

Reference No.: EMO-MNL-2021-E-004

**DATE** : September 21, 2021

**FOR** : **ENGR. WILLIAM P. CUÑADO**  
Director  
**ENVIRONMENTAL MANAGEMENT BUREAU**  
DENR Compound, Visayas Ave.,  
Diliman, Quezon City

Attention: **ENGR. ESPERANZA A. SAJUL**  
Chief, Environmental Impact Assessment and Management Division

**FROM** : **BENJAMIN ARMAND A. TANSINGCO**  
VP-Environmental Management

**SUBJECT** : **Report on the 2020 Flora Monitoring Report of the HPP Project Site**

Dear Director Cuñado:

We are submitting herewith to your office the “Flora Assessment of Hydrometallurgical Processing Site” for the Year 2020 in compliance to the EMoP of the December 2018 Environmental Performance Report and Management Plan (EPRMP) of Coral Bay Nickel Corporation. The field investigation for this study was conducted last October 28-30, 2020 by Petrosphere Incorporated led by Dr. Rodolfo O. Abalus and Dr. Ramon M. Docto.

We shall take note of the recommendations made by the assessment team on the monitoring report and will make our best effort to implement those that are possible for our company to undertake.

Thank you very much.

Very truly yours,



**BENJAMIN ARMAND A. TANSINGCO**  
VP- Environmental Management

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*Palawan Council for Sustainable Development*

# FLORA ASSESSMENT OF HYDROMETALLURGICAL PROCESSING PROJECT SITE

DECEMBER 2020



Coral Bay  
Nickel Corporation

RIO TUBA, BATARAZA, PALAWAN



# Flora Assessment of Hydrometallurgical Processing Site

## A Terrestrial Ecology Monitoring Report

December 2020

Prepared for



Rio Tuba, Bataraza, Palawan

By



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# Executive Summary

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The flora assessment within Coral Bay Nickel Corporation MPSA is part of the environmental compliance and corporate responsibility of the company. It is a regular assessment and monitoring activity on the existing flora within the impacted areas of its Hydrometallurgical Processing Project. This has been carried out for about 15 years since its start in 2005. This is a strong manifestation of the company's strict adherence to the principles of sustainable development, a development that complements economic activities with environmental protection and conservation.

This was carried out mainly to assess and monitor the vegetation structure of existing forest cover found in within and adjacent vicinities of the Hydrometallurgical Processing Plant Project of the Coral Bay Nickel Corporation. Specifically, it intended to: identify and classify the flora species composition of terrestrial sites within and adjacent areas; assess the biodiversity of these areas based on their species and population structural parameters; assess the impacts of HPP activities and its continuous operations to the ecology of the site; determine the conservation status of flora in the sites; and recommend flora conservation and protection measures.

The sampling sites are generally secondary forest growth, grassland and brushlands which are mainly attributed to the ultramafic nature of the soil in the area. The flora assessment field validation was conducted last October 28-30, 2020. New observations sites were established at Tailings Storage Facility (TSF 1) including TSF 3 and at Nagoya Beach. TSF 1 is a product of a progressive rehabilitation done by the CBNC management. It has effectively displayed a successful rehabilitation of mine tailings impoundment or mined out areas by converting them into stable manmade forest ecosystem. Monitoring site 3 (Nagoya Beach) also demonstrates an effort of reforestation is a good environmental initiative along the shoreline with thriving thick forest cover, indicating a healthy mangrove forest ecosystem.

Assessment results over Ibelnan, Kinurong Siltation Pond, Magas-Magas, Mt. Bulanjao, and TSF 3 monitoring sites showed 546 individuals recorded belonging to 70 different tree species and 34 families. At the understory level, a total of 84 plant species were identified, belonging to 51 families. *Xanthostemon speciosus* commonly known as Palawan Mangkono is the most dominant tree species with recorded importance value of 47.27% followed by *G. rumphianum* (Mountain Agoho) with 23.14%. Sampling site 8 or TSF 3 had a low diversity index at 2.409 while sites 1, 2, 4 and 5 had moderate diversity index at 2.703, 2.661, 2.888, 2.760 and 2.409, respectively.

The overall diversity index of monitoring sites was estimated at 2.684 which is described as moderately diverse. The overall evenness on the other hand was estimated at 0.002, which is very low indicating that the number of individuals of tree species were highly variable with only few species having number of individuals dominating the monitoring areas. These results were attributed mainly to the soil characteristics of the sampling sites being ultrabasic, a soil deficient of essential minerals to support growth and development of plants/trees. Ultrabasic or ultramafic soil environment is dominated by elements which are toxic to most plants.

Among the 70 tree species encountered, *E. longifolia* and *V. parviflora* were considered endangered while *C. pentapetalum*, *D. luzoniensis*, *D. monantha*, and *D. philosantha* are vulnerable based on the updated list of threatened flora species under PCSD Resolution No. 15-521. The rest of the remaining species were considered as non-threatened.

Enrichment planting through assisted natural regeneration should be done in order to increase tree species evenness. Identified endangered and vulnerable species should be prioritized as planting materials for enrichment planting and in rehabilitating mined out areas as measures to conserve them.

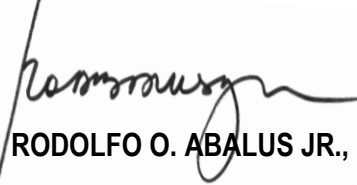
Designation of a separate and wider area that has an array of resources, physical and biotic factors that could allow the survival and reproduction of those identified threatened flora species for their protection and conservation must be implemented.

# Certification

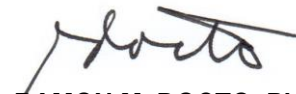
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This Flora Assessment of Hydrometallurgical Processing Plant was prepared in accordance with the requirements from DENR as stipulated in the environmental compliance certificate and as part of the company's environmental monitoring program.

Signed:



**RODOLFO O. ABALUS JR., PhD**



**RAMON M. DOCTO, PhD**

## A. BACKGROUND

The Coral Bay Nickel Corporation always subscribes to the tenets of sustainable development. It is a development that complements both economic and natural resource conservation, where development activities support environmental protection.

Various environmental protection and enhancement research and development programs have been developed and put in place by the company since the start of its operation in year 2005. The periodic monitoring schemes to assess the impacts of the company's operations on the social as well as on biological and physical environment, and utilizing the information being derived thereat for the development of management measures to maintain ecological balance were some of the measures it has instituted in its management system to attain sustainability.

This document contains the flora assessment report for the Hydrometallurgical Processing Plant (HPP) project sites of CBNC. Field validation was conducted on October 28-30, 2020.

## B. OBJECTIVES

### 1. General

The main aim of this study is to assess and monitor the vegetation structure of existing forest cover found in within and adjacent vicinities of the Hydrometallurgical Processing Plant Project of the Coral Bay Nickel Corporation in Rio Tuba, Bataraza, Palawan.

### 2. Specific

The assessment was conducted in order to meet the following specific objectives:

1. Identify and classify the flora species composition of terrestrial sites within and adjacent areas;
2. Assess the biodiversity of these areas based on their species and population structural parameters;
3. Assess the impacts of HPP activities and its continuous operations to the ecology of the site;
4. Determine the conservation status of flora in the sites; and
5. Recommend flora conservation and protection measures.

### **C. IMPORTANCE**

Environmental monitoring is an integral part of CBNC's commitment to environmental laws and regulations. Better monitoring of the environment in which the company is operating can have a significant and positive impact at the bottom line. By understanding of what is happening, the company can make better decisions on its own environmental policies, regulations, and programs.

Flora assessment of Coral Bay Nickel Corporation is a management strategy which intends to measure the impacts of the hydrometallurgical processing plant operations to the immediate or adjacent natural and man-made terrestrial forest ecosystems. This endeavor provides baseline quality, uncover environmental trends, identify any variations, determine the success of projects and confirm whether or not environmental goals and targets have been attained.

Assessment results on floral composition of forest ecosystems provide information on the positive or negative effects of the Company's operations on the adjacent natural and other forest ecosystems. This would also provide actual data necessary to determine if the company is religiously implementing established policies, laws, rules, and guidelines towards sustainable management of the area.

## II. Methodology

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### A. DESCRIPTION OF THE PROJECT SITE

#### 1. The Host Municipality

The HPP project site of CBNC is hosted by the municipality of Bataraza, a first-class municipality located in the southern portion of mainland Palawan. It has an approximate total land area of 726.20 sq. km. It is bounded in the east by the Sulu Sea, in the west by a great mountain range extending from Mount Mantalingahan (the highest peak in the province) to Mount Malitub, which serves as the divider between Bataraza and Rizal, and in the south-west by the West Philippine Sea. Bataraza's topography is hilly with rugged mountains mostly covered by forest.

Rugged to gently undulating terrain distinguishes most part of Bataraza. The highest land feature in the area is the north-northeast trending Bulanjao Range, which is located at the central portion of the municipality. The land slopes down to western and eastern coastlines. Steep slopes and sharp peaks characterize the Bulanjao Range whose ridgeline averages 900 meters above sea level (masl). Its highest point is the Escapardo Peak which rises to 1,036 masl. Ultramafic and volcanic rocks underline the Bulanjao Range.

The Hydrometallurgical Processing Plant covers Barangays of Rio Tuba, Ocayan and Taratak in Bataraza, Palawan.

#### 2. Accessibility

HPP project site is accessible from Manila via private or commercial aircraft with 1-hour travel time or through passenger ship with 22-hour travel time to Puerto Princesa City. It is approximately 225 kilometers from Puerto Princesa City (**Figure 1**). Land travel to Bataraza takes about 5 hours via south road passing through the municipalities of Aborlan, Narra, Sofronio Espanola and Brooke's Point. Bus companies and commercial or public utility vans serve as transport means for the general public.

#### 3. The Hydrometallurgical Processing Plant

The Hydrometallurgical Processing Plant of Coral Bay Nickel Corporation is located within the Rio Tuba Nickel Mining Corporation (RTNMC) mine areas in barangay Rio Tuba, Bataraza, Palawan. The HPP plant for nickel uses the high-pressure acid leaching technology. It includes support facilities such as hydrogen sulfide production plant, limestone quarrying operations and causeway/trestle facilities at the pier area. Limestone quarry is owned and managed by RTNMC.

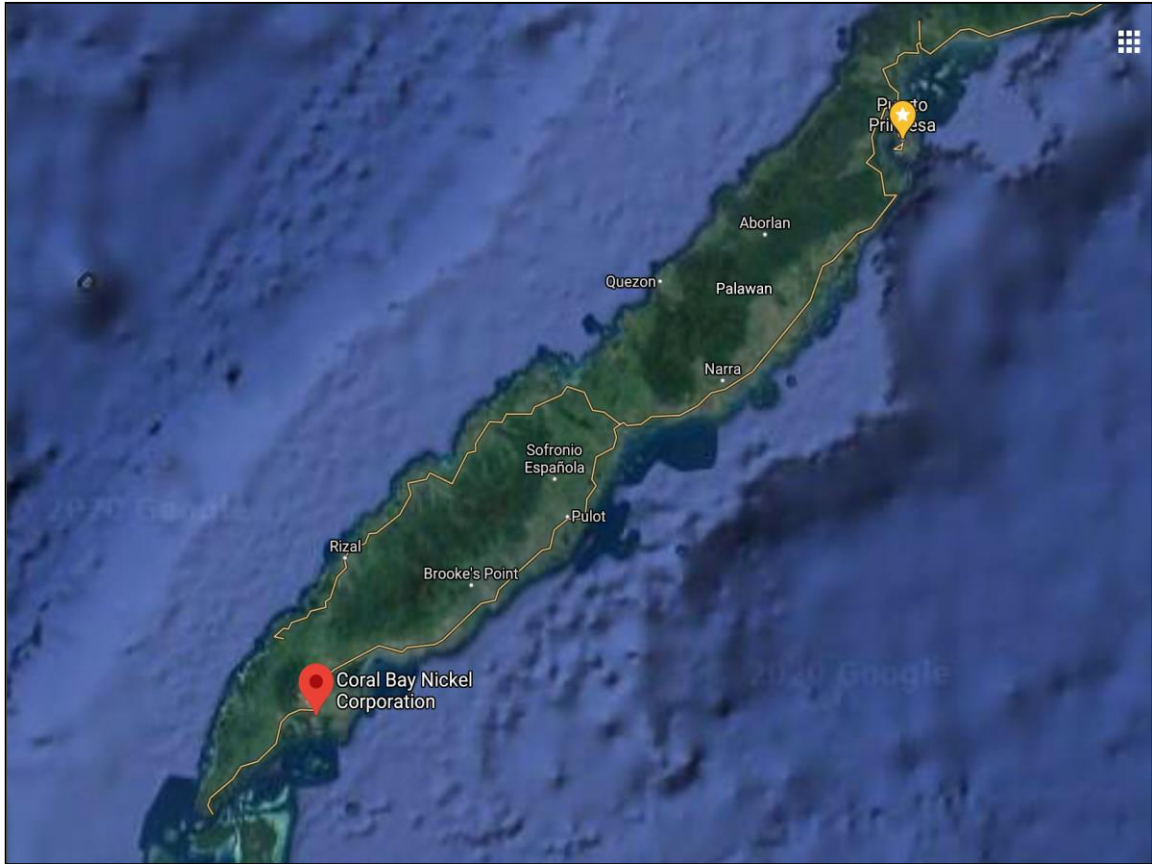


Figure 1. Location Map of Coral Bay Nickel Corporation (Source: google.com.ph).

## B. BACKGROUND OF HPP PROJECT VEGETATION COVER SAMPLING SITES

Implementation of the flora monitoring and assessment at the HPP project site for 2020 is on its 15<sup>th</sup> year. The activity is regularly carried out to better monitor the surrounding environment where the project will have significant and positive impact at the bottom line. In this way, the company can make better decisions on its own environmental policies, regulations and programs.

Based on the Environmental Impact Statement prepared in 2001, sampling stations for vegetation assessment have been identified as follows: a) limestone quarry, b) tailings pond, c) power plant, d) water and acid pipeline, and e) water impounding dam at East and West Ibelnan. These are the direct impact areas brought by the operations of the project. The components of the project include i) the construction and operation of a hydrometallurgical processing plant, ii) limestone quarry, iii) installation of water supply and drainage system, iv) construction of tailings dam, and v) installation of a power plant.

The first monitoring activity for vegetation was conducted on December 2005. The team employed the standardized method of data collection. Monitoring plots were established on the basis of impact areas with vegetation. The plots were geographically located. Generally, the type and number of species during as indicated in the EIS 2001 and 2005 monitoring were varied depending

on the number and size of plots established in the area. Findings on species composition and diversity were different.

The 2005 monitoring was composed of five (5) sites namely Ibelnan area, Kinurong silt containment pond, Supernatant water and acid pipelines at Nagoya coast and plantations near the intake dam, Ibelnan resort and water reservoir. The said water reservoir was improved for other purposes few months before the 2006 monitoring.

In 2006, monitoring, the Mt. Bulanjao forest was included in the monitoring areas. During 2007 monitoring, tailings dam 2 was included in the observation area and a separate preliminary report was made. In 2008, vegetation of the tailings dam and nearby covering Magas-Magas and Mangingidong pit was included in the assessment. The Magas-Magas siltation pond was the first pond to handle silts at the western area of the mine site, and three huge mine wastes stockpile which were considered as feed material for the HPP of CBNC. Generally, the area was constructed as allowed in the ECC of the expanded operations.

At present, a big portion of the stockpiles have been taken out and relocated to favor the start of the construction of TSF2's embankment. An area downstream was also opened up and used a preparation area for the core materials needed in the embankment and also to locate the equipment maintenance shops, geotechnical laboratories and offices. Prior to the opening of these areas, a team from PENRO/CENRO conducted a survey and gave clearance for the removal of trees smaller than 10cm diameter, which comprise about 70% of the inventory. The remaining bigger trees were not disturbed and those that cannot be avoided had to be removed and will be compensated by planting 50 trees for every tree cut in a new reforestation area. This will be done after the completion of the TSF 2 construction.

Since 2008, monitoring tailings dam 1 was excluded in the sampling site. The plots then in all sampling sites were permanently established and visited annually. In 2012, the Ursula Island was included in monitoring areas as requested by DENR-CENRO Brooke's Point and suggested for a 100 % timber inventory. The 2013 monitoring considered tailings dam 2 as observation areas. In 2016, all sampling and observation areas were monitored including Ursula Island. Additional sampling site was included in the forest area near Magas-Magas in 2017.

## **C. ASSESSMENT OF FLORAL COMPONENTS OF FOREST ECOSYSTEMS**

### **1. Permanent Sampling Sites**

Permanent and existing sampling sites were identified on the map and located on the ground with the purpose of assessing or monitoring the floral components of the different forest and other vegetated ecosystems adjacent to the HPP project site. The sample sites include Site 1A - Ibelnan, Site 2 - Kinurong Silt Pond, Site 4 – Magas-Magas, Site 5 - Mt. Bulanjao, and the observation area in TSF 1. Sampling site 8 - TSF 3 is newly added area for monitoring. All sampling sites representing various vegetation cover classes such as natural forest stand, forest cover between secondary and brushland areas, rehabilitated and observation areas were considered.



## 2. Sample Plots

For each sampling site, established permanent sampling plots with dimensions of 10 meters by 10 meters were tracked on the ground. Under each plot, one (1) 1 m X 1m subplot was also established. Detailed sketch of flora monitoring stations is shown in **Figure 2**.

Coordinates and elevation of the center of each plot were recorded (**Table 1**) through the Global Positioning System (GPS). Plot centers were marked with red ribbon as reference. Data gathered were translated in the map through GIS.

**Table 1.** Technical description of the flora sampling sites.

Site	Site/Plot	Coordinates		Elevation (m)
		Northing	Easting	
1A Ibelnan	Site 1 Plot 1	8°34'08.9"	117°23'37.5"	115
	Site 1 Plot 2	8°34'16"	117°23'35"	127
	Site 1 Plot 3	8°34'23"	117°23'37"	87
	Site 1 Plot 4	8°34'33"	117°23'32.4"	173
	Site 1 Plot 5	8°34'45.2"	117°23'24"	248
Kinurong Siltation Pond Area	Site 2 Plot 1	8°33'21.6"	117°24'58.7"	19
	Site 2 Plot 2	8°33'23.9"	117°25'3.8"	39
	Site 2 Plot 3	8°33'17.9"	117°25'16"	24
	Site 2 Plot 4	8°33'19.2"	117°25'21"	31
	Site 2 Plot 5	8°33'20.7"	117°25'26.6"	32
TSF 1	Rehabilitation area	8°34'01.1"	117°25'20.9"	62
TSF 3	Site 8 Plot 1	8°34'38.7"	117°25'59.7"	28
	Site 8 Plot 2	8°34'37.5"	117°26'01.5"	30
	Site 8 Plot 3	8°34'34.1"	117°26'02.1"	32
	Site 8 Plot 4	8°34'40.4"	117°25'59.8"	27
	Site 8 Plot 5	8°34'37.7"	117°26'05.6"	29
Magas-Magas	Site 4 Plot 1	8°34'11"	117°23'53"	94
	Site 4 Plot 2	8°34'08.4"	117°23'54.8"	87
	Site 4 Plot 3	8°34'08.3"	117°23'56.6"	91
	Site 4 Plot 4	8°34'12.1"	117°23'56.4"	92
	Site 4 Plot 5	8°34'14.6"	117°23'59"	97
Mt. Bulanjao	Site 5 Plot 1	8°33'50"	117°22'24.4"	504
	Site 5 Plot 2	8°33'44.1"	117°22'32.6"	456
	Site 5 Plot 3	8°33'47"	117°22'42"	412
	Site 5 Plot 4	8°33'44.4"	117°22'50"	351
	Site 5 Plot 5	Impenetrable due to a biohazard		
	Site 5 Plot 6	8°33'38.8"	117°22'50.9"	324
	Site 5 Plot 7	8°33'35"	117°22'53.1"	298
	Site 5 Plot 8	8°33'35"	117°22'58"	257
	Site 5 Plot 9	8°33'41.2"	117°23'09.5"	255
	Site 5 Plot 10	8°33'40.4"	117°23'03.5"	228
	Site 5 Plot 11	8°33'39.5"	117°23'07.1"	203
	Site 5 Plot 12	8°33'38.6"	117°23'17.7"	179
	Site 5 Plot 13	8°33'45.7"	117°23'12.6"	145

### 3. Data Gathered

Characterization of the sites within the HPP project vicinity were done within the sample plots. The species composition under each 10 m X 10 m plot were identified and recorded. Trees with 5 cm diameter at breast height (DBH) and above were measured. All plants and individuals below 5 cm DBH located inside the 1m X 1m subplot were also identified, counted and recorded. Significant species of understorey vegetation were also noted. Sample plant specimens needing further identification were brought to Palawan State University herbarium for proper identification and preservation.

The flora monitoring team were accompanied and assisted by CBNC Environmental Management staff during the whole duration of the flora assessment activity.

### 4. Data Analysis

The different flora species encountered within plots were identified and classified according to their local or common name, species, genus, and family name.

Importance value, species diversity, and evenness indices of all trees encountered within sampling sites were determined excluding those at TSF 1 which is a manmade forest and is only considered as an observation site. Estimation of the above forest structure indicators were based on the following equations:

#### a. Relative Dominance

Relative dominance is the number of individuals per area as a percent of the number of individuals of all species (Equation 1).

$$\text{Relative Dominance} = \frac{a}{\sum BA} \times 100 \quad \text{Equation 1}$$

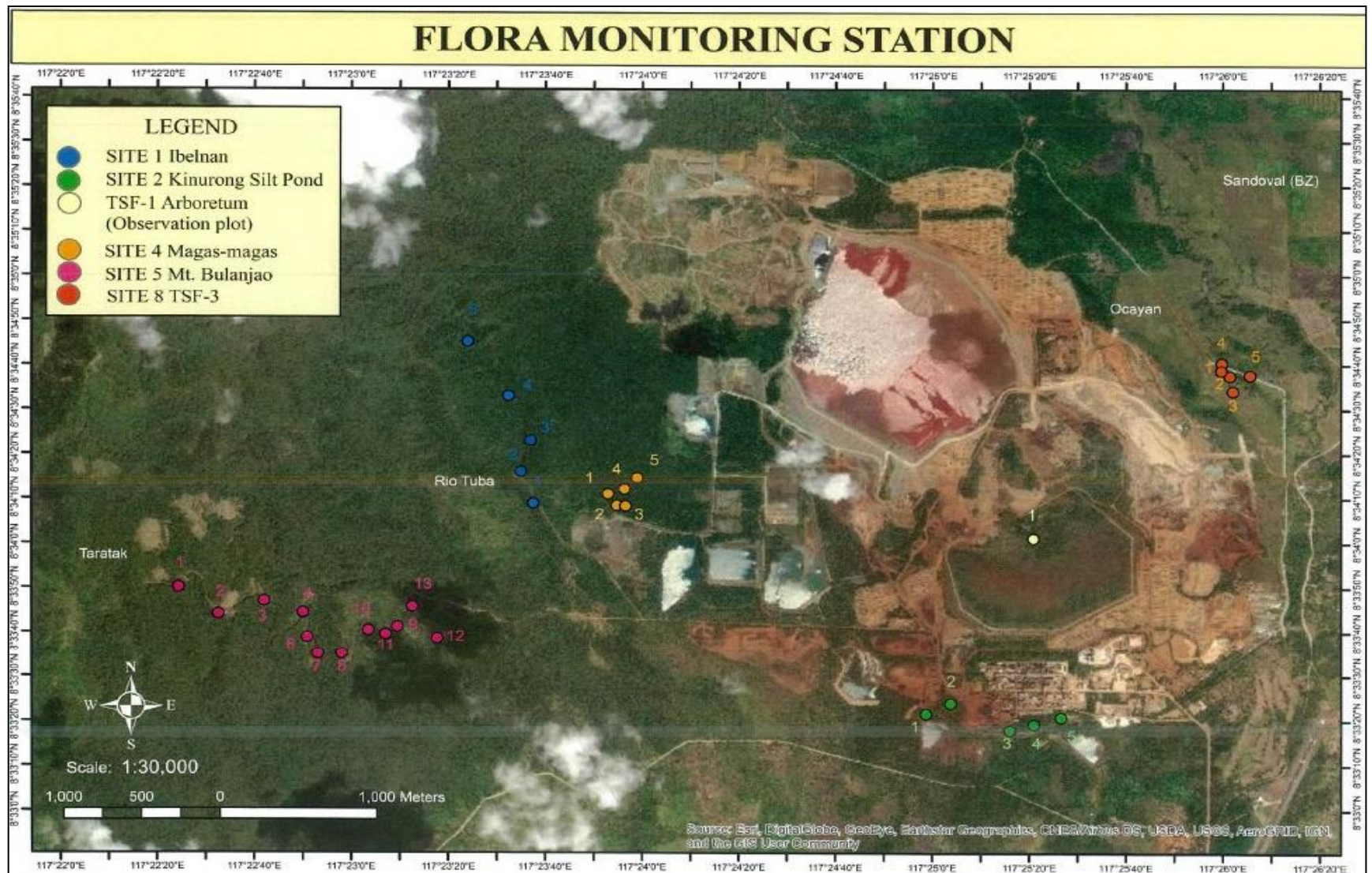
Where: a - Basal area of a species  
 $\sum BA$  - Summation of basal area of all species within a community

#### b. Relative Frequency

Relative frequency is the percent of inventory points occupied by species A as a percent of the occurrence of all species (Equation 2).

$$\text{Relative Frequency} = \frac{NP}{TP} \times 100 \quad \text{Equation 2}$$

Where: NP - Number of plots  
TP - Total plots



**Figure 2.** Flora assessment sampling sites.

c. Relative density

Relative density is the total number of individuals of a species as a percent of the total individuals of all species (Equation 3).

$$\text{Relative Density} = \frac{D}{\sum DS} \times 100 \quad \text{Equation 3}$$

Where: D - Number of individuals of a species  
- Total individuals of all species

d. Importance Value

Importance value is a measure of how dominant a species is in a given community. The importance value is the sum of these three measures (relative dominance, frequency, and density), and can range from 0 to 300. A high importance value indicates that Species A is well represented in the stand because of some combination of a) a large number of individuals of Species A compared with other species in the stand, or b) a smaller number of individuals of Species A, but the trees are large compared with others in the stand.

$$\text{Importance Value} = RD_o + RF + RD_e \quad \text{Equation 4}$$

Where: RD<sub>o</sub> - Relative dominance  
RF - Relative frequency  
RD<sub>e</sub> - Relative density

e. Diversity Index

The Shannon Diversity Index (H) was used to calculate population density, abundance and richness of the species. This is an information statistic index which means through assumptions based on the input information that all species are represented in a sample and that they are randomly sampled. Further, this is the mathematical measure of species diversity in a given community of fauna in the sampling sites. This provides more information about the community composition than simply species richness that also take the relative abundances of different species into account.

