400 species of plants, 192 of mammals, 778 of birds, 188 of reptiles, 139 of amphibians and 196 of fish.<sup>297</sup> It is also a region with high levels of plant and animal endemism and includes ten biological corridors.<sup>298</sup> Due to its rich biodiversity, Colombia's Pacific biome is one of the world's 17 priority sites for conservation. The region has over 2.4 million ha in 78 protected areas, including nine national natural parks, two fauna and flora sanctuaries and 14 forest reserves.<sup>299</sup> The region is also the source of 70% of Colombia's fresh water supply.<sup>300</sup>

**Around two million people live in the Pacific region, 80% in afro-descendant communities and 12% in Indigenous communities.**<sup>301</sup> Major urban centers include Buenaventura, Tumaco, Quibdó and Guapi.<sup>302</sup> Almost half of the territory is community owned by afro-descendant and almost a fifth owned by Indigenous communities, e.g. the Embera, Waunan, Tule and Awa communities.<sup>303</sup>

**The Pacific region – a remnant of the colonial legacy - has historically been neglected by the national Government.** The presence of institutions and provision of public services is very low compared with the national average. During the Spanish reign, the Pacific region delivered much of the gold to the colonial

<sup>295</sup> Reproduced by Climate Focus with data from Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>.

<sup>296</sup> Pacífico: de las regiones más biodiversas. (n.d.). Retrieved July 5, 2022, from [https://www.wwf.org.co/\\_donde\\_trabajamos\\_/pacifico/](https://www.wwf.org.co/_donde_trabajamos_/pacifico/).

<sup>297</sup> Pacífico: de las regiones más biodiversas. (n.d.).

<sup>298</sup> Torres, M. G. (2018). Caracterización de las cadenas de valor de los productos forestales no maderables en el Chocó biogeográfico. Retrieved July 5, 2022, from [https://wwflac.awsassets.panda.org/downloads/caracterizacion\\_de\\_las\\_cadenas\\_de\\_valor\\_de\\_los\\_productos\\_forestales\\_no\\_maderables\\_en\\_el\\_.pdf](https://wwflac.awsassets.panda.org/downloads/caracterizacion_de_las_cadenas_de_valor_de_los_productos_forestales_no_maderables_en_el_.pdf).

<sup>299</sup> MinAmbiente, & IIAP. (2016). Visión Pacífico. Retrieved from [https://siatpc.co/wp-content/uploads/vision\\_pacifico.pdf](https://siatpc.co/wp-content/uploads/vision_pacifico.pdf).

<sup>300</sup> Pacífico colombiano | Pontificia Universidad Javeriana, Cali. (n.d.). Retrieved July 5, 2022, from <https://www2.javerianacali.edu.co/cuenca/pacifico-colombiano>.

<sup>301</sup> Comisión de la Verdad. (n.d.). Pacífico. Retrieved July 5, 2022, from <https://web.comisiondelaverdad.co/en-los-territorios/despliegue-territorial/pacifico>.

<sup>302</sup> Comisión de la Verdad. (n.d.).

<sup>303</sup> Torres Torres, M. G. (2018).

power and mining continued to be a relevant economic activity in the region. Later, fugitive slaves built their own communities in Colombia's Pacific region and kept the Government at bay. This colonial legacy has impacted the effectiveness and scope of governmental institutions, which transcends to present times. Today, the Pacific region remains poor, with poverty levels significantly higher than the national average.<sup>304</sup> For instance, in 2015, the national Multidimensional Poverty Index (MPI) for the region was 23%; compared to 55% for the department of Chocó for the same year.<sup>305</sup>

**The region's economy is based on the extraction of natural resources, particularly minerals such as gold and silver.** Figure 24 highlights the areas of the region where legal mining occurs. However, the extractive industry does not translate into high levels of employment and regional development. The Pacific region is also characterized by high levels of illegal mining. Out of the 83,620 ha where there is alluvial gold exploitation, 39% takes place in Chocó, followed by Antioquia at 36%.<sup>306</sup> Gold mining is one of the main sources of income for armed groups and local communities in municipalities such as Iscuandé and Barbacoas Nariño; Timbiquí and Guapi in Cauca and the south of Chocó.<sup>307</sup> Mining is also a leading cause of social and environmental problems, including deforestation. High prices for gold and limited Government action against illegal mining mean that the extraction of minerals continues to threaten ecosystem and local communities.