Diversity index (Equation 5) also known as phylogenetic indices or phylogenetic metrics is a quantitative measure that reflects how many different types of species there are in a community and that can simultaneously take into account the phylogenetic relations of the individuals distributed among those types, such as richness, divergence or evenness. The Shannon's diversity index was applied in this assessment as shown in the below equation (Equation 5).

$$H' = \sum_{i=1}^s - (P_i * \ln P_i) \quad \text{Equation 5}$$

Where:  $H'$  = the Shannon diversity index  
 $P_i$  = fraction of the entire population made up of species  $i$   
 $S$  = number of species encountered  
 $\sum$  = sum from species 1 to species  $S$

f. Evenness Index

Evenness is the count of individuals of each species in an area. Species evenness is important to biodiversity because it gives an indication of the stability of an ecosystem. Evenness is high if all species have similar distribution (i.e., similar population density) (Baker and Savage, 2008)

$$\text{Pielou's Evenness Index (J')} = \frac{H}{\ln(S)} \quad \text{Equation 6}$$

Where:  $H'$  = the Shannon diversity index  
 $\ln$  = natural logarithm  
 $S$  = total number of species

The estimated Shannon's diversity and Pielou's Evenness indices were rated based on the Fernando diversity scale as shown in **Table 2**.

**Table 2.** Shannon's diversity and Pielou's Evenness indices rating

Diversity Index ( $H'$ )	Evenness Index ( $J'$ )	Rating
1.0-1.99	0.05-0.14	Very low
2.0 - 2.49	0.15-0.24	Low
2.5-2.99	0.25-0.49	Moderate
3.0 - 3.49	0.50-0.74	High
$\geq 3.5$	0.75-1.00	Very high

e. Conservation Status

The conservation status of flora found in the sites were determined based on the PCSD resolution 15-521 updated list of terrestrial and marine wildlife in Palawan and their categories. Comparative analysis on the species composition and ecological structure of identified study sites, as well as the visible ecological impacts of mining activities and operations of other sites in Palawan with similar biophysical conditions were also done based on actual observations during transect surveys.



### III. Results and Discussion

#### A. LAND COVER CLASSES

The sampling sites are generally second growth forest, grassland, and brushlands. This is attributed to the ultramafic nature of the soil in the area. The forested areas in Site 1A - Ibelnan and Site 5 - Mt. Bulanjao were mixed hardwoods and can be generally classified as “ultramafic mixed hardwood species” (Castillo et al., 2019). The sampling sites elevation ranged from 19 masl (Site 2 - Kinurong siltation pond) to 504 masl in (Site 5 - Mt. Bulanjao).

The terrain for sampling site 1A - Ibelnan is generally flat to rolling with elevation ranging from 87 masl-248 masl and dominated by natural forest vegetation. Sampling site 2 - Kinurong siltation pond area is general flat to slightly rolling with an elevation between 19 masl to 39 masl. Vegetation is natural forest to secondary growth. Sampling site at TSF 1 is a reforested area with terrain described as generally flat and situated at an elevation of 62 masl. Sampling site 4 - Magas-Magas has a generally flat terrain, elevation of 87 masl to 97 masl, and covered with natural forest with brushland ecosystem. Sampling site 5 - Mt. Bulanjao is rolling to rugged terrain with signs noted signs of erosion, elevation ranging from 145 masl to 504 masl, and covered with secondary to primary forest.

#### B. TREE SPECIES COMPOSITION

##### 1. Site 1A - Ibelnan

The vegetation cover of Sampling site 1A – Ibelnan is comprised with a total of 25 tree species (Table 3). Out of this total number of species encountered, 24 of them belong to 16 families which include Apocynaceae, Araliaceae, Burseraceae, Casuarinaceae, Chrysobalanaceae, Dilleniaceae, Ebenaceae, Euphorbiaceae, Guttiferae, Magnoliaceae, Myrtaceae, Ochnaceae, Pittosporaceae, Rubiaceae, Sapindaceae and Sapotaceae. However, 1 species was only identified at local/common name level, Masok Masok. Specimens were collected for further identification at the College of Sciences Museum of Natural History of the Palawan State University.

**Table 3.** Tree species encountered at site 1A.

No.	Family Name	Scientific Name	Common/Local Name
1	Apocynaceae	<i>Alstonia macrophylla</i>	Batino/kurayan
2	Araliaceae	<i>Arthrophyllum ahernianum</i>	Dokloi
3	Burseraceae	<i>Protium connarifolium</i>	Marangub
4	Casuarinaceae	<i>Gymnostoma rhumpianum</i>	Mt. Agoho
5	Chrysobalanaceae	<i>Licania splendens</i>	Amayan
6	Dilleniaceae	<i>Dillenia monantha</i>	Katmon Bugtong
7	Dilleniaceae	<i>Dillenia luzoniensis</i>	Malakatmon

**Table 3** continued...

No.	Family Name	Scientific Name	Common/Local Name
8	Ebenaceae	<i>Diospyrus sp.</i>	Tandakan
9	Ebenaceae	<i>Diospyrus philosantha</i>	Kanomay/bolong-eta
10	Euphorbiaceae	<i>Drypetes sp.</i>	Ranta Ranta
11	Guttiferae	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol
12	Guttiferae	<i>Callophyllum pentapetalum</i>	Pamitoyen
13	Magnoliaceae	<i>Talauma villariana</i>	Patangis
14	Magnoliaceae	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis
15	Magnoliaceae	<i>Magnolia grandiflora</i>	Magnolia
16	Myrtaceae	<i>Xanthostemon speciosus</i>	Palawan Mangkono
17	Ochnaceae	<i>Brakenridgea palustris</i>	Brakenridgea
18	Pittosporaceae	<i>Pittosporum pentandrum</i>	Mamalis
19	Rubiaceae	<i>Timonius arboreus</i>	Mabalod
20	Rubiaceae	<i>Canthium dicoccum</i>	Malakape
21	Rubiaceae	<i>Psychotria luzoniensis</i>	Tagpong gubat/Suwakaw
22	Rubiaceae	<i>Rothmania merilii</i>	Bagaay
23	Sapindaceae	<i>Euphoria didyma</i>	Alupag
24	Sapotaceae	<i>Planchonella foxworthyii</i>	Alalud
25			Masok Masok

## 2. Site 2 - Kinurong Siltation Pond

**Table 4** shows the tree species composition encountered in sampling site 2 – Kinurong siltation pond. The site was comprised of 28 tree species belonging to 22 families. Of the total families where the tree species were classified, 5 families had 2 species each such as Araliaceae, Lamiaceae, Leguminosae and Moraceae. The rest of the families were represented by single species each to include Annonaceae, Apocynaceae, Burseraceae, Chrysobalanaceae, Clusiaceae, Ebenaceae, Elaeocarpaceae, Euphorbiaceae, Fabaceae, Guttiferae, Lauraceae, Loganiaceae, Malvaceae, Meliaceae, Myrsinaceae, Myrtaceae, Pittosporaceae, Rubiaceae, Sapotaceae, and Verbenaceae.

**Table 4.** Tree species encountered at sampling site 2.

No.	Family	Scientific Name	Local Name
1	Annonaceae	<i>Mezzettiopsis creaghii</i>	Tabingalang
2	Apocynaceae	<i>Alstonia macrophylla</i>	Batino/kurayan
3	Araliaceae	<i>Arthropodium ahernianum</i>	Dokloi
4	Araliaceae	<i>Polyscias nodosa</i>	Malapapaya
5	Burseraceae	<i>Canarium Asperum</i>	Sahing/Pagsahingin
6	Chrysobalanaceae	<i>Licania splendens</i>	Amayan

**Table 4** continued...

No.	Family	Scientific Name	Local Name
7	Ebenaceae	<i>Diospyrus sp.</i>	Tandakan
8	Elaeocarpaceae	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo
9	Euphorbiaceae	<i>Macaranga tanarius</i>	Binunga
10	Fabaceae	<i>Acacia Auriculiformis</i>	Japanese Acacia
11	Guttiferae	<i>Cratoxylum formosum</i>	Salingogon
12	Guttiferae	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol
13	Lamiaceae	<i>Gmelina arborea</i>	Gmelina/Yemane
14	Lamiaceae	<i>Vitex pubescens</i>	Molawin mabuhok
15	Lauraceae	<i>Neolitea vidalli</i>	Puso Puso
16	Leguminosae	<i>Albizia saponaria</i>	Salingkugi
17	Leguminosae	<i>Intsia bijuga</i>	Ipil
18	Loganiaceae	<i>Fagraea fragrans</i>	Dulo/dolo
19	Malvaceae	<i>Commersonia bartramia</i>	Kakaag
20	Meliaceae	<i>Swietenia macrophylla</i>	Mahogany
21	Moraceae	<i>Artocarpus blancoi</i>	Antipolo
22	Moraceae	<i>Ficus sp.</i>	Ficus ulmifolia
23	Myrtaceae	<i>Syzygium aqueum</i>	Tambis
24	Pittosporaceae	<i>Pittosporum pentandrum</i>	Mamalis
25	Rubiaceae	<i>Canthium dicocum</i>	Malakape
26	Rubiaceae	<i>Psychotria luzoniensis</i>	Tagpong Gubat/Suwakaw
27	Sapotaceae	<i>Palaquim luzonensis</i>	Aripa/Nato
28	Verbenaceae	<i>Vitex parviflora</i>	Molave/Mulawin

### 3. Site TSF 1

The whole of TSF 1 is an old plantation with some trees planted in the area since 2013. The TSF-1 as a rehabilitation covered roughly 80 hectares of its embankment and impoundment area. Since 2013, re-vegetation has been done and tree species in the area has increased over the years; thus, an increase in species richness of flora. The following are the vegetation planted in TSF-1.

1. At least 110,000 of trees are growing sustainably in the whole area as of 3<sup>rd</sup> quarter of 2020.
2. An established 10,000-square meter Arboretum area, with a total of 150 native tree species found in the nearby forest surrounding the mineral processing plant.
3. High value crops plantation to show that a rehabilitated TSF can sustain agricultural activities. Crops like coconut is now on its fruit-bearing stage. Other products are vegetables, papaya, banana, pineapple and dragon fruit. Native fruit trees like guava, bignay, kamansi, duhat, and guyabano and avocado are all flourishing in TSF-1 giving fruits and food to sustain birds and other fauna in the area.



4. An Analogue Forest of about 900 square meters is developed in TSF-1. It is a replica of a good forest cover, that was chosen in the Magas-magas area. The replica or analogue forest is found successfully growing in the tailings soil of TSF-1 with an average of 9-centimeter diameter at DBH and an average height of 3 meters.
5. Other plants are found in TSF-1 include bamboo plantation as required by MGB to establish pandan plantation, Orchids, flower and herbal gardens.

#### 4. Site 4 - Magas - Magas

Site 4 – Magas-Magas area as shown in **Table 5** is comprised with a total of 22 tree species which were distributed to 16 families to include Anacardiaceae, Araliaceae, Burseraceae, Chrysobalanaceae, Elaeocarpaceae, Guttiferae, Lauraceae, Leguminosae, Magnoliaceae, Myristicaceae, Myrtaceae, Rubiaceae, Rutaceae, Sapindaceae, Sapotaceae, and Simaroubaceae. Two (2) species were identified only through their local names Maglunawan and Balinto.

**Table 5.** Tree species encountered at sampling site 4.

No.	Family Name	Scientific Name	Common/Local Name
1	Anacardiaceae	<i>Buchannania microphylla</i>	Bokanana/Palinlin
2	Araliaceae	<i>Arthrophyllum ahernianum</i>	Dokloi
3	Araliaceae	<i>Polyscias nodosa</i>	Malapapaya
4	Burseraceae	<i>Protium connarifolium</i>	Marangub
5	Chrysobalanaceae	<i>Maranthes corymbosa</i>	Liusin
6	Elaeocarpaceae	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo
7	Guttiferae	<i>Ochrocarpus ramiflorus</i>	Bitok
8	Guttiferae	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol
9	Lauraceae	<i>Cinnamomum mercadoi</i>	Sinamoman/ Kalingag
10	Leguminosae	<i>Albizia saponaria</i>	Salingkugi
11	Leguminosae	<i>Mimosa sp.</i>	Diklay
12	Magnoliaceae	<i>Talauma villariana</i>	Patangis
13	Myristaceae	<i>Gymnacranthera paniculata</i>	Anuping
14	Myrtaceae	<i>Syzygium sp.</i>	Wild Tambis
15	Myrtaceae	<i>Syzygium aqueum</i>	Tambis
16	Rubiaceae	<i>Canthium dicoccum</i>	Malakape
17	Rutaceae	<i>Achronesia pedunculata</i>	Marangkukutan
18	Sapindaceae	<i>Euphoria didyma</i>	Alupag
19	Sapotaceae	<i>Palaquim luzonensis</i>	Aripa/Nato
20	Simaroubaceae	<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali
21			Maglunawan
22			Balinto

## 5. Site 5 - Mt. Bulanjao

The Mt. Bulanjao site had 34 identified tree species belonging to 21 families such as Anacardiaceae, Annonaceae, Apocynaceae, Araliaceae, Burseraceae, Casuarinaceae, Dilleniaceae, Elaeocarpaceae, Fabaceae, Guttiferae, Lamiaceae, Lauraceae, Leguminosae, Magnoliaceae, Moraceae, Myrtaceae, Rubiaceae, Rutaceae, Sapotaceae, Simaroubaceae and Sterculiaceae (Table 6). However, 3 tree species were identified only at their local or common name level, Maglunawan, Talilisan and Magpango.

**Table 6.** Tree species encountered at sampling site 5.

No.	Family Name	Scientific Name	Common/Local Name
1	Anacardiaceae	<i>Swintonia foxworthyi</i>	Apitong babui/Rimaraw
2	Anacardiaceae	<i>Buchanania arborescens</i>	Balinghasai
3	Anacardiaceae	<i>Buchannania microphylla</i>	Bokanana/Palinlin
4	Annonaceae	<i>Licania splendens</i>	Amayan
5	Anonaceae	<i>Mezzettiopsis creaghii</i>	Tabingalang
6	Apocynaceae	<i>Alstonia macrophylla</i>	Batino/kurayan
7	Apocynaceae	<i>Alstonia scholaris</i>	Dita
8	Araliaceae	<i>Arthrophyllum ahernianum</i>	Dokloi
9	Burseraceae	<i>Protium connarifolium</i>	Marangub
10	Casuarinaceae	<i>Gymnostoma rumphianum</i>	Mt. Agoho
11	Dilleniaceae	<i>Dillenia Luzoniensis</i>	Malakatmon
12	Elaeocarpaceae	<i>Elaeocarpus cumingii</i>	Katap/Pasi pasi/Hunggo
13	Fabaceae	<i>Achidendron clypearia</i>	Tiagkot
14	Guttiferae	<i>Calophyllum pentapetalum</i>	Pamitoyen
15	Guttiferae	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol
16	Guttiferae	<i>Garcinia sp.</i>	Malatambis
17	Lamiaceae	<i>Premna depauperata</i>	Alagau
18	Lauraceae	<i>Cinnamomum mercadoi</i>	Sinamoman/Kalingag
19	Leguminosae	<i>Mimosa sp.</i>	Diklay
20	Leguminosae	<i>Albizia saponaria</i>	Salingkugi
21	Magnoliaceae	<i>Talauma villariana</i>	Patangis
22	Magnoliaceae	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis
23	Moraceae	<i>Ficus Bataanensis</i>	Bataan Fig
24	Myrtaceae	<i>Xanthostemon speciosus</i>	Palawan Mangkono
25	Myrtaceae	<i>Syzygium sp.</i>	Wild Tambis
26	Rubiaceae	<i>Timonius arboreus</i>	Mabalod
27	Rutaceae	<i>Achronesia pedunculata</i>	Marangkukutan
28	Sapotaceae	<i>Palaquim luzonensis</i>	Aripa/Nato
29	Sapotaceae	<i>Pouteria micrantha</i>	Marapasi
30	Simaroubaceae	<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali

**Table 6.** continued...

No.	Family Name	Scientific Name	Common/Local Name
31	Sterculiaceae	<i>Colona discolor</i>	Magbanotan
32			Maglunawan
33			Talilisan

## 6. Site 8 - TSF 3

**Table 7** shows that Site 8 – TSF 3 is comprised of 15 tree species. Thirteen (13) of these belong to 12 families. Guttiferae has 3 family tree species while Anacardiaceae has 2. On the other hand, families such as Apocynaceae, Clusiaceae, Chrysobalanaceae, Elaeocarpaceae, Lamiaceae, Loganiaceae, Myrsinaceae, Phyllanthaceae, Rutaceae and Verbenaceae had only 1 species each.

**Table 7.** Tree species encountered at CBNC flora sampling site 8 TSF 3.

No.	Family Name	Scientific Name	Common/Local Name
1	Anacardiaceae	<i>Buchanania arborescens</i>	Balinghasai
2	Anacardiaceae	<i>Buchanania microphylla</i>	Bokanana/Palinin
3	Chrysobalanaceae	<i>Licania splendens</i>	Amayan
4	Apocynaceae	<i>Alstonia macrophylla</i>	Batino/kurayan
5	Clusiaceae	<i>Garcinia benthami</i>	Bunog
6	Elaeocarpaceae	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo
7	Guttiferae	<i>Cratoxylum formosum</i>	Salinggogon
8	Guttiferae	<i>Callophylum pentapetalum</i>	Pamitoyen
9	Guttiferae	<i>Ochrocarpus ramiflorus</i>	Bitok
10	Lamiaceae	<i>Premna depauperata</i>	Alagau
11	Loganiaceae	<i>Fagraea fragrans Roxb.</i>	Dulo/Dolo
12	Myrsinaceae	<i>Ardisia squamulosa</i>	Tagpo
13	Phyllanthaceae	<i>Glochidion coronulatum</i>	Kakaua
14	Rutaceae	<i>Achronesia pedunculata</i>	Marangkukutan
15	Verbenaceae	<i>Vitex parviflora</i>	Molave/Mulawin

## 7. Other flora observation sites

Nagoya Beach was identified as observation station number 1. A walk-through survey was conducted along its shoreline which is covered by mangrove forest. The area is composed of *Rhizophora apiculata* (bakawan lalaki), *Rhizophora mucronata* (bakawan bato), *Rhizophora stylosa* (bakawan babae), *Sonneratia alba* (Pagatpat), *Terminalia catappa* (Talisay), and Malabaho. Observation station number 2 is a reforestation area with a natural growth of *S. alba* (Pagatpat). Station number 3 is covered by a dense natural growth mangrove forest. On the other side of the shore is a banana plantation in a privately-owned lot. Trees in the area were Bogo, Balonsaging, Igyo, Talisay gubat, Calamansanay, Malaikno, Bansalagin, Tanglen and Amugis.

## 8. Summary of tree species in all sampling sites

**Table 8** shows the summary of all tree species encountered within the 5 sites sampled. There were 70 tree species encountered belonging to 34 families. Of the total species, 5 were identified only by their local names. Specimens were obtained for their further identification at the Palawan State University Museum of natural history.

The family Guttiferae had 6 species and Myrtaceae and Rubiaceae with 4 species each, which were the highest. This was followed by families Anacardiaceae, Apocynaceae, Lamiaceae, Leguminosae, Lauraceae, Magnoliaceae and Moraceae, with 3 species each. Those families with 2 species each include, Chrysobalanaceae, Araliaceae, Burseraceae, Dilleniaceae, Ebenaceae, Euphorbiaceae, Fabaceae, Myrsinaceae, Sapotaceae. and Simaroubaceae. On the other hand, families such as Casuarinaceae, Chrysobalanaceae, Clusiaceae, Elaeocarpaceae, Loganiaceae, Malvaceae, Meliaceae, Myristicaceae, Ochnaceae, Pittosporaceae, Rutaceae, Sapindaceae, Sterculiaceae, and Verbenaceae had only single species each.

**Table 8.** Summary of tree species in all sampling sites.

No.	Family Name	Scientific Name	Common/Local Name
1	Anacardiaceae	<i>Buchanania Macrophylla</i>	Bokanana/Palinlin
2	Anacardiaceae	<i>Buchanania arborescens</i>	Balinghasai
3	Anacardiaceae	<i>Swintonia foxworthyi</i>	Apitong babui/Rimaraw
4	Annonaceae	<i>Mezzettiopsis creaghii</i>	Tabingalang
5	Apocynaceae	<i>Alstonia macrophylla</i>	Batino/kurayan
6	Apocynaceae	<i>Magnolia grandiflora</i>	Magnolia
7	Apocynaceae	<i>Alstonia scholaris</i>	Dita
8	Araliaceae	<i>Arthrophyllum ahernianum</i>	Dokloi
9	Araliaceae	<i>Polyscias nodosa</i>	Malapapaya
10	Burseraceae	<i>Protium connarifolium</i>	Marangub
11	Burseraceae	<i>Canarium Asperum</i>	Sahing/Pagsahingin
12	Casuarinaceae	<i>Gymnostoma rumphianum</i>	Mt. Agoho
13	Chrysobalanaceae	<i>Maranthes corymbosa</i>	Liusin
14	Chrysobalanaceae	<i>Licania splendens</i>	Amayan
15	Clusiaceae	<i>Brakenridgea palustris</i>	Brakenridgea
16	Clusiaceae	<i>Garcinia benthami</i>	Bunog
17	Dilleniaceae	<i>Dillenia luzoniensis</i>	Malakatmon
18	Ebenaceae	<i>Diospyrus sp.</i>	Tandakan
19	Ebenaceae	<i>Dillenia monantha</i>	Katmon Bugtong
20	Elaeocarpaceae	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo
21	Euphorbiaceae	<i>Drypetes sp.</i>	Ranta Ranta
22	Fabaceae	<i>Acacia Auriculiformis</i>	Japanese Acacia

Table 8. continued...