<sup>304</sup> Torres Torres, M. G. (2018).

<sup>305</sup> Torres Torres, M. G. (2018).

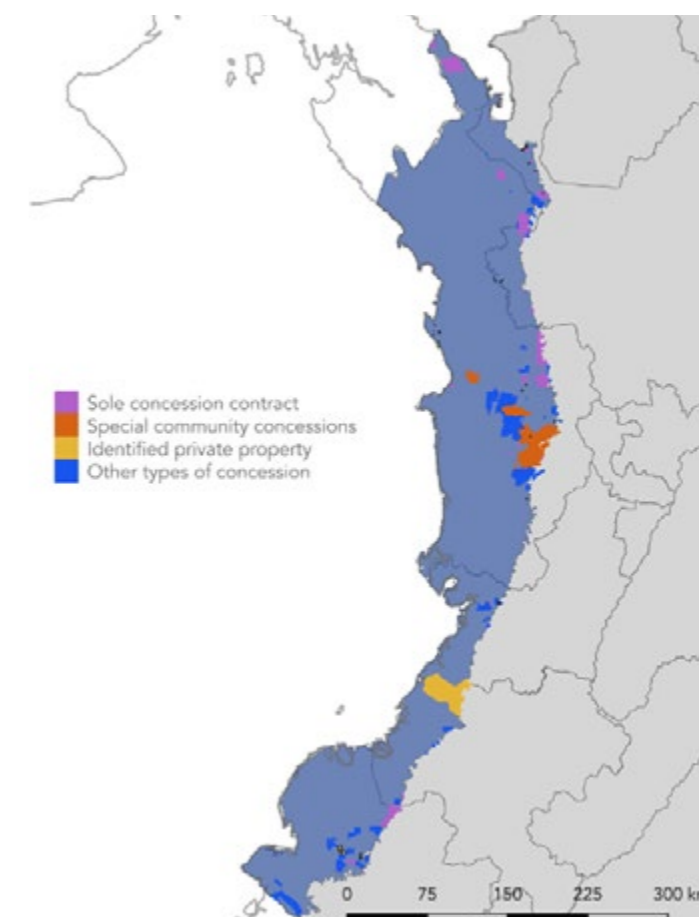
<sup>306</sup> United Nations Office on Drugs and Crime, & Gobierno de Colombia. (2016). Alluvial Gold Exploitation: Evidences from remote sensing 2016 and May 2018. Retrieved July 29, 2022, from [https://www.unodc.org/documents/publications/Evoa\\_2016\\_in\\_1.pdf](https://www.unodc.org/documents/publications/Evoa_2016_in_1.pdf).

<sup>307</sup> International Crisis Group. (2019). Tranquilizar el Pacífico tormentoso: violencia y gobernanza en la costa de Colombia. Informe sobre América Latina No.76, 55.

<sup>308</sup> Reproduced by Climate Focus based on data from Global Forest Watch. (n.d.). "Mining concessions." Retrieved from [www.globalforestwatch.org](http://www.globalforestwatch.org). Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Departamentos y municipios: Datos Abiertos. Retrieved September 1, 2022, from <https://www.datos.gov.co/Mapas-Nacionales/Departamentos-y-municipios-de-Colombia/xdk5-pm3f>. Ángel, J., Ordoñez, M., Olivero, J., & WWF-Colombia. (2019). Consideraciones sobre la minería en el departamento del Chocó y recomendaciones para mejorar la gestión. Retrieved from [https://wwflac.awsassets.panda.org/downloads/consideraciones\\_sobre\\_la\\_mineria\\_en\\_el\\_departamento\\_del\\_choco\\_doble\\_pagina.pdf](https://wwflac.awsassets.panda.org/downloads/consideraciones_sobre_la_mineria_en_el_departamento_del_choco_doble_pagina.pdf).