No.	Family Name	Scientific Name	Common/Local Name
23	Fabaceae	<i>Achidendron clypearia</i>	Tiagkot
24	Guttiferae	<i>Cratoxylum formosum</i>	Salinggogon
25	Guttiferae	<i>Callophyllum pentapetalum</i>	Pamitoyen
26	Guttiferae	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol
27	Guttiferae	<i>Ochrocarpus ramiflorus</i>	Bitok
28	Guttiferae	<i>Garcinia sp.</i>	Malatambis
29	Guttiferae	<i>Macaranga tanarius</i>	Binunga
30	Lamiaceae	<i>Gmelina arborea</i>	Gmelina/Yemane
31	Lamiaceae	<i>Premna depauperata</i>	Alagau
32	Lamiaceae	<i>Neolitea vidalli</i>	Puso Puso
33	Lamiaceae	<i>Vitex pubescens</i>	Molawin mabuhok
34	Lauraceae	<i>Cinnamomum mercadoi</i>	Sinamoman/Kalingag
35	Leguminosae	<i>Albizia saponaria</i>	Salingkugi
36	Leguminosae	<i>Mimosa sp.</i>	Diklay
37	Leguminosae	<i>Diospyrus philosanthera</i>	Kanomay/bolong-eta
38	Loganiaceae	<i>Fagraea fragrans</i>	Dulo/dolo
39	Magnoliaceae	<i>Talauma villariana</i>	Patangis
40	Magnoliaceae	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis
41	Malvaceae	<i>Commersonia bartramia</i>	Kakaag
42	Meliaceae	<i>Swietenia macrophylla</i>	Mahogany
43	Moraceae	<i>Artocarpus blancoi</i>	Antipolo
44	Moraceae	<i>Ficus Bataanensis</i>	Bataan Fig
45	Myristaceae	<i>Ficus sp.</i>	Ficus ulmifolia
46	Myrsinaceae	<i>Ardisia squamulosa</i>	Tagpo
47	Myrtaceae	<i>Xanthostemon speciosus</i>	Palawan Mangkono
48	Myrtaceae	<i>Syzygium sp.</i>	Wild Tambis
49	Myrtaceae	<i>Syzygium aqueum</i>	Tambis
50	Phyllanthaceae	<i>Glochidion coronulatum</i>	Kakaua
51	Pittosporaceae	<i>Pittosporum pentandrum</i>	Mamalis
52	Rubiaceae	<i>Timonius arboreus</i>	Mabalod
53	Rubiaceae	<i>Canthium dicoccum</i>	Malakape
54	Rubiaceae	<i>Psychotria luzoniensis</i>	Tagpong Gubat /Suwakaw
55	Rubiaceae	<i>Gymnacranthera paniculata</i>	Anuping
56	Rubiaceae	<i>Intsia bijuga</i>	Ipil
57	Rubiaceae	<i>Rothmania merilii</i>	Bagaay
58	Rutaceae	<i>Achronesia pedunculata</i>	Marangkukutan

**Table 8** continued...

No.	Family Name	Scientific Name	Common/Local Name
59	Sapindaceae	<i>Euphoria didyma</i>	Alupag
60	Sapotaceae	<i>Palaquim luzonensis</i>	Aripa/Nato
61	Sapotaceae	<i>Planchonella foxworthyii</i>	Alalud
62	Sapotaceae	<i>Pouteria micrantha</i>	Marapasi
63	Simaroubaceae	<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali
64	Sterculiaceae	<i>Colona discolor</i>	Magbanotan
65	Verbenaceae	<i>Vitex parviflora</i>	Molave/Mulawin
66			Maglonawan
67			Talilisan
68			Balinto
69			Masok Masok
70			Magpango

### C. UNDERSTOREY VEGETATION

The understory vegetation are those plants that occupy the forest floor with DBH <5 cm to include wildlings and saplings. These were categorized and classified according categories: a) Lower Vascular Plants (Ferns and Fern Allies) and b) Higher Vascular Plants (Angiosperms): (a.) Monocots and (b.) Dicots (Including the tree saplings). **Table 9** shows the list of all encountered understory vegetation during the flora assessment.

The assessed sites have a total of 83 understory vegetation species which are distributed to 51 families. Five (5) families and 6 genera were categorized under the lower vascular plants. For the higher forms of vascular plants, a total of 7 families and 11 genera for monocots while 39 families and 66 genera for the dicot category were identified (**Table 10**). The families having 4 species each include Anacardiaceae, Orchidaceae, Sapindaceae, and Sterculiaceae (**Table 11**). This was followed by, Euphorbiaceae, Guttiferae/Clusiaceae, Leguminosae, Polypodiaceae, Rubiaceae, Urticaceae and Verbenaceae with 3 species each. Families with 2 species each include Apocynaceae, Burseraceae, Casuarinaceae, Ebenaceae, Lauraceae, Moraceae, Myrtaceae, and Zingiberaceae. On the other hand, those species with only one species each include Acanthaceae, Agavaceae, Araliaceae, Asclepiadaceae, Aspleniaceae, Chrysobalanaceae, Combretaceae, Compositae/Asteraceae, Cyperaceae, Dilleniaceae, Elaeocarpaceae, Flagellariaceae, Gentianaceae, Goodeniaceae, Graminae, Lecythydaceae, Meliaceae, Myrsinaceae, Nepenthaceae, Ochnaceae, Pandanaceae, Phyllanthaceae, Pittosporaceae, Poaceae/Gramineae, Rhizophoraceae, Sapotaceae, Selaginellaceae, Simaroubaceae, Sinopteridaceae, Sonneratiaceae, and Ulmaceae.

**Table 9.** Understorey plants and tree saplings species found in the assessed areas at HPP Project Site of CBNC, Rio Tuba, Palawan.

No.	Family	Scientific Name	Common/Local Name
1	Acanthaceae	<i>Hemigraphis sp.</i>	Metal-leaf
2	Agavaceae	<i>Dracaena sp.</i>	Dracaena/Ti plant
3	Anacardiaceae	<i>Artocarpus blancoi</i>	Antipolo
4	Anacardiaceae	<i>Koordersiodendron pinnatum</i>	Amugis
5	Anacardiaceae	<i>Mangifera altissima</i>	Pahunan
6	Apocynaceae	<i>Alstonia macrophylla</i>	Batino
7	Apocynaceae	<i>Wrightia hanleyi</i>	Palawan Lanete
8	Araliaceae	<i>Arthrophyllum ahernianum</i>	Dokloi
9	Asclepiadaceae	<i>Hoya sp.</i>	Hoya (narrow leaf)
10	Aspleniaceae	<i>Asplenium nidus</i>	Pakpak lawin
11	Burseraceae	<i>Canarium asperum</i>	Pagsahingin
12	Burseraceae	<i>Protium connarifolium</i>	Marangub
13	Casuarinaceae	<i>Gymnostoma rhumpianum</i>	Mountain Agoho
14	Casuarinaceae	<i>Gymnostoma nobile</i>	Palawan Agoho
15	Chrysobalanoceae	<i>Licania splendens</i>	Amayan
16	Combretaceae	<i>Terminalia cattapa</i>	Talisay
17	Compositae/Asteraceae	<i>Vernonia cinerea</i>	Tagulinaw
18	Cyperaceae	<i>Cyperus sp.</i>	Cyperus
19	Dilleniaceae	<i>Dillenia luzonensis</i>	Malakatmon
20	Ebenaceae	<i>Diospyros discolor</i>	Kamagong
21	Ebenaceae	<i>Diospyros philosanthera</i>	Bulong-eta
22	Elaeocarpaceae	<i>Elaeocarpus palimlimensis</i>	Palimlim
23	Euphorbiaceae	<i>Antidesma obliquinervum</i>	Aniam/bignay gubat
24	Euphorbiaceae	<i>Claoxylon sphathulatum</i>	Balong sagai
25	Euphorbiaceae	<i>Euphorbia hirta</i>	Wild tawa-tawa
26	Flagellariaceae	<i>Flagellaria indica</i>	Uag/Baling uway
27	Gentianaceae	<i>Microrhium elmerianum</i>	
28	Goodeniaceae	<i>Scaevola frutescens</i>	Linu
29	Graminae	<i>Schizostachyum lima</i>	Sumbiling
30	Guttiferae	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol
31	Guttiferae	<i>Cratoxylon formosum</i>	Salingogon
32	Guttiferae	<i>Garcinia laterifolia</i>	Candis
33	Lauraceae	<i>Alseodaphne malabonga</i>	Malabunga
34	Lauraceae	<i>Cinnamomum mercadoi</i>	Kalingag/Sinamoman
35	Lecythidaceae	<i>Barringtonia acutangula</i>	Himbabalod (Tag.)



Table 9 continued...

No.	Family	Scientific Name	Common/Local Name
36	Leguminosae/Fabaceae	<i>Acacia auriculiformis</i> Cunn.	Acacia auri
37	Leguminosae/Fabaceae	<i>Intsia bijuga</i>	Ipil
38	Leguminosae/Fabaceae	<i>Pterocarpus indicus</i>	Narra
39	Meliaceae	<i>Swietenia macrophylla</i>	Mahogany
40	Mimosaceae	<i>Parkia timoriana</i>	Kupang
41	Moraceae	<i>Ficus balete</i>	Balete (Tag.)
42	Moraceae	<i>Ficus ulmifolia</i>	Is-is
43	Myrsinaceae	<i>Ardisia squamolosa</i>	Tagpo
44	Myrtaceae	<i>Syzygium aqueum</i>	Tambis
45	Myrtaceae	<i>Xanthostemon speciosus</i>	Palawan Mangkono
46	Nepenthaceae	<i>Nepenthes philippinensis</i>	Pitcher plant
47	Ochnaceae	<i>Brackenridgea palustris</i>	Nickel accumulator
48	Orchidaceae	<i>Bulbophyllum</i> sp.	Bulbophyllum
49	Orchidaceae	<i>Habenaria</i> sp. (1)	Small orchid/Habenaria
50	Orchidaceae	<i>Habenaria</i> sp. (2)	Habenaria
51	Orchidaceae	<i>Nervillia</i> sp.	Nervillia
52	Pandanaceae	<i>Pandanus tectorius</i>	Pandan
53	Phyllanthaceae	<i>Phyllanthus balgooyii</i>	
54	Pittosporaceae	<i>Pittosporum pentandrum</i>	Mamalis
55	Poaceae/Graminae	<i>Schizostachyum diffusum</i>	Balikaw
56	Polypodiaceae	<i>Drynaria quercifolia</i>	Drynaria
57	Polypodiaceae	<i>Pyrossia adnacens</i>	
58	Polypodiaceae	<i>Pyrossia piloselloides</i>	
59	Rhizophoraceae	<i>Rhizophora apiculata</i>	Bakauan-lalaki
60	Rubiaceae	<i>Canthium dicocum</i>	Malakape
61	Rubiaceae	<i>Jasminum aemulum</i>	Jasmin
62	Rubiaceae	<i>Timonius arboreus</i>	Mabalod
63	Sapindaceae	<i>Dimocarpus longan</i>	Alupag
64	Sapindaceae	<i>Guioa acuminata</i>	Pasi
65	Sapindaceae	<i>Nephelium lappaceum</i> L. var <i>lappaceum</i>	Usaw
66	Sapindaceae	<i>Pometia pinnata</i>	Malugay
67	Sapotaceae	<i>Planchonella duclitan</i>	Duklitan
68	Selaginellaceae	<i>Selaginella bififormis</i>	Selaginella
69	Simaroubaceae	<i>Eurycoma longifolia</i>	Tongkat ali
70	Sinopteridaceae	<i>Adiantum philippense</i> Linn.	Adiantum



**Table 9** continued...

No.	Family	Scientific Name	Common/Local Name
71	Sonneratiaceae	<i>Sonneratia alba</i>	Pagatpat
72	Sterculiaceae	<i>Commersonia bartramia</i>	Kakaag
73	Sterculiaceae	<i>Pterocymbium tinctorium</i>	Taluto
74	Sterculiaceae	<i>Pterospermum megalanthum</i>	Bayok lakihan
75	Sterculiaceae	<i>Sterculia ceramica</i>	Malakalumpang
76	Ulmaceae	<i>Trema orientalis</i>	Anabiong
77	Urticaceae	<i>Leucosyke ovatifolia</i>	Andarasa
78	Urticaceae	<i>Leucosyke palawanensis</i>	Palawan dai
79	Urticaceae	<i>Pipturus arborescens</i>	Dalunot
80	Verbenaceae	<i>Gmelina arborea</i>	Melina/Yemane
81	Verbenaceae	<i>Prema depauperata</i>	Alagau
82	Verbenaceae	<i>Vitex pubescens</i>	Molawin
83	Zingiberaceae	<i>Alphinia zerumbet</i>	Luya-luya

**Table 10.** Classification of understory plants found in the assessed sites.

Categories	No. of Families	No. of Genera
A. Lower Vascular Plants	5	6
B. Higher Vascular Plants (Angiosperms)		
1. Monocots	7	11
2. Dicots	39	66
<b>Total</b>	<b>51</b>	<b>83</b>

**Table 11.** Summary of families and number of species.

No.	Family	No. of Species
1	Anacardiaceae	3
2	Orchidaceae	4
3	Sapindaceae	4
4	Sterculiaceae	4
5	Euphorbiaceae	3
6	Guttiferae/Clusiaceae	3
7	Leguminosae/Fabaceae	3
8	Polypodiaceae	3
9	Rubiaceae	3
10	Urticaceae	3
11	Verbenaceae	3
12	Apocynaceae	2
13	Burseraceae	2
14	Casuarinaceae	2

Table 11. continued...

No.	Family	No. of Species
15	Ebenaceae	2
16	Lauraceae	2
17	Moraceae	2
18	Myrtaceae	2
19	Zingiberaceae	1
20	Acanthaceae	1
21	Agavaceae	1
22	Araliaceae	1
23	Asclepiadaceae	1
24	Aspleniaceae	1
25	Chrysobalanoceae	1
26	Combretaceae	1
27	Compositae/Asteraceae	1
28	Cyperaceae	1
29	Dilleniaceae	1
30	Elaeocarpaceae	1
31	Flagellariaceae	1
32	Gentianaceae	1
33	Goodeniaceae	1
34	Graminae	1
35	Lecythidaceae	1
36	Meliaceae	1
37	Mimosaceae	1
38	Myrsinaceae	1
39	Nepenthaceae	1
40	Ochnaceae	1
41	Pandanaceae	1
42	Poaceae/Graminae	1
43	Phyllanthaceae	1
44	Pittosporaceae	1
45	Rhizophoraceae	1
46	Sapotaceae	1
47	Selaginellaceae	1
48	Simaroubaceae	1
49	Sinopteridaceae	1
50	Sonneratiaceae	1
51	Ulmaceae	1

The presence of good vegetation in the area is an indication that it is still intact with preserved endemic and indigenous flora species. An example for this was the presence of the rare plants like *Microrhodium elmerianum* Regalado & Soejarto with Synonym name *Microrhodium palawanense* Elm. belonging to the Family Gentianaceae and the *Nervillia* sp. (with heart shaped leaf) belonging to the Family Orchidaceae which were identified by Merrill (1923) and revised by Regalado and Soejarto (1995). These plants are common component of ultramafic type of vegetation; hence, its habitat which is still intact and spared from destruction by the community residing near the sites assessed.

#### D. LOWER VASCULAR PLANTS

In **Table 12**, the understory vegetation categorized under lower vascular plants include the ferns and fern allies having a total of 4 families such as Aspleniaceae, Polypodiaceae, Selaginellaceae, and Sinopteridaceae with 6 species at 4 different genera to include *Asplenium*, *Drynaria*, *Pyrrhosia*, *Selaginella*, and *Adiantum*. These plants are important for they moisturize trees and the ground for the other plants to absorb water during dry seasons. Family Polypodiaceae had 3 species identified while Aspleniaceae, Selaginellaceae, and Sinopteridaceae had only one species each.

**Table 12.** Ferns and fern allies.

No.	Family	Scientific Name
1	Aspleniaceae	<i>Asplenium nidus</i> (Pakpak Lawin)
2	Polypodiaceae	a.) <i>Drynaria quercifolia</i> b.) <i>Pyrrhosia adnacens</i> c.) <i>Pyrossia piloselloides</i> (Pagong pagongan)
3	Selaginellaceae	<i>Selaginella biformis</i>
4	Sinopteridaceae	<i>Adiantum philippense</i>

#### E. IMPORTANCE VALUE

##### 1. Sampling site 1A - Ibelnan

**Table 13** presents the importance value of the tree species found at sampling area 1A - Ibelnan. Among the composition of 25 different tree species encountered that comprise a total of 89 tree individuals counted within the sampling area, reveals that *C. rumphiana*, locally known as Mount Agoho had the highest computed importance value of 80.59% followed by *Licania splendens* locally called Amayan having 29.66%. Other species encountered with importance value ranging from 3.16% - 21.67% are *X. speciosus*, *T. arboreus*, *P. connarifolium*, *E. didyma*, *Drypetes* sp., *T. villariana*, *A. ahernianum*, *C. blancoi*, *P. foxworthyii*, *C. dicoccum*, *A. macrophylla*, *B. palustris*, *C. pentapetalum*, *M. bornensis*, and *P. luzoniensis*. On the other hand, *P. pentandrum* locally known as Mamalis had the lowest computed important value of 2.75%.

## 2. Sampling site 2 - Kinurong Siltation Pond

The importance value for all species found at Sampling Site 2 is presented in **Table 14**. There are 28 different species of trees identified with a total of 96 tree individuals recorded within the sampling site. The exotic species *S. macrophylla* commonly known as Mahogany has obtained the highest importance value of 79.78%. This was followed by *C. formosum* more particularly known as Salinggogon with importance value of 42.12% while *A. blancoi* locally known as Antipolo had 33.54%. Other species of trees encountered such as *C. bartramia*, *E. cumingii*, *C. Asperum*, *A. Auriculiformis*, *G. arborea*, *A. ahernianum*, *L. splendens*, *M. tanarius*, *C. dicoccum*, *V. pubescens*, *A. auriculiformis*, *C. samarensis*, *P. luzonensis*, *P. nodosa*, *Ficus sp.*, *F. fragrans*, *I. bijuga*, *V. pubescens*, *N. vidalli*, *M. creaghii*, *Diospyrus sp.*, *C. blancoi*, *C. Luzoniensis* and *S. aqueum* had obtained lower important values ranging from 2.53% -23.33%.

## 3. Sampling area 4 - Magas-Magas

As shown in **Table 15**, *E. didyma* commonly known as Alupag had the highest computed importance value of 41.56%, followed by *E. cumingii* locally known as Hunggo and Palinlin had 37.18% and 24.04% importance value, respectively. The rest of the 19 species such as *O. ramiflorus*, *M. corymbosa*, *P. luzonensis*, *C. dicoccum*, *A. ahernianum*, *T. villariana*, *Mimosa sp.*, *Syzygium sp.*, *P. nodosa*, *P. connarifolium*, *G. paniculata*, *E. longifolia*, *S. aqueum*, and *C. blancoi* has an importance value range of 19.26 to 4.83%. and 5 scientifically unidentified local species namely Salingkugi, Balinto, Maglunawan, Marangkukutan and Sinamoman had importance value of 16.13%, 11.89%, 15.78%, 6.47% and 5.72 respectively. The *C. blancoi* species which is commonly known as Bitanghol had the lowest with 4.83%

## 4. Sampling Area 5 - Mt. Bulanjao

**Table 16** presents the importance value of 34 different species of trees encountered in sampling site 5 – Mt. Bulanjao area. Data revealed that *X. speciosus* known as Palawan Mangkono belonging to family Myrtaceae had the highest value of 85.14 % followed by *Syzygium sp.* also known as Wild Tambis had importance values of 28.39 %. Other existing species of trees identified in the sampling area such as *D. Luzoniensis*, *P. connarifolium*, *G. rumphianum*, *A. ahernianum*, *C. pentapetalum*, *T. arboreus*, *A. macrophylla*, *S. foxworthyi*, *A. saponaria*, *L. splendens*, *E. cumingii*, *Palaquim luzonensis*, *C. blancoi*, *B. arborescens*, *E. longifolia*, *M. creaghii*, *A. scholaris*, *Garcinia sp.*, *F. Bataanensis*, *A. penduculat*, *A. clypearia*, *C. discolor*, *T. villariana*, *M. borneensis*, *C. mercadoi*, *B. Microphylla*, *P. luzoniensis*, *Mimosa sp.*, *P. micrantha*, and *P. Odorata* and three (3) scientifically unidentified local species of Maglunawan, Talilisan and Magpango had importance value ranging from 19.88% to 0.90%.

## 5. Sampling site 8 - TSF 3

**Table 17** shows the importance value of 15 species of trees which belong to 12 families were encountered with corresponding 41 individuals recorded within the sampling area. An indigenous tree species named *C. formosum* with common name Salinggogon had the highest importance value 57.96% followed by *L. splendens* locally known as Amayan, *V. parviflora* commonly known as Molave, *A. macrophylla* also known as Batino and *G. coronulatum* or Kakaua with 37.87%, 35.47%, 34.98%, and 34.66

respectively. Other species such as *O. ramiflorus*, *B. arborescens*, *G. benthamii*, *E. cumingii*, *B. microphylla*, and *F. fragrans* Roxb. had importance value ranged from 7.13% to 22.66%. On the contrary, Marangkukutan *C. pentapetalum*, *A. squamulosa* and *P. depauperata*, have values ranged from 6.48% to 6.80% which are the lowest.

## 6. Importance Value Summary for All Sampling Sites

**Table 18** summarizes all the tree species encountered in five (5) assigned sampling sites (sampling site 1, sampling site 2, sampling site 4, sampling site 5 and, sampling site 8 TSF 3) which have recorded a total of 546 tree individuals from 70 different tree species encountered. All tree individuals recorded from 5 sampling sites are the main variable in estimating the Relative Density, Relative Dominance and Relative Frequency and the sum of these three indicators in the composition of forest vegetation was derived the species Importance Value. *X. speciosus* commonly known as Palawan Mangkono is the most dominant tree species with recorded importance value of 47.27 % followed by *G. rumphianum* particularly known as Mountain Agoho had obtained 23.14% while *Syzygium* sp., *S. macrophylla*, *P. connarifolium*, *D. Luzoniensis*, *L. splendens*, *A. ahernianum*, *C. formosum*, *E. cumingii*, *A. macrophylla* had an importance value ranging from 15.7% to 10.02 %. The rest of the remaining 57% of the sampling sites have an importance value ranging from 0.50% to 7.29%.

**Table 13.** Importance value for sampling site - 1A lbelnan.

No.	Scientific Name	Common/Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
1	<i>Gymnostoma rhumpianum</i>	Mt. Agoho	23	28.91	25.84	25.84	80.59
2	<i>Licania splendens</i>	Amayan	9	9.43	10.11	10.11	29.66
3	<i>Xanthostemon speciosus</i>	Palawan Mangkono	6	14.10	6.74	6.74	27.58
4	<i>Timonius arboreus</i>	Mabalod	7	4.87	7.87	7.87	20.60
5	<i>Protium connarifolium</i>	Marangub	6	5.78	6.74	6.74	19.26
6	<i>Dillenia luzoniensis</i>	Malakatmon	5	3.96	5.62	5.62	15.19
7	<i>Talauma villariana</i>	Patangis	5	3.35	5.62	5.62	14.58
8	<i>Drypetes sp.</i>	Ranta Ranta	4	3.45	4.49	4.49	12.44
9	<i>Euphoria didyma</i>	Alupag	3	4.46	3.37	3.37	11.20
10	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	2	3.85	2.25	2.25	8.35
11	<i>Arthrophyllum ahernianum</i>	Dokloi	2	2.43	2.25	2.25	6.93
12	<i>Diospyrus sp.</i>	Tandikan	2	1.62	2.25	2.25	6.12
13	<i>Canthium dicoccum</i>	Malakape	2	1.32	2.25	2.25	5.81
14	<i>Magnolia grandiflora</i>	Magnolia	2	1.21	2.25	2.25	5.70
15	<i>Planchonella foxworthyii</i>	Alalud	1	2.33	1.12	1.12	4.58
16		Masok Masok	1	1.42	1.12	1.12	3.67
17	<i>Alstonia macrophylla</i>	Batino/kurayan	1	1.12	1.12	1.12	3.36
18	<i>Brakenridgea palustris</i>	Brakenridgea	1	1.01	1.12	1.12	3.26
19	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis	1	0.91	1.12	1.12	3.16
20	<i>Callophyllum pentapetalum</i>	Pamitoyen	1	0.91	1.12	1.12	3.16
21	<i>Psychotria luzoniensis</i>	Tagpong gubat/Suwakaw	1	0.91	1.12	1.12	3.16
22	<i>Rothmania merilii</i>	Bagaay	1	0.71	1.12	1.12	2.96

Table 13 continued...

No.	Scientific Name	Common/Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
23	<i>Diospyrus philosanthera</i>	Kanomay/bolong-eta	1	0.71	1.12	1.12	2.96
24	<i>Dillenia monantha</i>	Katmon Bugtong	1	0.71	1.12	1.12	2.96
25	<i>Pittosporum pentandrum</i>	Mamalis	1	0.51	1.12	1.12	2.75
<b>Total</b>			<b>89</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>300.00</b>

Table 14. Importance value for sampling site 2 Kinurong Siltation Pond.

No.	Scientific Name	Common/Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
1	<i>Swietenia macrophylla</i>	Mahogany	26	25.61	27.08	27.08	79.78
2	<i>Cratoxylum formosum</i>	Salingogon	14	12.98	14.58	14.58	42.15
3	<i>Artocarpus blancoi</i>	Antipolo	9	14.79	9.38	9.38	33.54
4	<i>Alstonia macrophylla</i>	Batino/kurayan	7	8.75	7.29	7.29	23.33
5	<i>Commersonia bartramia</i>	Kakaag	5	5.32	5.21	5.21	15.74
6	<i>Eleocharis cumingii</i>	Katap/Pasi pasi/Hunggo	3	5.77	3.13	3.13	12.02
7	<i>Acacia Auriculiformis</i>	Japanese Acacia	2	3.43	2.08	2.08	7.59
8	<i>Canarium Asperum</i>	Sahing/Pagsahingin	4	2.98	4.17	4.17	11.31
9	<i>Gmelina arborea</i>	Gmelina/Yemane	2	2.07	2.08	2.08	6.24
10	<i>Arthrophyllum ahernianum</i>	Dokloi	3	2.43	3.13	3.13	8.68
11	<i>Licania splendens</i>	Amayan	3	2.07	3.13	3.13	8.32
12	<i>Canthium dicoccum</i>	Malakape	1	1.44	1.04	1.04	3.53
13	<i>Macaranga tanarius</i>	Binunga	1	1.44	1.04	1.04	3.53

Table 14 continued...

No.	Scientific Name	Common/Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
15	<i>Albizia Saponaria</i>	Salingkugi	2	0.99	2.08	2.08	5.16
16	<i>Pittosporum pentandrum</i>	Mamalis	1	0.90	1.04	1.04	2.99
17	<i>Palaquim luzonensis</i>	Aripa/Nato	1	0.81	1.04	1.04	2.89
18	<i>Polyscias nodosa</i>	Malapapaya	1	0.81	1.04	1.04	2.89
19	<i>Ficus sp.</i>	Ficus ulmifolia	1	0.72	1.04	1.04	2.80
20	<i>Fagraea fragrans</i>	Dulo/dolo	1	0.68	1.04	1.04	2.76
21	<i>Diospyrus sp.</i>	Tandakan	1	0.63	1.04	1.04	2.71
22	<i>Intsia bijuga</i>	Ipil	1	0.63	1.04	1.04	2.71
23	<i>Mezzettiopsis creaghii</i>	Tabingalan	1	0.63	1.04	1.04	2.71
24	<i>Neolitea vidalli</i>	Puso Puso	1	0.63	1.04	1.04	2.71
25	<i>Vitex pubescens</i>	Molawin mabuhok	1	0.63	1.04	1.04	2.71
26	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	1	0.59	1.04	1.04	2.67
27	<i>Psychotria luzoniensis</i>	Tagpong Gubat/Suwakaw	1	0.45	1.04	1.04	2.53
28	<i>Syzygium aqueum</i>	Tambis	1	0.45	1.04	1.04	2.53
<b>Total</b>			<b>96</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>300.00</b>

Table 15. Importance value for sampling site 4 Magas-Magas.

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
1	<i>Euphoria didyma</i>	Alupag	7	12.99	14.29	14.29	41.56
2	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo	6	12.69	12.24	12.24	37.18
3	<i>Buchannania microphylla</i>	Bokanana/Palinlin	3	11.79	6.12	6.12	24.04
4	<i>Ochrocarpus ramiflorus</i>	Bitok	3	7.02	6.12	6.12	19.26
5	<i>Maranthes corymbosa</i>	Liusin	1	5.97	2.04	2.04	10.05



Table 15. continued...

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
6	<i>Palaquim luzonensis</i>	Aripa/Nato	3	5.37	6.12	6.12	17.62
7	<i>Albizia Saponaria</i>	Salingkugi	3	3.88	6.12	6.12	16.13
8	<i>Canthium dicoccum</i>	Malakape	2	5.07	4.08	4.08	13.24
9		Maglunawan	2	7.61	4.08	4.08	15.78
10		Balinto	2	3.73	4.08	4.08	11.89
11	<i>Arthrophyllum ahernianum</i>	Dokloi	2	2.98	4.08	4.08	11.15
12	<i>Talauma villariana</i>	Patangis	2	2.84	4.08	4.08	11.00
13	<i>Mimosa sp.</i>	Diklay	2	2.84	4.08	4.08	11.00
14	<i>Syzygium sp.</i>	Wild Tambis	3	3.13	6.12	6.12	15.38
15	<i>Polyscias nodosa</i>	Malapapaya	1	1.94	2.04	2.04	6.02
16	<i>Achronesia pedunculata</i>	Marangkukutan	1	2.39	2.04	2.04	6.47
17	<i>Protium connarifolium</i>	Marangub	1	2.39	2.04	2.04	6.47
18	<i>Cinnamomum mercadoi</i>	Sinamoman/ Kalingag	1	1.64	2.04	2.04	5.72
19	<i>Gymnacranthera paniculata</i>	Anuping	1	1.19	2.04	2.04	5.28
20	<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali	1	0.90	2.04	2.04	4.98
21	<i>Syzygium aqueum</i>	Tambis	1	0.90	2.04	2.04	4.98
22	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	1	0.75	2.04	2.04	4.83
<b>Total</b>			<b>49</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>300.00</b>

**Table 16.** Importance value for sampling site 5 Mt. Bulanjao

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
1	<i>Xanthostemon speciosus</i>	Palawan Mangkono	78	27.58	28.78	28.78	85.14
2	<i>Syzygium sp.</i>	Wild Tambis	26	9.20	9.59	9.59	28.39
3	<i>Dillenia Luzoniensis</i>	Malakatmon	19	5.86	7.01	7.01	19.88
4	<i>Protium connarifolium</i>	Marangub	19	5.75	7.01	7.01	19.77
5	<i>Gymnostoma rumphianum</i>	Mt. Agoho	15	8.58	5.54	5.54	19.65
6	<i>Arthrophyllum ahernianum</i>	Dokloi	15	4.38	5.54	5.54	15.45
7	<i>Calophyllum pentapetalum</i>	Pamitoyen	11	4.43	4.06	4.06	12.55
8	<i>Licania splendens</i>	Amayan	11	2.67	4.06	4.06	10.79
9	<i>Timonius arboreus</i>	Mabalod	10	2.65	3.69	3.69	10.03
10		Maglunawan	6	5.02	2.21	2.21	9.45
11	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	6	3.33	2.21	2.21	7.75
12	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo	7	2.37	2.58	2.58	7.54
13	<i>Alstonia macrophylla</i>	Batino/kurayan	4	2.75	1.48	1.48	5.70
14	<i>Swintonia foxworthyi</i>	Apitong babui/Rimaraw	4	1.84	1.48	1.48	4.80
15		Talilisan	3	2.07	1.11	1.11	4.29
16	<i>Albizia saponaria</i>	Salingkugi	4	1.22	1.48	1.48	4.17
17	<i>Buchanania arborescens</i>	Balinghasai	4	1.02	1.48	1.48	3.97
18	<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali	3	0.72	1.11	1.11	2.94
19	<i>Mezzettiopsis creaghii</i>	Tabingalang	3	0.56	1.11	1.11	2.77
20	<i>Ficus bataanensis</i>	Bataan Fig	2	0.79	0.74	0.74	2.27
21	<i>Achronesia pedunculata</i>	Marangkukutan	2	0.69	0.74	0.74	2.17
22	<i>Achidendron clypearia</i>	Tiagkot	2	0.59	0.74	0.74	2.07
23	<i>Colona discolor</i>	Magbanotan	2	0.59	0.74	0.74	2.07
24	<i>Buchannania microphylla</i>	Bokanana/Palinlin	4	0.99	1.48	1.48	3.94
25	<i>Garcinia sp.</i>	Malatambis	2	0.53	0.74	0.74	2.00

Table 16 continued...

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
26	<i>Palaquim luzonensis</i>	Aripa/Nato	1	1.25	0.37	0.37	1.99
27	<i>Alstonia scholaris</i>	Dita	1	0.53	0.37	0.37	1.26
28	<i>Talauma villariana</i>	Patangis	1	0.43	0.37	0.37	1.17
29	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis	1	0.36	0.37	0.37	1.10
30	<i>Cinnamomum mercadoi</i>	Sinamoman/Kalingag	1	0.36	0.37	0.37	1.10
31		Magpango	1	0.26	0.37	0.37	1.00
32	<i>Mimosa sp.</i>	Diklay	1	0.23	0.37	0.37	0.97
33	<i>Pouteria micrantha</i>	Marapasi	1	0.23	0.37	0.37	0.97
34	<i>Premna depauperata</i>	Alagau	1	0.16	0.37	0.37	0.90
<b>Total</b>			<b>271</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>300.00</b>

Table 17. Importance value for sampling site 8 TSF 3.

No.	Scientific Name	Common/Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
1	<i>Cratoxylum formosum</i>	Salinggogon	8	18.94	19.51	19.51	57.96
2	<i>Licania splendens</i>	Amayan	5	13.48	12.20	12.20	37.87
3	<i>Vitex parviflora</i>	Molave/Mulawin	5	11.08	12.20	12.20	35.47
4	<i>Alstonia macrophylla</i>	Batino/kurayan	5	10.59	12.20	12.20	34.98
5	<i>Glochidion coronulatum</i>	Kakaua	5	10.27	12.20	12.20	34.66
6	<i>Ochrocarpus ramiflorus</i>	Bitok	3	8.03	7.32	7.32	22.66
7	<i>Buchanania arborescens</i>	Balinghasai	2	7.70	4.88	4.88	17.46
8	<i>Garcinia benthami</i>	Bunog	1	3.53	2.44	2.44	8.41
9	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo	1	3.53	2.44	2.44	8.41
10	<i>Buchannania microphylla</i>	Palinin	8	18.94	19.51	19.51	57.96

Table 17. continued...

No.	Scientific Name	Common/Local Name	No. of Individuals	Relative Dominance	Relative Density	Relative Frequency	Imptce. Value
				%	%	%	%
11	<i>Fagraea fragrans</i> Roxb.	Dulo/Dolo	1	2.25	2.44	2.44	7.13
12	<i>Achronesia pedunculata</i>	Marangkukutan	1	1.93	2.44	2.44	6.80
13	<i>Callophylum pentapetalum</i>	Pamitoyen	1	1.93	2.44	2.44	6.80
14	<i>Psychotria luzoniensis</i>	Tagpong Gubat	1	1.93	2.44	2.44	6.80
15	<i>Premna depauperata</i>	Alagau	1	1.61	2.44	2.44	6.48
<b>Total</b>			41	100.00	100.00	100.00	300.00

Table 18. Summary of importance values of all sampling sites

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance	Relative Density	Relative Frequency	Imptce. Value
				%	%	%	%
1	<i>Xanthostemon speciosus</i>	Palawan Mangkono	82	16.27	15.02	15.02	46.30
2	<i>Gymnostoma rumphianum</i>	Mt. Agoho	38	9.22	6.96	6.96	23.14
3	<i>Syzygium</i> sp.	Wild Tambis	29	5.08	5.31	5.31	15.70
4	<i>Swietenia macrophylla</i>	Mahogany	26	4.80	4.76	4.76	14.32
5	<i>Protium connarifolium</i>	Marangub	26	4.18	4.76	4.76	13.71
6	<i>Dillenia luzoniensis</i>	Malakatmon	24	3.67	4.40	4.40	12.46
7	<i>Licania splendens</i>	Amayan	28	1.91	5.13	5.13	12.17
8	<i>Arthrophyllum ahernianum</i>	Dokloi	22	3.45	4.03	4.03	11.51
9	<i>Cratoxylum formosum</i>	Salinggogon	22	3.43	4.03	4.03	11.49
10	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Pasi/Hunggo	17	3.92	3.11	3.11	10.15
11	<i>Alstonia macrophylla</i>	Batino/batinong gubat/kurayan	17	3.79	3.11	3.11	10.02
12	<i>Timonius arboreus</i>	Mabalod	17	2.17	3.11	3.11	8.40
13	<i>Callophylum pentapetalum</i>	Pamitoyen	13	2.53	2.38	2.38	7.29

Table 18 continued...

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Impctce. Value %
14		Maglonawan	8	3.44	1.47	1.47	6.37
15	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	10	2.54	1.83	1.83	6.21
16	<i>Artocarpus blancoi</i>	Antipolo	9	2.77	1.65	1.65	6.07
17	<i>Euphoria didyma</i>	Alupag	10	1.15	1.83	1.83	4.81
18	<i>Albizia saponaria</i>	Salingkugi	9	1.25	1.65	1.65	4.55
19	<i>Talauma villariana</i>	Patangis	8	1.10	1.47	1.47	4.03
20	<i>Buchanania microphylla</i>	Palinin	6	1.81	1.10	1.10	4.01
21	<i>Ochrocarpus ramiflorus</i>	Bitok	6	1.22	1.10	1.10	3.41
22	<i>Palaquim luzonensis</i>	Aripa/Nato	5	1.40	0.92	0.92	3.23
23	<i>Buchanania arborescens</i>	Balinghasai	6	0.93	1.10	1.10	3.13
24	<i>Vitex parviflora</i>	Molave/Mulawin	6	0.84	1.10	1.10	3.03
25	<i>Canthium dicoccum</i>	Malakape	5	1.06	0.92	0.92	2.90
26	<i>Commersonia bartramia</i>	Kakaag	5	1.00	0.92	0.92	2.83
27	<i>Swintonia foxworthyi</i>	Apitong babui/Rimaraw	4	0.95	0.73	0.73	2.41
28	<i>Glochidion coronulatum</i>	Kakaua	5	0.54	0.92	0.92	2.37
29		Talilisan	3	1.06	0.55	0.55	2.16
30	<i>Achronesia pedunculata</i>	Marangkukutan	4	0.61	0.73	0.73	2.07
31	<i>Drypetes sp.</i>	Ranta Ranta	4	0.57	0.73	0.73	2.04
32	<i>Canarium Asperum</i>	Sahing/Pagsahingin	4	0.56	0.73	0.73	2.02
33	<i>Mezzettiopsis creaghii</i>	Tabingalan	4	0.41	0.73	0.73	1.87
34	<i>Mimosa sp.</i>	Diklay	3	0.44	0.55	0.55	1.54
35	<i>Diospyrus sp.</i>	Tandakan	3	0.39	0.55	0.55	1.49
36	<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali	3	0.37	0.55	0.55	1.47
37	<i>Acacia Auriculiformis</i>	Japanese Acacia	2	0.64	0.37	0.37	1.37
38		Balinto	2	0.42	0.37	0.37	1.16

Table 18 continued...

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Impctce. Value %
40	<i>Gmelina arborea</i>	Gmelina/Yemane	2	0.39	0.37	0.37	1.12
41	<i>Cinnamomum mercadoi</i>	Sinamoman/Kalingag	2	0.37	0.37	0.37	1.10
42	<i>Polyscias nodosa</i>	Malapapaya	2	0.37	0.37	0.37	1.10
43	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis	2	0.34	0.37	0.37	1.07
44	<i>Maranthes corymbosa</i>	Liusin	1	0.68	0.18	0.18	1.04
45	<i>Colona discolor</i>	Magbanotan	2	0.30	0.37	0.37	1.04
46	<i>Achidendron clypearia</i>	Tiagkot	2	0.30	0.37	0.37	1.04
47	<i>Garcinia</i> sp.	Malatambis	2	0.27	0.37	0.37	1.00
48	<i>Fagraea fragrans</i>	Dulo/dolo	2	0.25	0.37	0.37	0.98
49	<i>Xanthostemon speciosus</i>	Palawan Mangkono	2	0.24	0.37	0.37	0.97
50	<i>Buchanania macrophylla</i>	Bokanana	2	0.20	0.37	0.37	0.94
51	<i>Magnolia grandiflora</i>	Magnolia	2	0.20	0.37	0.37	0.93
52	<i>Syzygium aqueum</i>	Tambis	2	0.19	0.37	0.37	0.92
53	<i>Premna depauperata</i>	Alagau	2	0.17	0.37	0.37	0.90
54	<i>Planchonella foxworthyi</i>	Alalud	1	0.39	0.18	0.18	0.76
55	<i>Macaranga tanarius</i>	Binunga	1	0.27	0.18	0.18	0.64
56	<i>Swintonia foxworthyi</i>	Dita	1	0.27	0.18	0.18	0.64
57		Masok Masok	1	0.24	0.18	0.18	0.60
58	<i>Garcinia benthami</i>	Bunog	1	0.19	0.18	0.18	0.55
59	<i>Brakenridgea palustris</i>	Brakenridgea	1	0.17	0.18	0.18	0.54
60	<i>Cryptocarya samarensis</i>	Kamalis/Kamali	1	0.17	0.18	0.18	0.54
61	<i>Psychotria luzoniensis</i>	Suwakaw	1	0.15	0.18	0.18	0.52
62	<i>Gymnacranthera paniculata</i>	Anuping	1	0.14	0.18	0.18	0.50
63	<i>Ficus</i> sp.	Ficus ulmifolia	1	0.14	0.18	0.18	0.50
64		Magpango	1	0.14	0.18	0.18	0.50
65	<i>Rothmania merilii</i>	Bagaay	1	0.12	0.18	0.18	0.48

Table 18 continued...

No.	Scientific Name	Local Name	No. of Individuals	Relative Dominance %	Relative Density %	Relative Frequency %	Imptce. Value %
66	<i>Intsia bijuga</i>	Ipil	1	0.12	0.18	0.18	0.48
67	<i>Diospyrus philosantha</i>	Kanomay/bolong-eta	1	0.12	0.18	0.18	0.48
68	<i>Dillenia monantha</i>	Katmon Bugtong	1	0.12	0.18	0.18	0.48
69	<i>Pouteria micrantha</i>	Marapasi	1	0.12	0.18	0.18	0.48
70	<i>Vitex pubescens</i>	Molawin mabuhok	1	0.12	0.18	0.18	0.48
71	<i>Neolitea vidalli</i>	Puso Puso	1	0.12	0.18	0.18	0.48
72	<i>Ardisia squamulosa</i>	Tagpo	1	0.10	0.18	0.18	0.47
73	<i>Eurycoma longifolia</i>	Tonkat Ali	1	0.10	0.18	0.18	0.47
74	<i>Pittosporum pentandrum</i>	Mamales	1	0.08	0.18	0.18	0.45
75	<i>Psychotria Luzoniensis</i>	Tagpong Gubat	1	0.08	0.18	0.18	0.45
<b>Total</b>			<b>546</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>300.00</b>



## F. DIVERSITY INDEX

### 1. Site 1A – Ibelnan

The diversity index at sampling site 1A was determined using Shannon's diversity index formula by determining the sum of all species encountered in sampling site 1A less the fraction of the entire population made up of the various species found in site 1 multiplied by the natural log of the fraction of the entire population made up of the various species found in site 1A. The result of diversity index takes into account the phylogenetic relations of the individuals distributed among those types, such as richness, divergence or evenness.

**Table 19** has a total of 89 encountered individual trees from various species and the Shannon diversity index is moderate at 2.7035 Mountain Agoho (*Gymnostoma rumphianum*) is the dominant tree species having 23 individuals. 26 are the total no. of species, 21 are identified up to genus level, and 5 unidentified species. The tree species in Ibelnan includes *L. splendens*, *T. arboreus*, *P. connarifolium*, *T. villariana*, *D. philippinensis*, *X. speciosus*, *Drypetes* sp., *E. didyma*, *A. ahernianum*, *M. grandiflora*, *C. dicocum*, *X. speciosus*, *C. blancoi*, *Diospyrus* sp., *Planchonella foxworthyii*, Masok Masok, *A. macrophylla*, *B. palustris*, *C. pentapetalum*, *P. luzoniensis*, *Rothmania merilii*, *D. philosanthera*, *D. monantha*, *Magnolia borneensis*, *D. luzoniensis*, *P. pentandrum*, and with natural log ranging from -0.2317 to -0.0504. The Evenness of 0.0.1117 is very low since majority of the number of individuals for every species is highly variable ranging from 1-9 while the highest number of species is at 23 for Mt. Agoho.

### 2. Site 2 – Kinurong Siltation Pond

Kinurong area has a total of 96 encountered individual tree from various trees species and has a diversity index of 2.6613 which is a moderate rating. Mahogany (*Swietenia macrophylla*) has the highest number of individuals at 26. The species shown in **Table 20** include *C. formosum*, *A. blancoi*, *A. macrophylla*, *C. bartramia*, *C. Asperum*, *E. cumingii*, *A. ahernianum*, *L. splendens*, *G. arborea*, *A. saponaria*, *A. auriculiformis*, *A. macrophylla*, *M. tanarius*, *C. dicocum*, *V. parviflora*, *A. auriculiformis*, *P. pentandrum*, *P. luzonensis*, *P. nodosa*, *Ficus* sp., *F. fragrans*, *I. bijuga*, *V. pubescens*, *N. vidalli*, *M. creaghii*, *Diospyrus* sp., *C. blancoi*, and *S. aqueum* with natural log ranging from -0.2808 to -0.0475.

### 3. Site 4 – Magas-Magas

In **Table 21**, sampling Site 4 has a total of 49 encountered tree species with Alupag (*Euphoria didyma*) as the dominant tree species. Site 4 has a diversity index of -2.888 that is moderate in rating. There are 20 identified tree species which include *E. didyma*, *E. cumingii*, *P. luzonensis*, *O. ramiflorus*, *Mimosa* sp., *A. ahernianum*, *C. dicocum*, *T. villariana*, *G. paniculata*, *S. urdanetensis*, *P. nodosa*, *P. connarifolium*, *B. microphylla*, *C. blancoi*, *E. longifolia*, *S. aqueum*, *A. pedunculata*, *C. mercadoi* and *Syzygium* sp. with diversity indices from 0.079 to 0.278. There are 2 tree species identified according to the common or local name such as Balinto, Maglunawan with diversity index of 0.131.