<sup>309</sup> La Silla Vacía. (2022, June 3). La violencia urbana en la región Pacífica: diagnóstico y recomendaciones. La Silla Vacía - Últimas noticias

Figure 24: Areas of existing mining titles, requests, and environmental licenses in the Pacific biome.<sup>308</sup>



**Drug cartels and illegal armed groups have taken advantage of the region's geographic position.** The fluvial system, which is the main connector of the region, is the main route for drug exportation. Control over the region is of essential strategic relevance for armed groups and drug cartels alike and fighting over the territory has transformed the region into the country's most violent area. Armed groups fight over the production and importation of cocaine in Tumaco and Buenaventura, and illegal wood and gold extraction in Quibdó.<sup>309</sup>

The southern parts also have one of the country's highest coca cultivation areas. In 2018, Nariño was the department with the highest area of coca crops in Colombia.<sup>310</sup> In 2014, the Pacific region accounted for 38% of the total ha planted with illegal crops in the country.<sup>311</sup> Illicit crops as well as policies to eradicate such crops (e.g. through the use of pesticides for the eradication of coca are a driver of deforestation,) degrading the land and adversely affecting the food security of rural communities.

**The Pacific biome has nearly 290.000 ha of mangroves, which amounts to 80% of the total amount of mangroves in the country.**<sup>312</sup>

Due to its humid weather and precipitation levels of over 8.000 mm/year, the region offers ideal conditions for this type of ecosystem.<sup>313</sup> Mangroves in Nariño can be up to 55 meters tall, whereas in the Caribbean, trees are not taller than 10 meters. The coastal region from the Mira river in Nariño to the delta of the Dagua river in Valle del Cauca hosts the largest mangrove extension in the region. About 75% of the Pacific coast has mangroves that extend through up to 30 meters inland.<sup>314</sup> Mangroves protect coastal areas from storms, prevent erosion and are home of a wide diversity of plants and animals. Mangroves also provide a source of income for many rural communities in the region that extract highly valuable timber and take advantage of the mangrove's rich fish banks.

Figure 25: Mangroves in the Pacific Biome.<sup>315</sup>



**Although these ecosystems were heavily cleared since 1960s for timber and shrimp farming among other practices, at present, mangroves in the region are generally well preserved.**<sup>316</sup> In the department of Nariño where 117,458 ha of mangroves are located, illegal mining and wood extraction occurs in nearby ecosystems, but generally spares mangrove forests.<sup>317</sup> Mangroves in the region retain their unique structure and occupy large areas of continuous coastline. Most of the

mangroves are located near the river deltas, land that is not suited for agriculture, making where the establishment of crops is very difficult.<sup>318</sup>

**The low-land forests account for 42% of the forest cover of the region.**<sup>319</sup> The moist tropical forests of the Pacific biome are located along the length of the Colombian Pacific coast, south-east Panama and northwestern Ecuador.<sup>320</sup> Approximately 5.3 million ha of forests comprise this ecosystem, accounting for around 9% of the total forest cover of the country.<sup>321</sup> Around 4.000 ha are dry forests, located mainly in the department of Valle del Cauca. Most of the dry forest cover has been transformed, endangering endemic fauna and flora. High-land forests can be found, in municipalities such as Carmen de Atrato, Tadó, Buenaventura and high lands of the Darien Mountain range. Cloud forests can be found in the Paraguas mountain range, in Chocó and Valle del Cauca.<sup>322</sup>

**Deforestation rates in the region are among the lowest in the country (7%), concentrated in four main hotspots: Pacific-north, Cauca, Nariño, and Pacific-south.**<sup>323</sup> The low-land forests account for 42% of the forest cover of the region, mainly tropical rainforests, located between 0 and 1000 meters above sea level.<sup>324</sup> Between 2019 and 2020, the region saw a reduction in deforestation from 14,120 ha in 2019 to 12,261 ha in 2020; however, forest cover loss remains significant.<sup>325</sup> Illegal gold mining has driven degradation of over 30,000 ha of land in the region, mainly in the municipalities of Nóvita, Istmina and Condoto in Chocó and San Pablo in Nariño.