#### 4. Site 5 – Mt. Bulanjao

In **Table 22** sampling site 5 has a total of 271 tree individuals and its diversity index is moderate at 2.760 with *X. speciosus* or Palawan Mangkono as the dominant tree species having 78 number of individuals. The tree species in site 5 as shown below include, *Syzygium sp.*, *D. luzoniensis*, *P. connarifolium*, *A. ahernianum*, *G. rumphianum*, *L. splendens*, *C. pentapetalum*, *T. arboreus*, *E. cumingii*, *C. blancoi*, *A. macrophylla*, *S. foxworthyi*, Tallisan, *A. saponaria*, *B. arborescens*, *E. longifolia*, *M. creaghii*, *F. Bataanensis*, *A. penduculata*, *A. clypearia*, *C. discolor*, *B. microphylla*, *Garcinia sp.*, *P. luzonensis*, *B. Macrophylla*, *T. villariana*, *M. borneensis*, *C. mercadoi*, Magpango, *Mimosa sp.*, *P. micrantha*, and *P. depauperate* with diversity indices ranging from 0.021 to 0.358. The number of individual trees also has a high variability with 9 species having more than 10 individuals.

#### 5. Site 8 – TSF 3

As shown in **Table 23**, the importance value of 15 species of trees encountered with corresponding 41 individuals recorded within the sampling area. An indigenous tree species of *C. formosum* also known as Salinggogon/Kakawa had recorded the highest diversity index  $H'$  having 0.32 followed by *L. splendens* locally known as Amayan with 0.26 and *V. parviflora* commonly known as Molave has recorded of the same value while *A. macrophylla* also known as Batino ranked third of the population encountered within the sampling area. Other species identified and recorded are *O. ramiflorus*, *B. arborescens*, *G. benthami*, *E. cumingii*, *F. fragrans*, *C. pentapetalum*, *A. squamulosa*, *P. odorata* and *A. penduculata* have recorded the diversity indices ranging from 0.09 to 0.19.

#### 6. Diversity Index for all sampling sites

**Table 24** shows the summary of diversity indices for all sampling sites. Sampling site 8 or TSF 3 had a low diversity index at 2.409. Sampling sites 1, 2, 4 and 5 had moderate diversity index at 2.703, 2.661, 2.888, 2.760 and 2.409 respectively. The overall diversity index is moderate at 2.684.

The tabulation for the five sites (S1, S2, S4, S5 and S8 TSF 3) determined the composition of its vegetation, considering the situation at present where species of plants were decreasing due to the development in the area. The data shown in **Table 24** are based on the ratings for diversity index. The Site 1A Ibelnan got a diversity Index of 2.703 with a moderate rating on the no. of species present in the area so was Site 2 Kinurong siltation pond having a diversity Index of 2.661 rated too as moderate rating. Site 4 had a moderate rating of diversity index at 2.888 while site 5 Mt. Bulanjao obtained a diversity index of 2.760 which is moderate in rating. While, TSF3 or sampling area 8 has a diversity Index of 2.409 has a low rating as the lowest in all ratings made for the different sampling area that were assessed during the study because of the very low number of individuals for each species which is below 10. The vegetation present in the said area were too damaged and the flora were likely to disappear and are critically endangered. Conservation and rehabilitation must take place to conserve and preserved the area mentioned and it should be done immediately. And, also due for being ultramafic type of soil, with high percentage of metals content in the area.

**Table 19.** Diversity Index of Site 1A – Ibelnan.

No.	Scientific Name	Common/Local Name	No. of Individuals	P <sub>i</sub>	ln P <sub>i</sub>	H'	J'
1	<i>Gymnostoma rhumpianum</i>	Mt. Agoho	23	0.26	-1.35	-0.3497	-0.00145
2	<i>Licania splendens</i>	Amayan	9	0.10	-2.29	-0.2317	-0.00096
3	<i>Timonius arboreus</i>	Mabalod	7	0.08	-2.54	-0.2000	-0.00083
4	<i>Xanthostemon speciosus</i>	Palawan Mangkono	6	0.07	-2.70	-0.1818	-0.00075
5	<i>Protium connarifolium</i>	Marangub	6	0.07	-2.70	-0.1818	-0.00075
6	<i>Dillenia luzoniensis</i>	Malakatmon	5	0.06	-2.88	-0.1618	-0.00067
7	<i>Talauma villariana</i>	Patangis	5	0.06	-2.88	-0.1618	-0.00067
8	<i>Drypetes</i> sp.	Ranta Ranta	4	0.04	-3.10	-0.1394	-0.00058
9	<i>Euphoria didyma</i>	Alupag	3	0.03	-3.39	-0.1143	-0.00047
10	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	2	0.02	-3.80	-0.0853	-0.00035
11	<i>Arthropphyllum ahernianum</i>	Dokloi	2	0.02	-3.80	-0.0853	-0.00035
12	<i>Diospyrus</i> sp.	Tandikan	2	0.02	-3.80	-0.0853	-0.00035
13	<i>Canthium dicoccum</i>	Malakape	2	0.02	-3.80	-0.0853	-0.00035
14	<i>Magnolia grandiflora</i>	Magnolia	2	0.02	-3.80	-0.0853	-0.00035
15	<i>Planchonella foxworthyii</i>	Alalud	1	0.01	-4.49	-0.0504	-0.00021
16		Masok Masok	1	0.01	-4.49	-0.0504	-0.00021
17	<i>Alstonia macrophylla</i>	Batino/kurayan	1	0.01	-4.49	-0.0504	-0.00021
18	<i>Brakenridgea palustris</i>	Brakenridgea	1	0.01	-4.49	-0.0504	-0.00021
19	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis	1	0.01	-4.49	-0.0504	-0.00021
20	<i>Callophyllum pentapetalum</i>	Pamitoyen	1	0.01	-4.49	-0.0504	-0.00021
21	<i>Psychotria luzoniensis</i>	Suwakaw	1	0.01	-4.49	-0.0504	-0.00021
22	<i>Rothmania merilii</i>	Bagaay	1	0.01	-4.49	-0.0504	-0.00021
23	<i>Diospyrus philosanthera</i>	Kanomay/bolong-eta	1	0.01	-4.49	-0.0504	-0.00021
24	<i>Dillenia monantha</i>	Katmon Bugtong	1	0.01	-4.49	-0.0504	-0.00021
25	<i>Pittosporum pentandrum</i>	Mamalis	1	0.01	-4.49	-0.0504	-0.00021
<b>Total</b>			<b>89</b>	<b>1.00</b>	<b>92.18</b>	<b>-2.7035</b>	<b>-0.01117</b>

**Table 20.** Diversity Index of Site 2 – Kinurong Siltation Pond.

No.	Scientific Name	Common/Local Name	No. of Individuals	Pi	ln Pi	- (Pi * ln Pi)	
1	Swietenia macrophylla	Mahogany	26	0.271	-1.306	-0.3538	-0.0014
2	Cratoxylum formosum	Salingogon	14	0.146	-1.925	-0.2808	-0.0011
3	Artocarpus blancoi	Antipolo	9	0.094	-2.367	-0.2219	-0.0009
4	Alstonia macrophylla	Batino/kurayan	7	0.073	-2.618	-0.1909	-0.0007
5	Commersonia bartramia	Kakaag	5	0.052	-2.955	-0.1539	-0.0006
6	Eleocharis cumingii	Katap/Pasi pasi/Hunggo	3	0.031	-3.466	-0.1083	-0.0004
7	Acacia Auriculiformis	Japanese Acacia	2	0.021	-3.871	-0.0807	-0.0003
8	Canarium Asperum	Sahing/Pagsahingin	4	0.042	-3.178	-0.1324	-0.0005
9	Gmelina arborea	Gmelina/Yemane	2	0.021	-3.871	-0.0807	-0.0003
10	Arthropodium ahernianum	Dokloi	3	0.031	-3.466	-0.1083	-0.0004
11	Licania splendens	Amayan	3	0.031	-3.466	-0.1083	-0.0004
12	Canthium dicoccum	Malakape	1	0.010	-4.564	-0.0475	-0.0002
13	Macaranga tanarius	Binunga	1	0.010	-4.564	-0.0475	-0.0002
14	Vitex parviflora	Molave/Mulawin	1	0.010	-4.564	-0.0475	-0.0002
15	Albizia saponaria	Salingkugi	2	0.021	-3.871	-0.0807	-0.0003
16	Pittosporum pentandrum	Mamalis	1	0.010	-4.564	-0.0475	-0.0002
17	Palaquium luzonensis	Aripa/Nato	1	0.010	-4.564	-0.0475	-0.0002
18	Polyscias nodosa	Malapapaya	1	0.010	-4.564	-0.0475	-0.0002
19	Ficus sp.	Ficus ulmifolia	1	0.010	-4.564	-0.0475	-0.0002
20	Fagraea fragrans	Dulo/dolo	1	0.010	-4.564	-0.0475	-0.0002
21	Diospyrus sp.	Tandakan	1	0.010	-4.564	-0.0475	-0.0002
22	Intsia bijuga	Ipil	1	0.010	-4.564	-0.0475	-0.0002
23	Mezzettiaopsis creaghii	Tabingalan	1	0.010	-4.564	-0.0475	-0.0002
24	Neolitea vidalli	Puso Puso	1	0.010	-4.564	-0.0475	-0.0002

Table 20 continued...

No.	Scientific Name	Common/Local Name	No. of Individuals	P <sub>i</sub>	ln P <sub>i</sub>	H'	J'
25	<i>Vitex pubescens</i>	Molawin mabuhok	1	0.010	-4.564	-0.0475	-0.0002
26	<i>Calophyllum blancoi</i>	Palomaria/dangkalan	1	0.010	-4.564	-0.0475	-0.0002
27	<i>Psychotria luzoniensis</i>	Tagpong Gubat	1	0.010	-4.564	-0.0475	-0.0002
28	<i>Syzygium aqueum</i>	Tambis	1	0.010	-4.564	-0.0475	-0.0002
<b>Total</b>			<b>96</b>	<b>1.00</b>	<b>-109.39</b>	<b>2.6613</b>	<b>0.01020</b>

Table 21. Diversity Index of Site 4 – Magas-Magas.

No.	Scientific Name	Common/Local Name	No. of Individuals	P <sub>i</sub>	ln P <sub>i</sub>	H'	J'
1	<i>Euphoria didyma</i>	Alupag	7	0.143	-1.946	-0.278	-0.002
2	<i>Eleocharis cumingii</i>	Katap/Pasi pasi/Hunggo	6	0.122	-2.100	-0.257	-0.002
3	<i>Buchanania microphylla</i>	Palinlin	3	0.061	-2.793	-0.171	-0.001
4	<i>Ochrocarpus ramiflorus</i>	Bitok	3	0.061	-2.793	-0.171	-0.001
5	<i>Maranthes corymbosa</i>	Liusin	1	0.020	-3.892	-0.079	-0.001
6	<i>Palaquim luzonensis</i>	Aripa/Nato	3	0.061	-2.793	-0.171	-0.001
7		Salingkugi	3	0.061	-2.793	-0.171	-0.001
8	<i>Canthium dicoccum</i>	Malakape	2	0.041	-3.199	-0.131	-0.001
9		Maglunawan	2	0.041	-3.199	-0.131	-0.001
10		Balinto	2	0.041	-3.199	-0.131	-0.001
11	<i>Arthropodium ahernianum</i>	Dokloi	2	0.041	-3.199	-0.131	-0.001
12	<i>Talauma villariana</i>	Patangis	2	0.041	-3.199	-0.131	-0.001
13	<i>Mimosa sp.</i>	Diklay	2	0.041	-3.199	-0.131	-0.001
14	<i>Syzygium</i>	Wild Tambis	3	0.061	-2.793	-0.171	-0.001
15	<i>Polyscias nodosa</i>	Malapapaya	1	0.020	-3.892	-0.079	-0.001

Table 21. continued...

No.	Scientific Name	Common/Local Name	No. of Individuals	Pi	ln Pi	H'	J'
16	<i>Achronesia pedunculata</i>	Marangkukutan	1	0.020	-3.892	-0.079	-0.001
17	<i>Protium connarifolium</i>	Marangub	1	0.020	-3.892	-0.079	-0.001
18	<i>Cinnamomum mercadoi</i>	Sinamoman/ Kalingag	1	0.020	-3.892	-0.079	-0.001
19	<i>Gymnacranthera paniculata</i>	Anuping	1	0.020	-3.892	-0.079	-0.001
20	<i>Eurycoma longifolia</i>	Tonkat Ali	1	0.020	-3.892	-0.079	-0.001
21	<i>Syzygium aqueum</i>	Tambis	1	0.020	-3.892	-0.079	-0.001
22	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	1	0.020	-3.892	-0.079	-0.001
Total			49	1.00	72.230	-2.888	-0.022

Table 22. Diversity Index of Site 5 – Mt. Bulanjao.

No.	Scientific Name	Common/Local Name	No. of Individuals	Pi	ln Pi	H'	J'
1	<i>Xanthostemon speciosus</i>	Palawan Mangkono	78	0.288	-1.245	-0.358	0.000
2	<i>Syzygium sp.</i>	Wild Tambis	26	0.096	-2.344	-0.225	0.000
3	<i>Dillenia Luzoniensis</i>	Malakatmon	19	0.070	-2.658	-0.186	0.000
4	<i>Protium connarifolium</i>	Marangub	19	0.070	-2.658	-0.186	0.000
5	<i>Gymnostoma rumphianum</i>	Mt. Agoho	15	0.055	-2.894	-0.160	0.000
6	<i>Arthropodium ahernianum</i>	Dokloi	15	0.055	-2.894	-0.160	0.000
7	<i>Calophyllum pentapetalum</i>	Pamitoyen	11	0.041	-3.204	-0.130	0.000
8	<i>Licania splendens</i>	Amayan	11	0.041	-3.204	-0.130	0.000
9	<i>Timonius arboreus</i>	Mabalod	10	0.037	-3.300	-0.122	0.000
10		Maglunawan	6	0.022	-3.810	-0.084	0.000
11	<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	6	0.022	-3.810	-0.084	0.000
12	<i>Eleocharis cumingii</i>	Katap/Pasi pasi/Hunggo	7	0.026	-3.656	-0.094	0.000

Table 22 continued...

No.	Scientific Name	Common/Local Name	No. of Individuals	Pi	ln Pi	H'	J'
13	<i>Alstonia macrophylla</i>	Batino/kurayan	4	0.015	-4.216	-0.062	0.000
14	<i>Swintonia foxworthyi</i>	Apitong babui/Rimaraw	4	0.015	-4.216	-0.062	0.000
15		Talilisan	3	0.011	-4.504	-0.050	0.000
16		Salingkugi	4	0.015	-4.216	-0.062	0.000
17	<i>Buchanania arborescens</i>	Balinghasai	4	0.015	-4.216	-0.062	0.000
18	<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali	3	0.011	-4.504	-0.050	0.000
19	<i>Mezzettiopsis creaghii</i>	Tabingalang	3	0.011	-4.504	-0.050	0.000
20	<i>Ficus Bataanensis</i>	Bataan Fig	2	0.007	-4.909	-0.036	0.000
21	<i>Achronesia pedunculata</i>	Marangkukutan	2	0.007	-4.909	-0.036	0.000
22	<i>Achidendron clypearia</i>	Tiagkot	2	0.007	-4.909	-0.036	0.000
23	<i>Colona discolor</i>	Magbanotan	2	0.007	-4.909	-0.036	0.000
24	<i>Buchannania microphylla</i>	Palinlin	2	0.007	-4.909	-0.036	0.000
25	<i>Garcinia sp.</i>	Malatambis	2	0.007	-4.909	-0.036	0.000
26	<i>Palaquim luzonensis</i>	Aripa/Nato	1	0.004	-5.602	-0.021	0.000
27	<i>Buchanania Macrophylla</i>	Bokanana	2	0.007	-4.909	-0.036	0.000
28	<i>Swintonia foxworthyi</i>	Dita	1	0.004	-5.602	-0.021	0.000
29	<i>Talauma villariana</i>	Patangis	1	0.004	-5.602	-0.021	0.000
30	<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis	1	0.004	-5.602	-0.021	0.000
31	<i>Cinnamomum mercadoi</i>	Sinamoman/Kalingag	1	0.004	-5.602	-0.021	0.000
32		Magpango	1	0.004	-5.602	-0.021	0.000
33	<i>Mimosa sp.</i>	Diklay	1	0.004	-5.602	-0.021	0.000
34	<i>Pouteria micrantha</i>	Marapasi	1	0.004	-5.602	-0.021	0.000
35	<i>Premna depauperata</i>	Alagau	1	0.004	-5.602	-0.021	0.000
<b>Total</b>			<b>271</b>	<b>1.00</b>	<b>-150.834</b>	<b>-2.760</b>	<b>0.004</b>

**Table 23.** Diversity Index of Site 8 -TSF 3.

No.	Scientific Name	Common/Local Name	No. of Individuals	Pi	ln Pi	H'	J'
1	<i>Cratoxylum formosum</i>	Salinggogon	8	0.20	-1.63	-0.32	-0.003
2	<i>Licania splendens</i>	Amayan	5	0.12	-2.10	-0.26	-0.002
3	<i>Vitex parviflora</i>	Molave/Mulawin	5	0.12	-2.10	-0.26	-0.002
4	<i>Alstonia macrophylla</i>	Batino/kurayan	5	0.12	-2.10	-0.26	-0.002
5	<i>Glochidion coronulatum</i>	Kakaua	5	0.12	-2.10	-0.26	-0.002
6	<i>Ochrocarpus ramiflorus</i>	Bitok	3	0.07	-2.61	-0.19	-0.002
7	<i>Buchanania arborescens</i>	Balinghasai	2	0.05	-3.02	-0.15	-0.001
8	<i>Garcinia benthami</i>	Bunog	1	0.02	-3.71	-0.09	-0.001
9	<i>Eleaocarpus cumingii</i>	Katap/Pasi pasi/Hunggo	1	0.02	-3.71	-0.09	-0.001
10	<i>Buchanania microphylla</i>	Bokanana/Palinin	1	0.02	-3.71	-0.09	-0.001
11	<i>Fagraea fragrans Roxb.</i>	Dulo/Dolo	1	0.02	-3.71	-0.09	-0.001
12	<i>Achronesia pedunculata</i>	Marangkukutan	1	0.02	-3.71	-0.09	-0.001
13	<i>Callophylum pentapetalum</i>	Pamitoyen	1	0.02	-3.71	-0.09	-0.001
14	<i>Ardisia squamolosa</i>	Tagpo	1	0.02	-3.71	-0.09	-0.001
15	<i>Premna depauperata</i>	Alagau	1	0.02	-3.71	-0.09	-0.001
<b>Total</b>			<b>41</b>	<b>1.00</b>	<b>-45.39</b>	<b>-2.41</b>	<b>0.022</b>

**Table 24.** Summary of diversity Index for all sampling sites.

Sampling Station	Diversity Index, H'	Rating
1A - Ibelnan	2.703	Moderate
2 - Kinurong Siltation Pond	2.661	Moderate
4 - Magas-Magas	2.888	Moderate
5 - Mt. Bulanjao	2.760	Moderate
8 - TSF 3	2.409	Low
<b>Overall</b>	<b>2.684</b>	<b>Moderate</b>



## G. EVENNESS INDEX FOR ALL SAMPLING SITES

**Table 25** presents the summary of evenness index for all sampling sites. Evenness is the count of individuals of each species in an area. Evenness indices for Site 1A, Site 2, Site 4, site 5 and sampling site 8 TSF 3 had very low evenness at 0.011, 0.010, 0.022, 0.004 and 0.022. The overall evenness was estimated at 0.002 which is very low which means that the number of individual species are highly variable in the areas sampled. This further indicates that few species have high number of individuals.

**Table 25.** Summary of Evenness Index for all sampling sites.

Sampling Station	Evenness, J'	Rating
1A - Ibelnan	0.011	Very Low
2 - Kinurong Siltation Pond	0.010	Very Low
4 - Magas-Magas	0.022	Very Low
5 - Mt. Bulanjao	0.004	Very Low
8 - TSF 3	0.022	Very Low
<b>Overall</b>	<b>0.068</b>	<b>Very Low</b>

## H. CONSERVATION STATUS

Shown in **Table 26** and in reference to PCSD resolution 15-521 on the updated list of terrestrial and marine wildlife in Palawan and their categories the tree species having >5 cm DBH were identified. Two of the 70 tree species were considered endangered, *E. longifolia* (Linatog/Tongkat Ali) and *V. parviflora* (Molave), four were considered vulnerable *C. pentapetalum* (Pamitoyen), *D. luzoniensis* (Malakatmon), *D. monantha* ((Katmon Bugtong), *D. philosanthera* (Bolong-eta) and the rest of the other species were considered as non-threatened.

The presence of threatened species in the areas studied implies that a careful management of the habitats where they are found should be done. Protection and conservation programs should be immediately crafted and implemented to avoid further damage on their population and habitat.

**Table 26** Conservation status based on PCSD resolution 15-521.

Scientific Name	Local/Common Name	Categories
<i>Eurycoma longifolia</i>	Linatog/Tonkat Ali	Endangered
<i>Vitex parviflora</i>	Molave/Mulawin	Endangered
<i>Callophylum pentapetalum</i>	Pamitoyen	Vulnerable
<i>Dillenia luzoniensis</i>	Malakatmon	Vulnerable
<i>Dillenia monantha</i>	Katmon Bugtong	Vulnerable

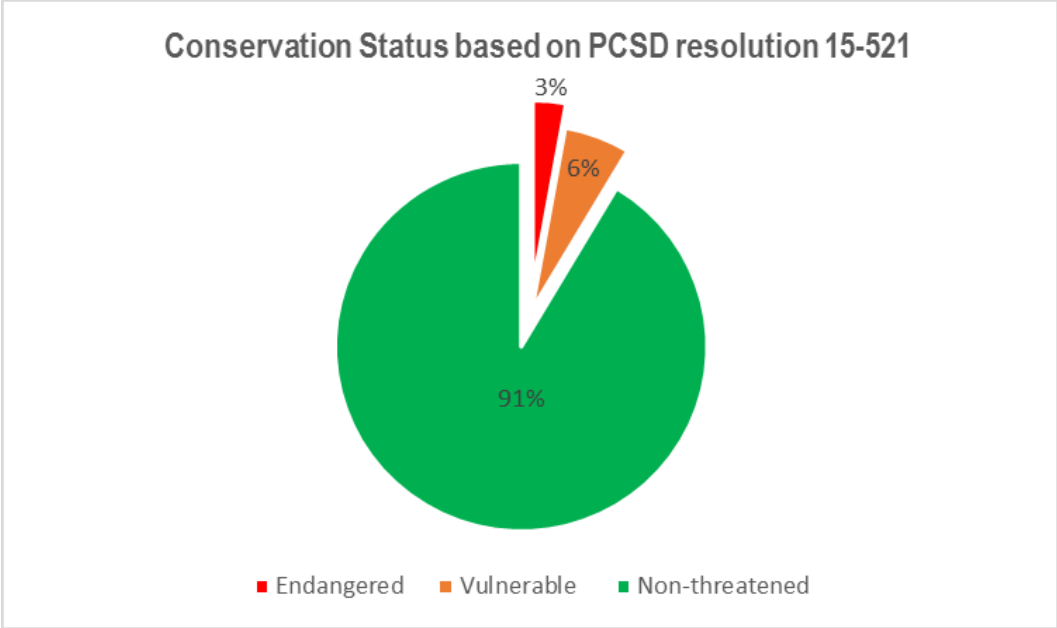
Table 26 continued...