**Other economic activities such as cattle ranching and agriculture are less prevalent than in other regions of Colombia.** The high precipitation levels and low levels of soil fertility of the region make agriculture difficult.<sup>326</sup> Nonetheless, cattle ranching and agriculture are still important drivers of deforestation and degradation in the Pacific biome.<sup>327</sup> Forests are threatened by illegal gold mining, logging, illicit crops as well as agriculture more generally. Cattle ranching also remains a relevant driver, as is illegal logging, mainly in the road Cali-Buenaventura and the municipalities of Tumaco and Urabá.

**According to our analysis, the Pacific biome has the lowest carbon market potential among of all regions in Colombia.** In comparison with the other biomes, the Pacific scores low across all categories, presenting only 8.4% of the country's AD opportunities, 4.7% for A/R, and 3.3% for agriculture. Despite this, 15% of existing projects in the country are implemented in this region, with 17 AD projects and 1 A/R project. Despite its notable low AD potential of 2.6%, Chocó hosts 11 AD projects, making it the Colombian department with the highest number of voluntary carbon market projects.

**Eight of the AD projects implemented in Chocó are collectively referred to as the BioREDD+ project, located in Chocó, which were validated with the support of the USAID's Connected Landscape Program and Paramos and Bosques Program, Fondo Colombia Sostenible's Community REDD+ Portfolio and Fondo Acción.**<sup>328</sup> The projects could be successfully implemented with

locales y nacionales. Retrieved July 5, 2022, from <https://www.lasillavacia.com/historias/historias-silla-llena/la-violencia-urbana-en-la-region-pacifica-diagnostico-y-recomendaciones/>.

<sup>310</sup> International Crisis Group. (2019).

<sup>311</sup> MinAmbiente, & IIAP. (2016). Visión Pacífico. Retrieved from [https://siatpc.co/wp-content/uploads/vision\\_pacifico.pdf](https://siatpc.co/wp-content/uploads/vision_pacifico.pdf).

<sup>312</sup> INVEMAR. (2015). Areas de arrecifes de coral, pastos marinos, playas de arena y manglares con potencial de restauración en Colombia. Retrieved July 5, 2022, from <https://alfresco.invemar.org.co/share/s/YBMyJDhXST62SLJ-0jxNOQ>.

<sup>313</sup> Recent studies by NASA seem to think that abundant water is one of the main reasons for the height of the mangroves in the area. El Espectador. (2020, August 12). En Colombia están los manglares más altos y conservados de América. Retrieved from <https://www.elespectador.com/ambiente/en-colombia-estan-los-manglares-mas-altos-y-conservados-de-america-articulo/>.

<sup>314</sup> MinAmbiente, & IIAP. (2016).

<sup>315</sup> Reproduced by Climate Focus with data from Gobierno de Colombia, & Ministerio de Tecnologías de la Información y las Comunicaciones. (n.d.). Ecosistemas, biomas, bioclima: Datos Abiertos. Retrieved from <https://www.datos.gov.co/dataset/Ecosistemas-biomas-bioclima/nhvp-5xxk>. Caribbean Marine Atlas. (2019). Bosque de manglar, Colombia. Retrieved August 31, 2022, from [https://www.caribbeanmarineatlas.net/layers/geonode:tm\\_col\\_manglar1#more](https://www.caribbeanmarineatlas.net/layers/geonode:tm_col_manglar1#more).

<sup>316</sup> Gutiérrez, A. E. (2019, December). Manglares y Migración. ArcGIS StoryMaps. Retrieved September 1, 2022, from <https://storymaps.arcgis.com/stories/e02248544584465fb9faf074b6a43ca0>.

<sup>317</sup> Tavera Escobar, H. A., & Ministerio de Ambiente, Vivienda y Desarrollo Territorial. (2014). Plan General de Manejo Integral de los Ecosistemas de Manglares en el departamento de Nariño. Retrieved from [https://d2ouvy59p0dg6k.cloudfront.net/downloads/manglares\\_final\\_web.pdf](https://d2ouvy59p0dg6k.cloudfront.net/downloads/manglares_final_web.pdf).

<sup>318</sup> Tavera Escobar, H. A., & Ministerio de Ambiente, Vivienda y Desarrollo Territorial. (2014).

<sup>319</sup> MinAmbiente, & IIAP. (2016).

<sup>320</sup> Ecological Carbon Offsets Partners. (2015). Bajo Calima y Bahía Málaga REDD+ Project Summary. Verra. Retrieved August 18, 2022, from <https://registry.verra.org/app/projectDetail/VCS/1395>.

<sup>321</sup> MinAmbiente, & IIAP. (2016).

<sup>322</sup> MinAmbiente, & IIAP. (2016).

<sup>323</sup> IDEAM. (2021). Resultados del Monitoreo de la Deforestación: Año 2020 y Primer Trimestre 2021. Retrieved from [http://www.ideam.gov.co/documents/10182/113437783/Presentacion\\_Deforestacion2020\\_SMBByC-IDEAM.pdf/8ea7473e-3393-4942-8b75-88967ac12a19](http://www.ideam.gov.co/documents/10182/113437783/Presentacion_Deforestacion2020_SMBByC-IDEAM.pdf/8ea7473e-3393-4942-8b75-88967ac12a19).

<sup>324</sup> MinAmbiente, & IIAP. (2016). MinAmbiente, & IIAP. (2016). Visión Pacífico. Retrieved from [https://siatpc.co/wp-content/uploads/vision\\_pacifico.pdf](https://siatpc.co/wp-content/uploads/vision_pacifico.pdf).

<sup>325</sup> IDEAM. (2021).

<sup>326</sup> Torres Torres, M. G. (2018).

<sup>327</sup> Grupo de Investigación: Conocimiento, Manejo y Conservación de los Ecosistemas del Chocó Biogeográfico. (n.d.). Estructura Ecológica Principal de la Región del Chocó Biogeográfico. Retrieved July 5, 2022, from [http://181.225.72.78/archivosSIAC/recursosSiac/img/SIAC/Documentos\\_pdf/ESTRUCTURA\\_ECOLOGICA\\_PRINCIPAL\\_DE\\_LA\\_REGION\\_DEL\\_CHOCO\\_BIOGEOGRAFICO.pdf](http://181.225.72.78/archivosSIAC/recursosSiac/img/SIAC/Documentos_pdf/ESTRUCTURA_ECOLOGICA_PRINCIPAL_DE_LA_REGION_DEL_CHOCO_BIOGEOGRAFICO.pdf).

<sup>328</sup> Fondo Acción. (2020). REDD+ Corredor de conservación Chocó-Darién. Retrieved September 1, 2022, from <https://fondoaccion.org/2020/10/16/redd-corredor-de-conservacion-choco-darien/>; Climate Community Biodiversity Alliance (CCBA). (2014). Bajo Calima y Bahía Málaga (BC-BM) REDD+ Project. Retrieved September 1, 2022, from <https://www.climate-standards.org/2014/10/14/bajo-calima->

continued public support, which amounted to USD 17.9 million. The projects overall protect approximately 700,000 ha in the Colombian Pacific region, and were individually developed in cooperation with the local communities.<sup>329</sup>

## Carbon market opportunities

**Colombia's Pacific region offers the opportunity to combine conservation with the development of a forest-based economy.**

Forests in the region present opportunities for the sustainable extraction of non-timber products such as resins, latex, oils, fibers and seeds, as well as PES for activities supporting deforestation's halting. Around 220 non-timber products can be found in Pacific forests for medicinal, food, handcrafts, ornamental, toxic, religious, fuel, coloring and latex production purposes.<sup>331</sup> There are opportunities to support forest products such as açai palm, achiote, turmeric, peach palm (*chontaduro*) and cocoa with high commercial value.<sup>332</sup> Supporting the development of these value chains with a focus on sustainability, agroforestry, and climate-smart agriculture practices, is a way to halt illegal activities such as mining, wood extraction and agriculture that are deforesting the natural forests. These activities can also support the crop displacement program of the Colombian Government.