Scientific Name	Local/Common Name	Categories
<i>Diospyrus philosanthera</i>	Kanomay/bolong-eta	Vulnerable
<i>Acacia Auriculiformis</i>	Japanese Acacia	Non-Threatened
<i>Achidendron clypearia</i>	Tiagkot	Non-Threatened
<i>Achronesia pedunculata</i>	Marangkukutan	Non-Threatened
<i>Albizia saponaria</i>	Salingkugi	Non-Threatened
<i>Alstonia macrophylla</i>	Batino/kurayan	Non-Threatened
<i>Alstonia scholaris</i>	Palawan Dita	Non-Threatened
<i>Ardisia squamulosa</i>	Tagpo	Non-Threatened
<i>Arthropodium ahernianum</i>	Dokloi	Non-Threatened
<i>Artocarpus blancoi</i>	Antipolo	Non-Threatened
<i>Brakenridgea palustris</i>	Brakenridgea	Non-Threatened
<i>Buchanania arborescens</i>	Balinghasai	Non-Threatened
<i>Buchanania Macrophylla</i>	Bokanana/Palinlin	Non-Threatened
<i>Calophyllum blancoi</i>	Palomaria/Bitanghol	Non-Threatened
<i>Canarium Asperum</i>	Sahing/Pagsahingin	Non-Threatened
<i>Canthium dicoccum</i>	Malakape	Non-Threatened
<i>Cinnamomum mercadoi</i>	Sinamoman/Kalingag	Non-Threatened
<i>Colona discolor</i>	Magbanotan	Non-Threatened
<i>Commersonia bartramia</i>	Kakaag	Non-Threatened
<i>Cratoxylum formosum</i>	Salinggogon	Non-Threatened
<i>Diospyrus sp.</i>	Tandikan	Non-Threatened
<i>Drypetes sp.</i>	Ranta Ranta	Non-Threatened
<i>Eleaocarpus cumingii</i>	Katap/Pasi pasiHunggo	Non-Threatened
<i>Euphoria didyma</i>	Alupag	Non-Threatened
<i>Fagraea fragrans</i>	Dulo/dolo	Non-Threatened
<i>Ficus Bataanensis</i>	Bataan Fig	Non-Threatened
<i>Ficus sp.</i>	Ficus ulmifolia	Non-Threatened
<i>Garcinia benthami</i>	Bunog	Non-Threatened
<i>Garcinia sp.</i>	Malatambis	Non-Threatened
<i>Glochidion coronulatum</i>	Kakaua	Non-Threatened
<i>Gmelina arborea</i>	Gmelina/Yemane	Non-Threatened
<i>Gymnacranthera paniculata</i>	Anuping	Non-Threatened
<i>Gymnostoma rumphianum</i>	Mt. Agoho	Non-Threatened
<i>Intsia bijuga</i>	Ipil	Non-Threatened
<i>Licania splendens</i>	Amayan	Non-Threatened
<i>Macaranga tanarius</i>	Binunga	Non-Threatened

Table 26 continued...

Scientific Name	Local/Common Name	Categories
<i>Magnolia borneensis</i>	Maglandak/Palawan Patangis	Vulnerable
<i>Magnolia grandiflora</i>	Magnolia	Non-Threatened
<i>Maranthes corymbosa</i>	Liusin	Non-Threatened
<i>Mezzettiopsis creaghii</i>	Tabingalang	Non-Threatened
<i>Mimosa sp.</i>	Diklay	Non-Threatened
<i>Neolitea vidalli</i>	Puso Puso	Non-Threatened
<i>Ochrocarpus ramiflorus</i>	Bitok	Non-Threatened
<i>Palaquim luzonensis</i>	Aripa/Nato	Non-Threatened
<i>Pittosporum pentandrum</i>	Mamalis	Non-Threatened
<i>Planchonella foxworthyii</i>	Alalud	Non-Threatened
<i>Polyscias nodosa</i>	Malapapaya	Non-Threatened
<i>Pouteria micrantha</i>	Marapasi	Non-Threatened
<i>Premna depauperata</i>	Alagau	Non-Threatened
<i>Protium connarifolium</i>	Marangub	Non-Threatened
<i>Psychotria luzoniensis</i>	Tagpong Gubat /Suwakaw	Non-Threatened
<i>Rothmania merilii</i>	Bagaay	Non-Threatened
<i>Swietenia macrophylla</i>	Mahogany	Non-Threatened
<i>Swintonia foxworthyi</i>	Apitong babui/Rimaraw	Non-Threatened
<i>Syzygium aqueum</i>	Tambis	Non-Threatened
<i>Syzygium sp.</i>	Wild Tambis	Non-Threatened
<i>Talauma villariana</i>	Patangis	Non-Threatened
<i>Timonius arboreus</i>	Mabalod	Non-Threatened
<i>Vitex pubescens</i>	Molawin mabuhok	Non-Threatened
<i>Xanthostemon speciosus</i>	Palawan Mangkono	Non-Threatened
	Balinto	Non-Threatened
	Masok Masok	Non-Threatened
	Magpango	Non-Threatened
	Maglonawan	Non-Threatened
	Talilisan	Non-Threatened

**Figure 3** shows the graphical presentation of the conservation status of all tree species in HPP site based on PCSD resolution no. 15-521. The study revealed that 3% of the total population was categorized as endangered, 6% were vulnerable and the remaining 91% were non-threatened.



**Figure 3.** Graphical presentation on the conservation status of the tree species in HPP site.

## IV. Conclusion

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The sampling sites are generally second growth forest, grassland, and brushlands. Forested areas in Ibelnan and Mt. Bulanjao were mixed hardwoods. The presence of good vegetation in the area is an indication that it is still intact with preserved endemic and indigenous flora species. An example for this was the presence of the rare plants like *Microrhodium elmerianum*. Alteration in vegetation cover was minimal and the vegetated areas are still favorable as habitat for animals.

TSF 1 is a product of a progressive rehabilitation done by the CBNC management. It has effectively displayed a successful rehabilitation of mine tailings impoundment or mined out areas by converting them into stable manmade forest ecosystem. Monitoring site 3 (Nagoya Beach) also demonstrates an effort of reforestation is a good environmental initiative along the shoreline with thriving thick forest cover, indicating a healthy mangrove forest ecosystem.

Assessment results over Ibelnan, Kinurong Siltation Pond, Magas-Magas, Mt. Bulanjao, and TSF 3 monitoring sites showed 546 individuals recorded belonging to 70 different tree species and 34 families. At the understory level, a total of 84 plant species were identified, belonging to 51 families. *Xanthostemon speciosus* commonly known as Palawan Mangkono is the most dominant tree species with recorded importance value of 47.27% followed by *G. rumphianum* (Mountain Ago) with 23.14%. Sampling site 8 or TSF 3 had a low diversity index at 2.409 while sites 1, 2, 4 and 5 had moderate diversity index at 2.703, 2.661, 2.888, 2.760 and 2.409, respectively.

The overall diversity index of monitoring sites was estimated at 2.684 which is described as moderately diverse. The overall evenness on the other hand was estimated at 0.002, which is very low indicating that the number of individuals of tree species were highly variable with only few species having number of individuals dominating the monitoring areas. These results were attributed mainly to the soil characteristics of the sampling sites being ultrabasic, a soil deficient of essential minerals to support growth and development of plants/trees. Ultrabasic or ultramafic soil environment is dominated by elements which are toxic to most plants.

Based on PCSD resolution 15-521 there were 2 endangered species *E. longifolia* (Tongkat ali) and *V. parviflora* (Molave), 4 vulnerable species *C. pentapetalum* (Pamitoyen), *D. luzoniensis* (Malakatmon), *D. monantha* (Katmon bugtong) and *D. philosanthera* (Bolong-eta) and 64 others are non-threatened species.

## V. Recommendations

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Based on the findings of this study, the following are recommended:

1. Enrichment planting through assisted natural regeneration should be done in order to increase tree species evenness.
2. Identified endangered and vulnerable species should be prioritized as planting materials for enrichment planting and in rehabilitating mined out areas as measures to conserve them.
3. In case that portion of the forest cover are utilized for mining, a permanent conservation area must be designated that could allow the survival and reproduction of those identified threatened flora species for their protection and conservation must be implemented.
4. An enhanced monitoring system such as foot patrolling combined with frequent aerial drone coverage over existing forest cover within the MPSA including but not limited to Site 3 Nagoya Beach and Site 8 TSF 3 should be established to prevent encroachment by nearby communities.
5. Publish a miscellany of endemic flora at the HPP project site to further promote the biodiversity and preservation of species vis-à-vis of the on-going development and other related activities.

## VI. References

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- Pancho J. V., 1983. *Kalikasan The Philippine Journal of Biology Supplement No. 1. "Vascular Flora of Mount Makiling and Vicinity (Luzon: Philippines), Part 1* New Mercury Printing Press Quezon City, Philippines.

- Pancho J.V., and Gruezo W. Sm. 2006. *Vascular Flora of Mount Makiling and Vicinity (Luzon: Philippines), Part 2* National Academy of Science and Technology (NAST) Taguig City and Institute of the Philippines Los Banos, Laguna, Philippines.
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- Salvosa, F.M. 1963. *Lexicon of the Philippine Trees. Forest Products* Research Institute, College Laguna, Philippines.
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**ANNEX A. PHOTO-DOCUMENTATION OF SELECTED FLORA FOUND IN HPP VICINITY**

**PHOTOGRAPHS OF SELECTED FLORA FOUND IN  
CORAL BAY NICKEL CORPORATION (CBNC)  
RIO TUBA, PALAWAN**

## LOWER VASCULAR PLANTS

### Ferns and Fern Allies :

#### 1. Family : Polypodiaceae

- a) S. N. : *Pyrrisia adnacens* (Sw.) Ching  
L. N. : Apatpat andodologapdi (Luzon); Humang anapatpat; Holg



- b) S. N. : *Pyrossia piloselloides* (Linn.) Price  
L. N. : Dragon's scale fern (Engl.) ; Pagong-pagongan (Tag.)



2. Family : **Aspleniaceae**

a) S. N. : *Asplenium nidus* Linn.

L. N. : Bird's Nest fern (Eng.); Pakpak lawin/ Pugad Lawin (Tag.)



**Angiosperms:**  
(Monocots and Dicots)

**A. Monocots:**

1. Family : **Alismanthaceae**

a) S.N. : *Sagittaria leucopetala* (Miq.) Gruez

L. N. : Tikog



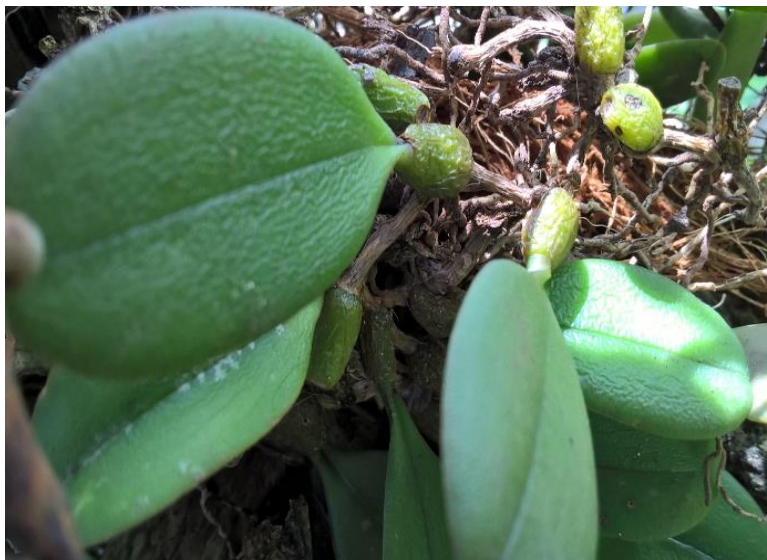


2. Family : Orchidaceae

- a) S.N.: *Aerides cootesii*  
L . N. : Aerides



- b) S.N. : *Cirrophetallum* sp.  
L.N. : NONE



- c) **S.N.** : *Habenaria* sp. (1)  
**L. N.** : Habenaria



- d) **S.N.** : *Habenaria* sp. (2)  
**L. N.**: Habenaria





- e) S.N. : *Nervilla* sp.  
L.N. : *Nervilla*



3. Family : Pandanaceae  
a) S.N. : *Pandan* sp.  
L. N. : *Pandan*



**B. Dicots**

**1. Family : Acanthaceae**

- a) S.N. : *Hemigraphis* sp.  
L.N. : Metal leaf



**2. Family : Apocynaceae**

- a) S.N. : *Ervatamia pandacaqui* (Poir.) Pichon  
L.N. : Pandakaki (Tag.)





3. **Family : Asclepiadaceae**

- a) **S.N. :** *Dischidia purpurea*  
**L.N. :** Dischidia



4. **Family : Euphorbiaceae**

- a) **S.N. :** *Antidesma obliquinervum* Merr.  
**L.N. :** Bignay Gubat





5. Family : Gentianaceae

- a) S.N. : *Microrhium elmerianum* Regalado & Soejarto  
L. N. : NONE



6. Family : Leguminosae/Fabaceae

- a) S.N. : *Archidendron clypearia* var. *casai*  
L. N. : Ipil-ipilang gubat



7. Family : Myrtaceae

- a) S.N. : *Xantosthemon speciosus*  
L. N. : Mancono/Mangkono



8. Family : Nepenthaceae

- a) S.N. : *Nepenthes philippinensis*  
L. N. : Pitcher plant (Engl.); Kuong-kuong (Tbw.)





9. Family : Ochnaceae

- a) S.N. : *Brakenridgea palustris*  
L. N. : NONE



10. Family: Rubiaceae

- a) S.N. : *Ixora palawanensis*  
L. N. : Wild Santan



b) **S.N.** : *Mussaenda palawanensis*  
**L.N.** : Kahoy dalaga (Tag.)



11. **Family** : Simaroubaceae  
a) **S.N.** : *Eurycoma longifolia* Jack.  
**L. N.** : Tonkat ali





# ANNEX B. PHOTO-DOCUMENTATION AT ALL SAMPLING SITES

Sampling site 1A: Ibelnan





Sampling Site1A: Ibelnan



Sampling Site 2 Kinurong (Natural Forest)





Nagoya Beach (Observation Site)



TSF 1 Rehabilitation Area





Sampling Site 4 Magas-Magas (Natural Forest)





Sampling Site 5 Mt. Bulanjao





Sampling site 8 TSF 3





**ANNEX C. PHOTO-DOCUMENTATION DURING FLORA ASSESSMENT MEETING AND FIELD ACTIVITIES**



Flora Assessment Team Kick off Meeting



Establishment of new sampling site at TSF 3







GPS reading at sampling plots



Species identification



ned







Data Gathering at sampling plots



Field work at TSF 1







During field work to different sampling sites



## ANNEX D. FLORA AND FAUNA ASSESSMENT TEAM PERSONAL PROFILE

Name : **Ramon M. Docto**  
Agency/Company : Palawan State University,  
Present Position : Professor VI/SUC President III  
Birth Date : July 28, 1960  
Birth Place : Cauayan, Negros Occidental  
Address : 25-P2 Baltan Street, Puerto Princesa  
Contact number : 09178495330 / 09285053949  
Email address : [mondocto@yahoo.com](mailto:mondocto@yahoo.com)



### EDUCATIONAL BACKGROUND

#### **PhD – Environmental Science, 2003**

University of the Philippines – Los Baños

Member: Honour Society for Applied Sciences

Fellow : R.E. Train Education for Nature Program of the  
World Wildlife Fund (WWF-USA)

#### **MA – Educational Administration, 1994**

Palawan State University  
Puerto Princesa City

#### **BS General Science, 1981**

Southwestern University  
Cebu City

Area of Concentration: Biology / Chemistry

#### **Secondary, 1977**

Lapinigan National High School  
San Francisco, Agusan del Sur

High School (Valedictorian)

#### **Secondary, 1973**

Lapinigan National High School  
San Francisco, Agusan del Sur

Elementary (Valedictorian)

## MAJOR EMPLOYMENT

<u>Date</u>	<u>Employer</u>	<u>Position and Responsibility</u>
Jul 6, 2018 to date	<b>Palawan State University,</b> Puerto Princesa City, Philippines	<b>State University President III</b>
May 2017-Jul 5, 2018	<b>Palawan State University,</b> Puerto Princesa City, Philippines	<b>Vice President for External Campuses Operatio Professor VI</b>
Jan. 2012 -Apr 2017	<b>Palawan State University,</b>	<b>ETEEAP Director /Professor VI</b>
Jan 2005 - Dec. 2011	<b>Palawan State University,</b>	<b>University Research Director /Professor IV</b>
June 2003 - Jan 2005	<b>Palawan State University,</b>	<b>University Extension Services Director Associate Professor IV</b>
Jun 1994 - May 1998	<b>Palawan State University –</b> Quezon, Palawan	<b>Campus Director- Quezon Campus,</b>
Jun 1987 - May 1994	<b>Palawan State University –</b> Puerto Princesa City	<b>Assistant Professor</b> <ul style="list-style-type: none"> <li>▪ Teaches Biological and Physical Sciences subjects</li> <li>▪ Subject Tutor for Physics – UP Open Unive</li> </ul>
Jun 1986 - May 1987	<b>Palawan State College</b>	<b>High School Principal- Aborlan Campus,</b>
Jun 1982 - May 1986	<b>Palawan State College</b> Puerto Princesa City	<b>Instructor</b>



## ACADEMIC AND TRAINING AWARDS

- 2018 Outstanding Alumnus for Institutional Service - University of the Philippines-Los Baños  
2018 Macli Eng Dulag Environmental Award - UPLB, School of Environmental Science and Management  
Accredited Full-Pledge Professor - Philippine Association of State Universities and Colleges,  
PASUC & AACUP since 2006  
Fellowship Grant - R.E. Train, Education for Nature Program, WWF–USA  
Gamma Sigma Delta  
Member/awardee  
- Honour Society of Agriculture and Allied Sciences, UPLB  
March 21, 2001

## PROFESSIONAL MEMBERSHIP IN ORGANIZATIONS

-

### CAREER EXECUTIVE SERVICE

**Passed CES Written Examination**  
Career Executive Service Board

### SKILLS AND BACKGROUND

**Registered Environmental Impact Statement (EIS) Preparer**  
DENR-EMB Central Office  
IPCO-105

**Environmental Planning and Natural Resource Management  
Program Planning and Project Development**

**Research Adviser/Researcher**

### VISITING PROFESSOR

**MS Environmental Management Program,**  
Thai Nguyen University, Peoples Republic of Vietnam

## PUBLICATIONS

**F. Jollant, A. Malafosse, R. Docto, and C. Macdonald.** 2014. **Authors/Researchers;** A pocket of very high suicide rates in a non-violent, egalitarian and cooperative population of South-East Asia; Psychological Medicine, Cambridge University Press.

**Docto, R.M.** 2011. **Contributor;** Zero Carbon Resorts: Reduce, Handbook Vol.1, Building Energy Autonomous Creating Appropriate Technology Solutions. GrAT (Center for Appropriate Technology) Vienna, Austria

**Docto, R.M.** 2010. **Contributor/Survey Coordinator for Palawan;** Philippine Pharmaceutical Situation Assessment: 2009 WHO Health Facility and Medicine Survey.

**Batangan S.B. et. al. DOH and WHO**

- Docto, R.M.** 2010. **Issue Editor** (Ecotourism Issue) PSU Research Journal, PSU, Vol.3 No.5, Puerto Princesa City, Philippines.
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- Docto, R.M.** 1999. Animal Movement and Migration; PSU Graduate School Journal. Puerto Princesa, Philippines.
- Docto, R.M.** 1998. Mine Tailing Deposition in Honda Bay, Palawan; PSU Graduate School Journal. Puerto Princesa, Philippines

## **PROJECTS/RESEARCHES UNDERTAKEN**

### ***List of projects' involvements:***

#### **ENVIRONMENTAL PROJECTS:**

- **Team Leader - Environmental Consultant**  
Forestry Carbon Sequestration Estimation and Emission Management Program, Coral Bay Nickel Corporation. 2017-2018
- **Team Leader - Environmental Consultant**  
EIS of Agro-Forestry (Coffee) Plantation Development Projects, SOC Resources Inc. 2016 on-going.
- **Team Leader - Environmental Consultant**  
EIS of El Nido Sewage and Solid Wastes Treatment Plant Project, Provincial Government of Palawan and LGU of El Nido, 2015.

- **Team Leader - Environmental Consultant**  
EIS of Municipal Water Supply System Projects (MWSSP), 14 Municipalities of Palawan, Provincial Government of Palawan, 2015 on-going.
- **Co-Team Leader - Environmental Consultant**  
EIS of Philippine Navy Port and Base Support Logistics (BSL) Facilities Improvement Project, NDOB, Bahile, Puerto Princesa City, 2014
- **Team Leader, and Faunal Specialist**  
Area Characterization of Woods Point, Macarascas, Puerto Princesa City, 2013
- **Environmental/Technical Consultant**  
Dr. Han Sung Key, Happy Link Co., Ltd., Seoul, South Korea  
Preparation of the Feasibility Study of **Biomass Power Plant** in Palawan, 2009
- **HRD Consultant**  
Sustainable Environment Management Program for Northern Palawan (SEMP-NP), JBEC, DOT- CEST, Northern Palawan, September 2005 to September 2006
- **EIA Team Leader**  
PSU Hospitality Management Building, Puerto Princesa City, 2006
- **EIA Team Leader**  
PSU-Socialized Industrial Forest Management Agreement (SIFMA) Project, PSU & Development Bank of the Philippines, Rizal, Palawan, 2006.
- **EIA Team Leader**  
Municipal Employees' Subdivision and Housing Project, LGU-Quezon, Palawan, 2005
- **IEE Team Leader**  
PSU Agroforestry Project, Brooke's Point, Palawan. 2004

#### RESEARCH PROJECTS:

- **Study of the Very High Rate of Suicide among the *Pala'wans* of Kulbi, Rizal, Palawan, Philippines**, McGill University and Douglas Mental Health University Institute, Montreal, Canada (on-going research) 2012-2017, **Co-Investigator**
- **Total Economic Valuation of Citi Nickel Mining Site, Nara, Palawan**, ABS-CBN Bantay Kalikasan Foundation Inc. 2014, **Research Consultant**

- **Impact Study on the Iwahig Firefly Watching, Mangrove Eco-Tourisms and Wildlife project.** Bayan Educational Systems and Technology, ABS-CBN Foundation Inc. CBST Projects 2013 (**Study Leader**)
- **Mangrove and Estuarine Biodiversity in Negros Occidental and Palawan**  
CHED-PSU R & D Program for Marine Biodiversity (on-going research)  
2012-2013, **Socio-Economic component Leader**
- **Settlement and Livelihood Opportunities for Mining-affected Communities in Palawan**  
CHED- UPLB Zonal Research Center (on-going research) Approved- December 2009 – **Co-Study Leader**
- **The Role of Indigenous Beliefs and Practices in Biodiversity Conservation**  
CHED- UPLB Zonal Research Center (completed research) Approved- December 2009 – **Study Leader**
- **Utilization of Bio-engineering in Slope Area Rehabilitation at Palawan State University,** September 2008 - June 2009-**Team Leader**
- **Carrying Capacity Study of Calauit Game Refuge and Wildlife Sanctuary**  
Palawan Council for Sustainable Development & Palawan State University  
October 19-25, 2008 – **Team Leader**
- **Landscape and Seascape Assessment of Selected Catchments in the Western Side of Mt. Mantalingahan Range, Southern Palawan,** CHED/UPLB-ZRC.  
Quezon and Rizal, Palawan. March 2004, 3 man- months – **Component Leader**

### TRAININGS, CONFERENCES AND WORKSHOPS

**Southeast Asia International Joint-Research and Training Program “Low Carbon Green Energy and Environmental Green Technology for Sustainable Environmental Development”** College of Nuclear Science, National Tsing Hua University, Hsinchu, Taiwan, November 5-14, 2014

**Mid-Term Review on UNEP-GEF Project-Stakeholders’ Workshop “Removing Barriers to Invasive Alien Species Management in Production and Protection Forests in Southeast Asia Project**  
“DENR-Biodiversity Management Bureau (BMB), Manila. September 10, 2014.

**Consultative Workshop “Updating of PCSD List of Threatened Terrestrial Flora and Fauna”** Palawan Council for Sustainable Development (PCSD)  
PCSD Training Institute, Puerto Princesa City, August 1, 2014.