**Due to security and violence-related risks, public sector support is often essential.**

Lessons learned from the USAID and Fondo Acción's Community REDD+ Portfolio projects in Chocó indicate that a blended finance approach can enhance social and environmental benefits; as well as create profitable projects. Projects will still depend on public support, but could build on the BioREDD model projects and expand the concept beyond current program boundaries. Public and international cooperation funding could create an enabling environment for local communities to benefit from carbon markets. (See **Box 14**)

### Box 14: REDD+ Community Portfolio in Chocó<sup>330</sup>

As the BioREDD+ program came to an end in 2015, the eight projects that had kicked off under the initiative continued their activities with the support from Fondo Acción USAID, Fondo Colombia Sostenible, Inter-American Development Bank (IDB), Norway, Sweden and the UK's Partnership for Forests (P4F). The collective group of projects have since independently registered in the RENARE and are led by representatives of from nineteen Afro-Colombian Community Councils and one Indigenous Senior Council in the Colombian Biogeographic Chocó, numbering 9 projects by 2022.

These REDD+ projects have protected over 710,000 ha, benefited over 500 families, contributed to biodiversity and ecosystems conservation. The projects are all certified by VCS and the Climate, Community and Biodiversity (CCB). The REDD+ Community Portfolio projects have collectively avoided over 7 MtCO<sub>2</sub>e. The project has since trained over 4,857 locals in governance issues, strengthened local value chains by encouraging the sustainable productions of açai, cocoa and coconut, and the uptake of sustainable fishing practices.

Source: Fondo Acción. REDD+ Community Portfolio.

## Barriers to carbon investments

**There is little need for reforestation activities in the region, as well as low rates of deforestation.** Around 79% of ecosystems have not been transformed, and the dynamics of the territory have helped to conserve forests.<sup>333</sup> According to a study from the Humboldt Institute, the region has low reforestation priorities, meaning that A/R projects might not be viable in the region. This aligns with the results of our analysis, where the Pacific scores low mitigation potential for A/R activities compared to other biomes, as mentioned above. While the region offers limited carbon finance opportunities, as a high-integrity forest region, it is well-positioned to benefit from conservation payments that reward the climate, biodiversity and water services provided by the region.

**High levels of violence and insecurity are prevalent in some areas the Pacific region.**

The Pacific region is the main exporting region of illegal drugs to other countries, which has transforming large parts of the territory into a war zone for illegal groups who fight over its control. For instance, by March 2021 the average rate of homicides in the four departments was 255.<sup>334</sup> These levels of violence mean that the development of mitigation activities is often dangerous.

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# Conclusions and recommendations

**Carbon markets provide an opportunity for Colombia to channel finance into sustainable land use.** Carbon markets have grown significantly over the last two years, driven by companies relying on these markets to offset a portion of their emissions to achieve their mitigation targets. Colombia's longstanding support for carbon markets makes the country a favorite place for investors and carbon market developers.

**However, before Colombia's carbon market potential can be realized, Government agencies and investors must collaborate to overcome several investment barriers.** Violence and conflict, a deficiency of correctly implemented policies and enforced laws, as well as understaffed and underfunded institutions, make investments in many parts of the country a risky prospect. It is therefore essential that public and private actors collaborate to strengthen the enabling environment and mitigate these risks so that markets can mobilize funding to support significant GHG reductions and removals in the land sector.

**Acceptance of carbon investments among the local population will require integrating support for increased productivity in farm systems and resilience of rural livelihoods.** Carbon projects and programs can facilitate a transition to sustainable land use. However, efforts to reduce GHG emissions or enhance GHG removals alone will often not sufficiently garner political will, ensure local support, and mobilize longer-term finance. Taking this into account, this report seeks to identify carbon opportunities in the various biomes that can yield human and environmental benefits. Since carbon models fail to account for the complexity of local investment contexts, the analysis of biome-specific investment opportunities helps to acknowledge these nuances and put the findings of the team's modelling effort into context.

**Conservation and reducing deforestation depend, among others factors, on increasing productivity and efficiency in the agricultural sector.** Agriculture, in particular cattle ranching, is the most significant driver of deforestation in Colombia. Consequently, efforts to reduce deforestation depends on securing the

protection of forests through enhancing the enforcement of conservation mandates and strengthening Indigenous rights to efforts to improve rural farm operations and livelihoods.