**Orientation for Environmental Impact Assessment (EIA) Practitioners**  
Sulo Riviera Hotel, Quezon City, Metro Manila, July 11, 2014.

**14<sup>th</sup> Annual Scientific Meeting and Conference “Public-Private Partnerships: Creating Possibilities for Responsible Resource Use”**

Philippines Society for the Study of Nature, Inc. (PSSN), Benguet State University (BSU), La Trinidad, Benguet, May 21-24, 2014. (**Moderator/Facilitator**)

**7<sup>th</sup> International Conference and Scientific Meeting “Traditional Local Environmental Knowledge and Practices to address Climate Change Impacts”**

Philippines Network of Educators on Environment (PNEE). Southern Luzon State University (SLSU), Lucban, Quezon, May 12-14, 2014. (*Moderator/Facilitator*)

**Area Balance Sheet Methodology Coaching for Environment and Natural Resources.**

ABS-CBN Foundation Inc. Ateneo de Manila University, Quezon City, July 11, 2013

**First National Convention on the Philippine Environmental Impact Assessment (EIA) System**

DENR-Environmental Management Bureau and Pollution Control Association of the Philippines  
Manila Hotel, Manila, Philippines, June 19-21, 2013

**K to 12 Teaching Strategies towards Education for Sustainable Development**

Cebu Normal University, Cebu City, May 3, 2013 (*Guest Speaker*)

**Workshop on Standardization of Sampling Protocols, Laboratory Techniques and Data Analysis for the CHED R & D Program for Marine Biodiversity along Sulu and Bohol Seas**

Negros Oriental State University, Dumaguete City, March 15-17, 2013 (*Presenter*)

**6<sup>th</sup> International Conference and Scientific Meeting “Environmental Education towards a Green Economy: Water Resources Initiatives”**

Philippine Network of Educators on Environment and Caraga State University, Butuan City  
February 20-22, 2013. (*Paper-Poster Presenter*)

**3<sup>rd</sup> Philippine National Biodiversity Meeting (BIOME3) & 2012 National Conference on Water and Biodiversity**, Catanduaes State University, Virac, Catanduanes,

October 21-23, 2012 (*Keynote Plenary Lecturer*)

**5<sup>th</sup> International Conference and Scientific Meeting on Environmental Education: “Environmental Education for Adaptive Water Resource Management”**

Environmental Education Network of the Philippines & JBLFMU, Iloilo City.  
February 15-17, 2012. (*Paper Presenter*)

**Gap Analysis Workshop “Improving Access to Medicines in Palawan”**

Department of Health & University of the Philippines-Manila  
Legend Hotel, Puerto Princesa City, December 28-29, 2011 (*Resource Speaker*)

**2<sup>nd</sup> National BIOME Conference**

Virac, Catanduanes, October 18-22, 2011 (*Paper Presenter*)

**Zero Carbon Resorts (Basic Course – Replace)**

GrAT, Philippine Green Building Council & PCSD,  
Palawan Sustainable Development Training Institute, Puerto Princesa City.  
June 6-7, 2011. (*Resource Speaker*)

**11<sup>th</sup> National Annual Scientific Convention: “Scientific and Technological Innovations for Environmental and Disaster Management”**

Philippine Society for the Study of Nature  
University of the Philippines-Los Banos, Laguna. May 24-28, 2011. (*Paper Presenter*)

**4<sup>th</sup> International Conference and Scientific Meeting on Environmental Education: “Environmental Education for Disaster Risk Management”** Environmental Education Network of the Philippines & CBSUA, Pili, Camarines Sur.  
February 16-18, 2011. (*Resource Speaker*)

**Trainers’ Training-Workshop for Community-Based Information, Education and Communication for Mt. Mantalingahan Protected Landscape**  
South Palawan Planning Council and Conservation International,  
Mt. Maruyog Resort, Brooke’s Point, Palawan. January 18-21, 2011.

**Zero Carbon Resorts: Building Energy Autonomous Resorts Creating Appropriate Technology Solutions (Basic Course – Reduce)**  
GrAT, Philippine Green Building Council & PCSD, Palawan Sustainable Development Training Institute, Puerto Princesa City. May 25-27, 2010.

**Seminar-Workshop on Local Perceptions on the Viability of Swidden on Palawan in the 21<sup>st</sup> Century**  
Wenner-Gren Foundation, University of Queensland, UPLB & PSU  
Palawan State University- Puerto Princesa City  
March 15-16, 2010 (*Moderator*)

**3<sup>rd</sup> International Conference and Scientific Meeting: “Environmental Education to Meet the Challenges of Developing Environmental Leadership”**  
Environmental Education Network of the Philippines (EENP) Atenio de Davao University, Davao City,  
February 17-19, 2010 (*Paper/Poster Presenter*)

**RODOLFO O. ABALUS, JR.**  
**PhD in Forestry**

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**PERSONAL DATA**

Nickname : Jun  
 Date of Birth : August 25, 1972  
 Place of Birth : Solano, Nueva Vizcaya, Philippines  
 Present Address : No. 42 Abad Santos St.,  
 Puerto Princesa City Philippines  
 Sex : Male  
 Height : 177.8 cm.  
 Weight : 176 lbs.  
 Dialects can speak or write : English, Tagalog, Ilocano,  
 Cuyonon, & Pala'wan  
 Contact No. (Mobile Phone) : 09171622572  
 E-mail Address : rodolfo\_abalus@yahoo.com

**EDUCATIONAL ATTAINMENT**

Level	Name and Place of School	Course/Degree	Year Graduated
Elementary	Aggub Elementary School Aggub, Solano, Nueva Vizcaya,	Primary	March 1985
High School	New Dalton High School Solano, Nueva Vizcaya, Philippines	Secondary	March 1989
Tertiary	Nueva Vizcaya State University Bayombong, Nueva Vizcaya	Bachelor of Science in Forestry	4 April 1995
Graduate Studies	University of the Philippines Los Baños, College, Laguna	MS in Forestry: Watershed Management/Natural Resources Conservation	May 2013
	University of the Philippines Los Baños, College, Laguna	PhD in Forestry: Forest Resources Management/ Environmental Science	24 June 2017



## **SKILLS**

Profession : Registered Forester  
Major Skills : Forestry: Forest Resources Management  
Field of Specialization : Watershed Management, Silviculture and Forest Influences, Natural Resources Conservation  
Minor Skills : Environmental Science, Natural Resources Conservation

## **SCHOLARSHIP AWARDS**

<b>Name of Scholarship</b>	<b>Date of Award</b>
DOST-ASTHRD scholarship study and thesis grant	November 2010 – May 2012
DOST-ASTHRD scholarship study and dissertation grant	November 2013 to December 2016
PCAARRD dissertation grant	15 November 2016
CHED dissertation grant	January 2017
DOST-ASTHRDP Student Research Support Fund (SRSF)	21 November 2016

## **DISTINCTION/AWARDS RECEIVED**

<b>Name of Award</b>	<b>Date of Award</b>
Outstanding DOST-SEI PhD scholar	24 July 2017
Best Paper Presenter, STARRDEC In-house Research Review	November 2017
Jubilation award	10 October 2015
Civil Service Loyalty Award (10 years of continuous service)	1 March 2007
Civil Service Loyalty Award (15 years of continuous service)	March 2012
Civil Service Loyalty Award (20 years of continuous service)	March 2017

## **PAPERS PRESENTED IN R AND D CONVENTIONS**

1. Pilipinas Shell Tabangao Refinery Carbon Sequestration. 1<sup>st</sup> International Conference on Forest, Environment and Climate Change: Forestry Researches Promoting Sustainable Development amidst Climate Change. Gladiola Center, Benguet State University, La Trinidad, Benguet, Philippines. January 11-13, 2017.
2. Vulnerability Assessment of the Irawan Watershed in Puerto Princesa City, Philippines Using the GeoREVIEW Model. Southern Tagalog Agriculture, Aquatic and Resources Research,

- Development and Extension Consortium. Southern Luzon State University, Lucban, Quezon. November 2017.
3. Greenhouse Gas Emissions Inventory and Management within the Makiling Forest Reserve. Graduate Seminar. University of the Philippines Los Baños. May 21, 2015.
  4. Weight Distribution of Vulnerability Indicators for the GeoREVIEW Model. 3<sup>rd</sup> DOST-SEI National Scholars Conference. Traders Hotel, Manila. February 27-28, 2014.
  5. Vulnerability Assessment of the Irawan Watershed in Puerto Princesa City, Philippines Using the GeoREVIEW Model. Graduate Seminar. University of the Philippines Los Baños. October 2011.
  6. Exploring the Potentials of Rubber-based Agroforestry System for Enterprise Development: Experience of the Palawan State University. Presented during the 4<sup>th</sup> National Agroforestry Congress at the Chali Beach Resort, Cagayan De Oro City, Misamis Oriental on November 18-20, 2009.
  7. CLIMBER: Focused on PORADISE. Presented during the 2<sup>nd</sup> Visayas Agroforestry Congress. La Carmela de Boracay Resort Hotel, Boracay Island. November 5 – 7, 2008.
  8. The Continuing Livelihood Intervention with Mountain-based Ecological Rehabilitation of Palawan State University. Presented during the International Conference on Environmental Education held on May 5 – 7, 2008 at the Banaue Hotel, Banaue, Ifugao.
  9. Palawan State University's Experiences in the Implementation of a Socialized Integrated Forest Management Program. Presented during the 3<sup>rd</sup> National Agroforestry Congress held on November 14-15, 2007 at DMMSU, Bacnotan, La Union.

**RESOURCE PERSON / SPEAKER / LECTURER / CONSULTANT TO THE FOLLOWING:**

1. Consultant. Environmental Impact Statement for the Proposed Coffee-based Agroforestry Development Project, Brgy. Campong Ulay, Municipality of Rizal, Palawan. December 2017 to July 2018.
2. Consultant. Carbon Sink Management of Coral Bay Nickel Mining Corporation, Rio Tuba, Bataraza, Palawan. June to December 2017.
3. Consultant. Yamang Bukid Farm, The Yamang Bukid Food Products Incorporated. September 2017 to date.
4. Consultant. STAR TREC Project Carbon Sink Management Program of Shell Tabangao Refinery, Tabangao, Batangas. November to December 2015.
5. Project Leader. Community-level GHG Inventory Project, Puerto Princesa City. On-going.
6. Consultant. Terrestrial Ecology Monitoring of Berong Nickel Corporation. Ongoing.
7. Research Coordinator. College of Sciences, Palawan State University. Ongoing.
8. Mangrove Assessment Training/Lecture-Seminar. Barangay San Jose, Puerto Princesa City. October 21-25, 2013.
9. Graduate School Fun Day. Copeland Gymnasium, UPLB. August 29, 2011.
10. Training/Seminar on Package of Technology (POT) on Abaca. PSU-SIFMA Project Site, Culasian, Rizal, Palawan. July 27 to 31, 2009.
11. Hands-on Training and Exposure to 4<sup>th</sup> Year BS Entrepreneurship Students in Rubber and Abaca Ventures. PSU-SIFMA Project, Culasian, Rizal, Palawan. July 27 – August 13, 2008.
12. Making Research and Extension Responsive to PSU's Programs for the 21<sup>st</sup> Century. 2006 Faculty and Staff Conference: Broadening the PSU Horizon in the 21<sup>st</sup> Century. June 29-30, 2006.
13. Training on Geographic Positioning System. DENR-CENRO, Quezon, Palawan. October 17, 2005.
14. SEED Seminar Part IV. Narra, Palawan. August 27, 1998.
15. Training on Geographic Positioning System. DENR-CENRO, Quezon, Palawan, October 17, 2005.

16. Symposium on the Issues on the Hydrometallurgical Processing Plant Project of the Rio Tuba Nickel Mining Corporation. Training Center, State Polytechnic College of Palawan. November 18, 2003.
17. Board Exam Reviewer: 2003 Foresters Licensure Examination Review Class. Institute of Environment, State Polytechnic College of Palawan. June 17-19, 2003.
18. Board Exam Reviewer: 2001 Foresters Licensure Examination Review Class. Institute of Environment, State Polytechnic College of Palawan. April 23-May 20, 2001.
19. Board Exam Reviewer: 1999 Foresters Licensure Examination Review Class. Institute of Environment, State Polytechnic College of Palawan. April 5-May 31, 1999.

**RESEARCH AND OTHER RELATED EXPERIENCES:**

1. Carbon Sink Management of the Coral Bay Nickel Mining Corporation in Rio Tuba, Bataraza, Palawan. June to December 2017.
2. Development of a Model for Forest Biomass and Carbon Estimation within the Mt. Makiling Forest Reserve and Quezon City, Philippines. August 2016 to June 2017.
3. Forest Biomass and Carbon Storage within Quezon City, Philippines. January to June 2017.
4. Forest Biomass and Carbon Estimation within the Mt. Makiling Forest Reserve. September to December 2016.
5. Forest Biomass and Carbon Estimation within the La Mesa Watershed Reserve, Quezon City, Philippines.
6. Carbon Sink Management of the Pilipinas Shell Petroleum Corporation STAR TREC Project in Tabangao, Batangas City. November to December 2015.
7. GIS-based Assessment of Vulnerable Areas to Flooding in Los Baños, Laguna Due to Rise of Water Level of Laguna Lake. November to December 2014.
8. Area Characterization of Woods Point in Macarascas, Puerto Princesa City. August to November 2013.
9. Vulnerability Assessment of the Irawan Watershed in Puerto Princesa City, Philippines Using the GeoREVIEW Model. University of the Philippines Los Baños. June 2012 to May 2013.
10. Characterization of Indigenous Fruit Trees in Southern Palawan. April 2004 to May 2005.
11. Mangrove Forest Survey in Southern Palawan. Western Philippines University & Conservation International. June-July 2004.
12. Survey of Plants in Mantalingahan Mountain Range Southern Palawan, Philippines. Western Philippines University & Conservation International. April to May 2004.
13. Survey of Plants in Mantalingahan Mountain Range Southern Palawan, Philippines. Western Philippines University and Conservation International. April – May 2003.

**MEMBERSHIP TO ORGANIZATIONS AND OTHER RECOGNIZED HONOR SOCIETIES:**

1. Board of Director, DOST-PCAARRD Graduate Alumni Association Incorporated
2. Member, Gamma Sigma Delta Honor Society of Agriculture, University of the Philippines Chapter.
3. Phi Sigma Biological Sciences Honor Society, University of the Philippines Chapter.
4. Member, Society of Filipino Foresters in the Philippines.
5. Member, National Agroforesters Association of the Philippines.
6. Member, Philippine Agroforestry Education and Research Network.
7. Member, DOST Scholars Society, UPLB Chapter.
8. Member, Beta Sigma Fraternity.


## **WORK EXPERIENCE**

- Professor - Palawan State University. Tiniguiban, Puerto Princesa City. June 1, 2005 – Present.
- Professor - Western Philippines University (Formerly SPCP) Aborlan, Palawan. February 15, 1998 – May 31, 2005
- Instructor - State Polytechnic College of Palawan (SPCP) Aborlan, Palawan. August 6, 1996 – February 14, 1998

## **CHARACTER REFERENCES:**

- 1. JOSE V. CAMACHO JR., PhD**  
Dean, Graduate School  
University of the Philippines Los Baños (UPLB)  
College, Laguna
  
- 2. RAMON M. DOCTO, PhD**  
President  
Palawan State University, Puerto Princesa City
  
- 3. WILLIE ABASOLO, PhD**  
Dean, CFNR, UPLB, College, Laguna

I certify that the above information are true and correct:



**RODOLFO O. ABALUS, JR**  
Consultant

## **EMI MARJORIE N. GABINETE**

*Master of Science in Environmental Management*

*Licensed Environment Planner*

*DOLE Accredited Safety Practitioner*

*No. 1033-170926-E0016*

*Contact no. +63 9205467352/+63 9171459017*

*Email address: [emngabinete@gmail.com](mailto:emngabinete@gmail.com)*



### **PROFESSIONAL EXPERIENCE**

#### **PETROSPHERE INC. – TRAINING, CONSULTANCY AND REVIEW CENTER**

##### **OSH Lead Trainer**

February 2017 – Present

- Conducts training for Basic Occupational, Safety and Health (BOSH) and Construction Occupational, Safety and Health (COSH) for aspiring safety officers as part of company compliance to RA 11058 (Occupational Health and Safety Law)
- Mentor and coach personnel to ensure SH&E considerations are included in business decision process
- Ensure appropriate standards and policies are developed and maintained to meet corporate and regulatory requirements
- Determine the most effective mechanism for achieving statutory compliance

#### **BERONG NICKEL CORPORATION**

##### **Research Team Member – Palawan State University Research Team**

December 2018 – April 2019

Terrestrial Flora and Fauna Assessment and Monitoring of BNC as part of their compliance to their Environmental Compliance Certificate issued by the Department of Environment and Natural Resources

- Identification and classification of flora and fauna species composition of terrestrial sites within adjacent areas, assessment of the biodiversity based on their species and population structural parameters, measure economic importance and ecological impacts
- Assess the impacts of mining activities and operations to the ecology and determine the status of flora and fauna in the sites and recommend conservation and protection measures

#### **BANTAY KITA AND HIVOS**

Project Team Lead for Open Mining Governance

September 2018 – December 2018

- Provide leadership and coordination with mining companies and indigenous peoples community leaders to promote royalty payments transparency
- Report preparation and development of knowledge product (infographic material) as an output for Indigenous People's information on Rio Tuba Mining Corporation's Royalty Payments Transparency

#### **SEMIRARA MINING AND POWER CORPORATION**

##### **Safety, Health and Environmental Consultant**

March 2016 to January 2017

Project: Risk Management Plan and updating of the Awareness and Preparedness for Emergency at Local Level (APELL) – December 7, 2016 – January 15, 2017



Project: Final Mine Rehabilitation and Closure Plan for Panian Pit – August 2016  
Project: Hazard Operability Study for Power Plant Operations – March – April 2016  
Preparation of Awareness and Preparedness for Emergency at Local Level (APELL)

- The project includes detailed conduct of risk assessment, hazard study and management for the mine and surrounding areas, mine rehabilitation and closure plan as well as detailed risk assessment of the power plant operations. These are vital for the permit application of the SMPC to expand their operation and mine out another area as well as environmental legal compliance to extend the life of their mine permits as required by the DENR main office.

#### **ORICA PHILIPPINES INC.**

##### **Sustainability (Safety, Health, Environment and Community) Advisor**

Permanent – April 2010 – June 2015

- Provide SH&E leadership and focus to ensure compliance to Orica SHE systems and applicable environmental laws and regulations
- Assists site operations in the development of sustainable SH&E Management Plan; promote the effective method of the implementation process
- Visit work areas at the site to discover/address the potential SH&E concerns in close coordination with the line Managers and Supervisors
- Provides functions of Safety Officer, Pollution Control Officer and Environmental Management representative to ensure compliance to regulations
- Provide OPI Limay and associated sites with advise on SH&E and related issues.
- Mentor and coach operations personnel to ensure SH&E considerations are included in business decision process
- Facilitate Limay site SH&E plans and Letter of Assurance process
- Ensure appropriate standards and policies are developed and maintained to meet corporate and regulatory requirements
- Determine the most effective mechanism for achieving statutory compliance within various business models
- Overall custodian of the site Legal Compliance Register
- Ensures that an appropriate system for the effective provision of SH&E internal audit functions for the Limay site
- Provide effective follow up on audit compliance and come out with action plan to bridge gaps with Department Managers to close identified non-conformance
- Provide effective incident management and reporting processes.
- Provide expertise in significant incident management and investigation
- Participates in Hazard Operability Studies, periodic Hazard Study and Risk Assessment
- Conduct SH&E training programs and achieve 100% SH&E fitness training
- Conduct incident investigations for SH&E related incidents\
- Issues Permit-to-Work, conducts open clearance, cross functional audits
- Implements Corporate Social Responsibility Projects of Orica in Bataan.

#### **PHILIPPINE NATIONAL OIL COMPANY – Alternative Fuels Corporation (PNOC AFC) formerly PNOC**

##### **Petrochemical Development Corporation**

##### **Environmental Planning and Pollution Control Officer**

**Acting Community Relations Officer** – Facilities Management Department Permanent - Jan 2005 – April 2010

- Ensure all locators, third party contractor and their agents comply with all the requirements of the Industrial Park, Department of Environment and Natural Resources (DENR) and outside agencies for permits and documentations prior to hauling/transport and transfer of toxic and hazardous materials.
- Attend to permitting requirements of locators (existing and new) prior to the construction/installation of pollution control facilities.