**A/R projects can help to build a timber sector in Colombia.** A forest and timber sector that operates and manages forests sustainably can help to remove pressure from natural forests while supplying markets with timber products. Many smaller areas allow for silvopastoral or mixed farming systems that include tree planting. In addition, the Orinoquia region holds the potential for more extensive timber plantations. The areas for such plantations should be chosen carefully considering the ecosystem value of natural savannahs and local tree species.

**Projects that strengthen the rights of Indigenous communities would help reward the sustainable stewardship of forests by Indigenous peoples.** Such projects should be facilitated by NGOs and other established intermediaries that are trusted partners of communities. While such projects are likely to yield relatively few GHG emission reductions and removals per area, they could cover large areas of community-managed forest. These projects would also help to protect Colombia's high-integrity forests over the long term.

**The realization of Colombia's carbon investment potential depends on coordinated efforts by Government entities and private investors.** NGOs often play an important role in implementing carbon projects and ensuring fair participation of local communities. Stabilizing the volatile status of frontier communities depends on implementing benefit-sharing provisions with investors as much as it depends on clarifying weak land titles and ensuring safe and peaceful rural livelihoods. This cannot be achieved without Government support. Private investors can reward these efforts by investing in carbon projects that promote climate-smart agricultural or forestry activities.

**The commitment to the Peace Agreement by the Government of President Petro provides an opportunity to address some of the underlying investment barriers in rural Colombia.** The 2016 Peace Agreement

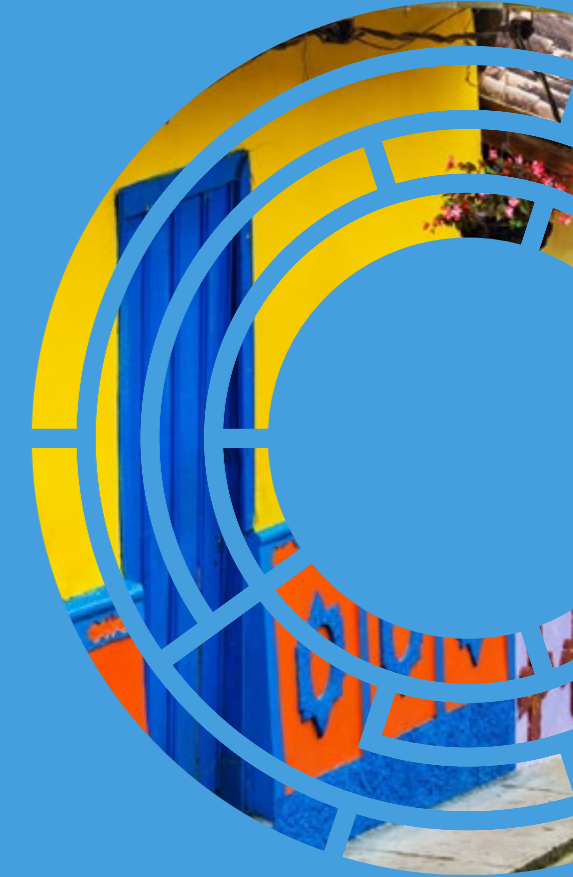
addressed many of the structural problems that have plagued rural Colombia for decades and formulated strategies to address them. However, the implementation of the Agreement is lagging and the previous Government's support for the process was lukewarm at best. The long-due implementation of measures that allocate and distribute titles to land and substitute illicit with regular crops will help to address structural investment barriers in many regions of the country. The Government must design Integral Crop Substitution Plans and engage in land reform. These activities can benefit from catalytic carbon finance.

**Clarification of pending carbon market rules, such as the "nesting" of projects in jurisdictional reference levels, by the Government, would help to attract financing.**

The Government is engaged in several results-based payment programs for REDD+. It is not clear whether and how private sector-driven carbon market projects can be implemented in these areas. A commitment to "nesting" projects into jurisdictional programs and the adoption of implementation rules would help to unlock finance for AD projects.

Climate Focus is an independent expert in international and national climate law, policies, project design and finance. We have been pioneering carbon markets ever since their inception. We aim to find a creative and unique solution for every single client, ranging from the development of policies to protect the rainforest to structuring greenhouse gas mitigation projects in the energy sector. Our advice is rooted in a profound knowledge of climate change policies, emission trading schemes and project development.

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