- Recommend and prepare for the issuance of environmental clearance (with concurrence from the Department of Environment) to locators prior to start up or decommissioning
- Supervise and monitor Industrial Park locators' (performance, operations and maintenance of pollution control facilities and systems.
- Submit duly notarized and validated Self-Monitoring Reports to Environmental Management Bureau (National, Regional and Provincial Offices)
- Organize and train members of the multi-sectoral monitoring group who monitors environmental compliance of the Industrial Park
- Assists in the review, document preparation of the company for the Integrated Management System Certification (ISO 9001, EMS 14001, OHSAS 18001
- Conducts environmental audit to the Polyethylene, Polypropylene at Polyvinyl Chloride Plants inside the industrial Park
- Coordinate with various agencies to expedite the processing of documents relevant to issuance of Feedstock Jetty's Permit-to-Operate
- Participate in the review and finalization of the Industrial Park's Park-wide Emergency Response Procedure
- Provide technical and academic information expertise on environmental management and pollution control handling and operations
- Prepare presentation materials for the Petrochemical Industrial Park visitors, Steering Committee and Board of Directors
- Provide lectures and trainings on the existing environmental laws in the Philippines
- Assists and advice the Safety Officer and Emergency Controller in cases of emergency affecting the environment, as well as in the implementation of the Emergency Response Plan
- Review pertinent documents such as Environmental Impact Assessment, Commissioning/recommissioning plan of the Industrial Park Locators (PVC, Polypropylene, Polyethylene and Explosive plants) prior to plant start-up
- Ensure all environmental procedures in coordination with locators are in place (i.e. waste disposal, air, marine, effluent/wastewater sampling)
- Implement Corporate Social Responsibility (CSR) Projects (i.e information dissemination campaign, coastal clean-up, medical and dental mission, livelihood trainings, and facilitate fund donation to non-government agency for disabled children)
- Represents the company to various inter-agency meetings/seminars and conferences (Local, National and international meetings) with regards to CSR and Environmental Protection
- Coordinates with UNIDO and DENR EMB on the Global Programme on PCB destruction facility or non-combustion POPs project
- Prepares, facilitates and implement health programs of the company (audiometric tests, health seminars on AH1N1, HIV/AIDS Awareness, Lifestyle Risk and Diseases, and Standard First Aid and Cardio-Life Support)

**PHILIPPINE NATIONAL OIL COMPANY – EXPLORATION CORPORATION (PNOC EC)**

**Safety, Health and Environment Assistant** – Project Operations Dept. Project based

May 2003 – Oct 2004 **Safety, Health and Environment Assistant (SHEA)** – Office of the Vice- President

- Engage in the implementation, monitoring and control of SHE activities and programs of the company as a whole and in the Batangas-to-Manila Natural Gas Pipeline Project (especially during the Environmental Impact Assessment)
- Assist in the conduct of technical studies and environmental surveys related to the project
- Coordinate with the Environmental Consultants and other agencies
- Assists/Organizes the Community Relations projects in different field installations of PNOC EC
- Provide technical and administrative support to the SHE Officer such as securing Environmental Compliance Certificate (ECC) and other related environmental permits
- Prepare reports and other environmental documents of various company projects
- Regularly prepare safety/incident reports, pollution control officer's report, safety statistics and safety task analyses

- Assist in the conduct of technical studies related to performance monitoring of safety equipment, tools and personal protective equipment.
- Assist in the updating and reviewing of Company's field installation's Emergency Response/Contingency Plan

**Batangas State University**

**College Instructor**

June 2002 – March 2003

- Handles Chemistry and Mathematics Subjects
- Facilitates Laboratory Activities
- Prepares course syllabus on the subjects handled

**EDUCATION**

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- Post Graduate      **Master of Science in Environmental Management**  
Palawan State University, Palawan, Philippines  
Consistent Dean's Merit Award
- Undergraduate      **Bachelor of Science in Petroleum Engineering (1996-2001)**  
Palawan State University, Palawan, Philippines  
Leadership Awardee/Loyalty Awardee/Outstanding Red Cross Youth

**AWARDS & RECOGNITION:**

**Safety VIP 2014 Awardee**

December 19, 2014, Crown Royale, Balanga City, Bataan

**Safety VIP for the month of August 2013**

"For the initiative to create and improve the Safety, Health and Environment induction pamphlet for Limay and Subic sites"

August 2013 by Viney Kumar – Orica Factory Manager

**Safety Recognition Award (No Lost Time Accident for 2011)**

Bureau of Working Condition – Department of Labor and Employment  
December 6, 2012, Pacific Grand Ballroom, Pan Pacific Manila

**Deliver the Promise Awards (Australia/Asia Regional)**

***"SHE Improvement at Orica Limay Plant"***

November 7, 2011 by James Bonnor – Orica General Manager (Australia/Asia)

**Deliver the Promise Awards (Australia/Asia Regional)**

***"Integrated Management System Certification of Orica Philippines", "Working towards Improving Limay Factory's Cash Fixed Cost (Profit Improvement Projects)"***

October 2010 by Mark Thomas – Orica General Manager (Australia/Asia)

**Safety VIP for the Month of May 2011**

***"By finding Alternative means for the disposal of styropor wastes in an environment friendly manner through recycling and yield savings for the company"*** May 25, 2011 by Viney Kumar – Orica Factory Manager (Asia)

**SEMINARS/TRAININGS CONDUCTED**

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**Basic Occupational Safety and Health (BOSH)**

**Construction Occupational Safety and Health (COSH)**

**Loss Control Management (LCM)****Drug-Free Workplace Seminar**

Part of Regular Training Offered at Petrosphere, 3F Daniel Alley Building, San Pedro, Puerto Princesa City

**Society of Petroleum Engineers – PSU SC Philippine Oil and Gas Student Summit (Resource Speaker)**

March 2, 2018, Best Western Plus, The Ivywall Hotel, Puerto Princesa City

**Golden Anniversary of the National Industrial Safety Convention (Resource Speaker) November 13-14, 2017,**

Edsa Shangri-La Hotel, Ortigas Center, Mandaluyong City

**Barangay Disaster Risk Reduction Management Council Training (Organizer) October 1, 2018, Brgy.**

Mandaragat, Puerto Princesa City

**PSU Graduate School Consultative Meeting with Stakeholders (Organizer) September 2, 2017,**

PSU LES Gymnasium, Puerto Princesa City

**Municipality of Kalayaan: Gearing Towards Disaster Risk Reduction and Resiliency (Organizer) September 10, 2018, PSU**

Hostel, Tiniguiban Campus, Puerto Princesa City

**Seminar on Sustainable Development and Climate Change (Facilitator) August 23, 2017,**

PSU Hostel, Tiniguiban, Puerto Princesa City

**Raising Awareness in Environmental Sustainability in the Field of Safety Practice (Resource Speaker)**

October 19, 2017, Mariner's Plaza, San Pedro, Puerto Princesa City

**Workshop on Waste Segregation (Resource Speaker)**

May 13, 2017, Purok Westwood Day Care Center, San Pedro, Puerto Princesa City

**Symposium on “Waste Management, a Breakthrough in Science in Sustaining a Healthy Lifestyle and an Eco-Friendly**

**Environment” (Resource Speaker) September 28, 2012, Crown Royale Hotel, Bataan, Philippines**

**TRAININGS/SEMINARS ATTENDED**

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**4<sup>th</sup> National Mangrove Conference Linking Science, Innovation and Policy: Mangrove and Beach Forest Conservation**

November 24-27, 2020, Iloilo City, Philippines (via zoom)

**1<sup>st</sup> Public Consultation on the Revision of the Comprehensive Development Plan 2020-2022****Puerto Princesa City Development Council**

June 19-21, 2019, Hue Hotel, Puerto Princesa City, Palawan

**Capability Enhancement Seminar on Environmental Planning**

April 29-May 3, 2019, Hue Hotel, Puerto Princesa City, Palawan

**Oil Spill Response Training**

March 26-28, 2019, Jurias Pension, El Nido, Palawan

**Advocacy Seminar on the Employees' Compensation Program**

January 29, 2019, Hue Hotels and Resort, Puerto Princesa City

**Basic PCGA Officer's Course of PCGA Ladderized Training Program**

March 24-25, 2018, Dang Maria's Bancao-Bancao, Puerto Princesa City

**50<sup>th</sup> Nat'l Industrial Safety Convention: A Journey to OSH Excellence (Participant & Resource Speaker)**

November 13-14, 2017, Edsa Shangri la, Mandaluyong City

**Capacity Building for OSHNET Officers in MIMAROPA**

October 5, 2017, Solemare, G21 Extremeli Suites, Paranaque City

**Seminar on Sustainable Development and Climate Change**

August 23, 2017, Palawan State University Hostel, Puerto Princesa City

**Seminar on Philippine Extractive Industries Transparency Initiative (PH-EITI)**

August 9-10, 2017, Aziza Paradise Hotel, Puerto Princesa City,

**Symposium on Climate Change Adaptation & Updates on SBMA Environmental Permitting & Monitoring System**

March 25, 2015, Subic Bay Convention Center, Subic Bay Freeport Zone

**14<sup>th</sup> National Occupational Safety and Health Congress**

November 20-21, 2014, OSH Center, Diliman, Quezon City

**Workshop on Audit Management & Procedures of Multi-Partite Monitoring Team in Region 3**

September 4-5, 2014, Holiday Inn, Clark, Pampanga

**Environmental Management Representative Skills Development Training**

April 7, 2014, Richmonde Hotel, Ortigas Center, Pasig City

**34<sup>th</sup> Pollution Control Officers Assoc. of the Philippines Annual Convention**

April 2-4, 2014, Taal Vista Hotel, Tagaytay City, Cavite

**Standard First Aid Training with Basic Life Support (AR/CPR)**

November 18-22, 2013, Orica Philippines Inc., Limay Training Room, Limay, Bataan

**Seven (7) Pillars Train the Trainer Training**

June 4-6, 2013, Orica Philippines Inc., Limay Training Room, Limay, Bataan

**Workshop on "Building a Nation through Environmental Stewardship"**

February 28, 2013 Century Resort Hotel, Balibago, Angeles, Pampanga

**Incident, Cause, Analysis Method (ICAM) Training by Safety Wise Australia**

February 18-19, 2013 Dusit Thani, Makati City, Philippines

**SHE&C Regional (Asia) Conference**

November 20-21, 2012, Dusit Thani Hotel, Makati City, Philippines

**13<sup>th</sup> National Occupational Safety and Health Congress "Enhancing Enterprise Competitiveness through OSH"**

October 24-25, 2012, Occupational Safety and Health Center, Diliman, Quezon City, Philippines

**Fundamentals of Industrial Hygiene**

May 15, 2012, Occupational Safety & Health Center (OSHC), DOLE-OSHC Baguio City, Philippines

Conducted By: Occupational Safety & Health Center (OSHC)

**Loss Control Management**

February 20-24, 2012, Safety Organization of the Philippines (SOP), Mandaluyong City, Philippines

**Apollo Root Cause Analysis by ARMS Reliability Australia**

February 2-4, 2012, Orica Training Center, Limay, Bataan, Philippines

Conducted By: Ned Calahan (ARMS)



**Hazard Study Training Awareness**

October 11, 2011, OPI Limay Training Room, Limay, Bataan, Philippines

**Safety Summit 2011**

August 19, 2011, Diamond Hotel, Roxas Boulevard, Pasay City, Manila, Philippines

**Seminar on Non-Combustion Persistent Organic Pollutants**

August 16, 2011, Crown Royale Hotel, Balanga City, Bataan, Philippines

**Crisis Management Training**

March 31 2011, Orica Philippines Inc., Global City, Taguig, Philippines

**SHE Leadership Training for Operations**

March 28-29, 2011, OPI Limay Training Center, Limay, Bataan, Philippines

**Clearance (Permit-to-Work) Training**

February 15-16, 2011, OPI Limay Training Center, Limay, Bataan

**ELIGIBILITY/LICENSES/EXAMINATIONS PASSED**

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**Certificate on Conduct Safety and Health Investigation Cert. no. SWS5816-A**

**Safety Practitioner – 1033-170926-E0016**

**Accredited Pollution Control Officer – 14K-03BA-257**

**Career Service for Professional (80.54%) – Banawe, Quezon City – June 28, 2001**

**Career Service for Sub-Professional (91.55%) - Narra, Palawan – November 8, 1998**

**SKILLS**

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Audit (ISO 18001, EMS 14001), Risk Assessment, Hazard Study (HazOp), People Oriented, Training skills, Incident Investigation using Apollo Root-Cause Analysis and Incident Cause Analysis Method (ICAM), First Aid/Basic Life Support (AR/CPR) Application, Water Survival Techniques/Water Safety, Microsoft Application, driving

**ORGANIZATION AFFILIATION**

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**Philippine Institute of Environmental Planners (PIEP) – National and Palawan Chapter**

**Philippine Red Cross Palawan Chapter – Board of Director/ Board Secretary**

**Occupational Safety and Health Network (OSHNET) – (NCR) Member, (Palawan) Secretary**

**Philippine Coast Guard Auxiliary 402<sup>nd</sup> Squadron – (Rank: Lieutenant Commander)**

**Palawan State University Graduate Students Organization (former President)**

**Brotherhood of Christian Businessmen and Professionals (BCLP 27) - member**

**Association of Overseas Technical Scholars (AOTS) – Member/Former Scholar**

**Philippine Cultural and Technical Association of Returned Overseas Scholars (PHILCULTAROS) - member**

## **ELIZABETH P. GIRONELLA**

Kaakbayan, Brgy. Tiniguiban  
Puerto Princesa City, Palawan



### **Personal Information**

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Date of Birth : October 19, 1949  
Citizenship : Filipino

### **Languages and Degrees of Proficiency**

English	:	Excellent
Filipino	:	Mother Tongue
Cuyunin	:	Excellent
Agutaynin	:	Excellent

### **Areas of Specialization**

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Botanist/Plant Taxonomist,  
Plant Identification  
Herbarium Specialist and Curator.

### **Education**

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#### **Master of Arts in Teaching Chemistry**

46 units earned (except thesis writing), Palawan State University  
Puerto Princesa City, Philippines

#### **Diploma in Teaching Biology 1995**

32 units earned, University of the Philippines Open University (UPOU),  
Los Banos Laguna, Philippines

#### **Bachelor of Science in Botany, 1972**

Far Eastern University (FEU),  
Manila, Philippines

**Short-Term Scholar, 1997**

Research Training Program on the **Principles of Plant Taxonomy and Management** at the Program

**Herbarium**

Pharmaceutical Sciences (PCRCPS), Department of Medicinal Chemistry and Pharmacognosy, College of Pharmacy, University of Illinois at Chicago (UIC) and at the Department of Botany, Natural History Field Museum, Chicago, Illinois, U.S.A.  
September-December 1997

**Work Experiences:**

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**Part-Time Bio/Science Faculty and Herbarium Curator**

Palawan State University, Puerto Princesa City.  
January 1, 2017 to date.

**Retired Assistant Professor II**

Palawan State University, Puerto Princesa City, Philippines  
October 19, 2014.

**Assistant Professor II**

Palawan State University, Puerto Princesa City, Philippines  
January 1, 2004 - to October 19, 2014.

**Officer – In – Charge**

Biodiversity Center for Research and Conservation (BCRC) Office,  
Palawan State University Puerto princesa City, Philippines  
2007

**Assistant Professor I**

Palawan State University, Puerto Princesa City, Philippines  
December 31, 2003 – to January 1, 2004.

**Instructor III**

Palawan State University, Puerto Princesa City, Philippines  
April 1, 1999 – December 31, 2003.

**Faculty member designated as Botanist for Research Project**

“Botanical Inventory and a Geographic Information System (GIS) as Basis for Management and Sustainable Development of Palawan (Philippines Forest Resources“  
MacArthur Foundation and Palawan State University, Puerto Princesa City  
April 1, 1997 to March 31, 1999.

**Instructor II**

Palawan State University, Puerto Princesa City, Philippines  
Jan. 1993 – March 31, 1999.

**Instructor I**

Palawan State University, Puerto Princesa City, Philippines  
Sept. 1989 – Dec. 1992

**Science Research Assistant I**

Palawan State University, Puerto Princesa City, Philippines  
July 1981 – Aug. 1989.

**Science Technician I**

Palawan State University Puerto Princesa City, Philippines  
Jan. 1997 – June 1981

**Faculty member**

Palawan State University, Puerto Princesa City, Philippines.  
August 1989 - October 19, 2014

**Science Technician**

Palawan State University, Puerto Princesa City, Philippines  
January 1979 to June 1981

**Training – Workshop/Seminar Attended:**

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**Participant, 1<sup>st</sup> International Symposium of the Philippines**

Native Plants Conservation Society, Inc., “Philippine Botanical Treasures and Legacy of Leonardo L. Co”

Philippine National Museum, Manila, Philippines

Nov. 19 – 20, 2011

**Participant, National Forum on “Biodiversity, Culture, and Sustainability: Interactive Efforts on Balancing Priorities and Decisions “**

Hotel Supreme Baguio City

May 25 –27, 2007

**Participant, In the Conservation through Collaboration: A National Conference on the Management of the Tubbataha Reef and the Greater Sulu Sea**

UNESCO World Heritage, Center UNESCO National Commission of the Philippines Committee on Culture and Science and Technology and

Tubbataha Protection Area Management Board

Asturias Hotel Puerto Princesa City, Palawan, Philippines

Dec. 12 – 14, 2006

**Participant, Rapid Appraisal of the Terrestrial Ecosystem of Balabac**

**Ecoregion**, Palawan part of the Sulu – Sulawesi Marine Ecoregion,

Batas Kalikasan, Foundation,

Muntinlupa City, Metro Manila,

September 21, 2004

**Participant Training Seminar for Trainers on Seri-Culture (Mulberry and Silk Production)**

Office of the Mayor, Puerto Princesa City, Philippines

April 11, 2003

**Participant, Biological Visioning Workshop for Palawan Corridor Strategy Development Project**

Puerto Princesa City, Philippines

Dec, 10-11, 2002

**Speaker, Training on Conservation, Ecotourism and Wildlife Tourist Guiding**

DENR, Puerto Princesa City, Philippines

July 27 – 29 2000

**Participant, Seminar on REVIVAL – TALIMA**

Office of the Ombudsman for Luzon and PSU Puerto Princesa City, Philippines

June 29, 2000

**Participant, Concepts in Biology III Summer Seminar – Workshop “Evaluation and Conservation Protocols in Biodiversity “**

Institute of Biology, College of Science,  
UP Diliman, Quezon City, Philippines.

April 24 – 28, 2000

**Participant, “Fourth National Senior Educators’ Assembly for Environmental Protection and Management “**

PATLEPAM, DENR, EMB, Office of the Mayor of Puerto Princesa City  
UNEPNETTEPAM and UNDP

Asturias Hotel, Puerto Princesa City, Philippines.

Nov. 17 –19, 1999

**Participant, Seminar on “Biodiversity Research Methods and Techniques”**

Palawan State University Puerto Princesa City, Philippines

Nov. 3 – 6, 1999

**Resource Person, Training Course on “Cutflower Production”**

Department of Agriculture in Puerto Princesa City, Philippines

October 27, 1999

**Participant, Training Course on “the Human and Scientific Dimensions of Managing Tubbataha Reef as a Natural World Heritage Site”**

Island Palawan Hotel, Puerto Princesa City, Philippines

April 22-24, 1999



## Published Research Output:

**Co – Author:** New Orchid Species *Stigmatodactylus* (Orchidaceae; Diurideae) and A New Record of *Cryptostylus carinata* from Central Palawan, Philippines. *Phytotaxa*. 252 (2); 99 – 113. DOI: 11.11646/Phytotaxa.252.22. Authors: Alastair S. Robinson, Elizabeth P. Gironella and Jehson M. Cervancia. 2016

**Co – Author:** {BOTANY. 2016} New Orchid Species of *Stigmatodactylus* (Orchidaceae; Diurideae) from Central Palawan, Philippines *Stigmatodactylus dalagang palawanicum* and *Stigmatodactylus aquamarines*. Authors: Alastair S. Robinson and Elizabeth P. Gironella.

**Co – Author:** *Drosera ultramafica* (Droseraceae), a new sundew species of the ultramafic flora of Malesian highlands. Authors: A. Fleischmann, A.S. Robinson, S. McPherson, V. Heinrich, E. P. Gironella, D.A. Madulid. 2011 Feb. 9. Research Article, *Blumea*.

**Co – Author:** *Nepenthes leonardoii* (Nepenthaceae) a new pitcher plant Species from Palawan, Philippines. *Carniflora Australis* 8 (1); 4 – 19, Authors: McPherson, S., G. Bourke, J. Cervancia, M. Jaunzems, E. Gironella, A. Robinson and A. Fleischmann 2011.

**Co – Author:** *Nepenthes gantungensis* (Nepenthaceae), a new pitcher plant species from Mount Gantung, Palawan, Philippines. Authors: McPherson, S., J. Cervancia, C. Lee, M. Jaunzems, A. Fleischmann, F. Mey, E. Gironella and A. Robinsosn. 2010. In: S.R. McPherson Carnivorous plants and their Habitats. Volume 2. Redfern Natural History Production, Poole pp. 1286 – 1295.

**Co – Author:** *Nepenthes palawanensis* (Nepenthaceae) a new pitcher plant species from Sultan Peak, Palawan Island, Philippines. Authors: McPherson, S., J. Cervancia, C. Lee, M. Jaunzems, A. Fleischmann, F. Mey, E. Gironella and A. Robinson. 2010. In: S.R. McPherson Carnivorous Plants and their Habitats. Volume 2. Redfern Natural History production, Poole. Pp. 1332 – 1339.

**Co – Author:** A spectacular new species of *Nepenthes* L. (Nepenthaceae) pitcher plant from Central Palawan, Philippines. *Botanical Journal of the Linnean Society*. Authors: Robinson, A.S., A.S. Fleischmann, S.R. McPherson, V.B. Heinrich, E.P. Gironella, and C. Q. Pena 2009. (*Nepenthes attenboroughii*).

**Assistant Botanist for the research** on “Botanical Inventory and Geographic Information System (GIS) as a Basis for Management and Sustainable Development of Palawan (Philippines) Forest Resources.” Palawan Council for Sustainable Development and Staff (PCSDS) Puerto Princesa City Palawan, Philippines, program for Collaborative Research in the Pharmaceutical Sciences (PCRPS), University of Illinois at Chicago (UIC), Chicago Illinois, USA, Palawan State University (PSU), Puerto Princesa City, Philippines, Philippine National Herbarium (PNH), National Museum, Manila, Philippines. June 1999.

**Research Member (Co – Author),** The Palawan, Monograph Series, Palawan State University, Puerto Princesa City, Philippines

**Research Member (Co – Author)**, Ethnobotanical Study of Indigenous Philippine Forest Plants among the Pala'wans of Quezon, Palawan, Palawan State University, Puerto Princesa City, Philippines. October 2000

### **Awards and Recognitions**

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**Scientific Achievement Award for TOP TEN NEW SPECIES AWARD 2010**  
**HONOR THE SCIENTIFIC ACHIEVEMENT FOR THE DISCOVERY OF THE REMARKABLE NEW SPECIES *Nepenthes Attenboroughii***  
ASU INTERNATIONAL INSTITUTE FOR SPECIES EXPLORATION ARIZONA STATE UNIVERSITY U.S.A.  
MAY 21, 2010

### **Professional Affiliation:**

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- Biology Teachers Association of the Philippines (BIOTA)
- Philippine Association of Chemistry Teachers
- Faculty Professional Organization Palawan State University
- Faculty and Staff Club Palawan State University

## EPHRAIM ABE OCOP

Puerto Princesa City 5300 Palawan

Contact No. 09095964040;

Email-Address: [ephraim\\_taurus69@yahoo.com](mailto:ephraim_taurus69@yahoo.com)



### Professional Qualification

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Registered Forester  
Board Rating of 76.70%  
Professional Regulation Commission (PRC)  
4th Floor, PRC Annex Building, Sampaloc, Manila  
June 10-12, 2002 obtaining a R

### Academic Training

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#### **Master of Science in Rural Development (SY 2008-2009)**

Have earned 18 units under the MSRD course taken from Western Philippines University (WPU) - Puerto Princesa campus

#### **Bachelor of Science in Forestry (SY 1997-2000)**

Western Philippines University (main campus) in Aborlan, Palawan

#### **Certificate in Forest Ranger (SY 1988—1991)**

Palawan National Agricultural College (PNAC) now Western Philippines University-main campus in Aborlan, Palawan

### Employment Record

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Position	:	<b>FORESTER II</b>
Inclusive Dates of Employment	:	January 10, 2019 - Present
Office Assignment	:	CENRO-Puerto Princesa City
Employer	:	DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES OFFICE (MIMAROPA REGION)
Position	:	<b>FORESTER II</b>
Inclusive Dates of Employment	:	January 11, 2016 - January 10, 2019
Office Assignment	:	CENRO-Quezon
Employer	:	DEPARTMENT OF ENVIRONMENT AND

NATURAL RESOURCES OFFICE (MIMAROPA REGION)

Position : **Community Development assistant - I**  
 Inclusive Dates of Employment : December 16, 2005 - January 10, 2016  
 Office Assignment : PG-ENRO  
 Employer : Provincial Government of Palawan

Position : **Forester**  
 Inclusive Dates of Employment : May 1, 2004—June 15, 2004  
 Field Assignment : Southern Palawan  
 Employer : Palawan Tropical Forestry Protection Programme (PTFPP) - a project of the Palawan Council for Sustainable Development (PCSD) in partnership with the European Union (EU)

Position : **Forester/Crew Leader**  
 Inclusive Dates of Employment : April 27, 2003 - November 30, 2003  
 Employer : DARUMA Technologies Inc.  
 Project Implemented : Sustainable Environment & Management Project - ECAN Zoning Component (a JBIC funded project for Northern Palawan under the auspices of the of the PCSDS and the Department of Tourism (DOT)

Position : **Clerk (Casual)**  
 Inclusive Dates of Employment : September 7, 2000—September 7, 2001  
 Office Assignment : Office of the Resident Auditor  
 Employer : DepEd-Palawan National School-main campus

Position : **Tree Plantation Surveyor**  
 Inclusive Dates of Employment : April 5, 1991– June 4, 1999  
 Field Assignment : Northern Palawan  
 Employer : Palawan Tropical Forestry Protection Programme

Position : **Farm Foreman**  
 Inclusive Dates of Employment : March 28, 1995 - April 5, 1997  
 Area of Assignment : Rural Agricultural Center (RAC)  
 - Busuanga, Palawan  
 Employer : Provincial Government of Palawan  
 Project Implemented : Second Palawan Integrated Area Development Project (SPIADP) — DA Component

Position : **Forest Ranger**  
 Inclusive Dates of Employment : April 5, 1991 - April 5, 1993  
 Office Assignment : CENRO Quezon and CENRO Narra,  
 Palawan  
 Employer : Department of Environment & Natural  
 Resources Office (DENR)

### **Trainings and Seminars Attended:**

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Title : **Learning Event on Technical Bulletin No. 16-A Revised  
 SupplementsI Guidelines and Procedures of Watershed  
 Characterazation and Climate Reslient Training**  
 Provider : Department of Environment and Natural Resources –  
 MIMAROPA REGION IV-B  
 Date : November 11-13, 2019

Title : **Training on Crocodile Conservation and Rescue Operation**  
 Provider : Palawan Wildlife Rescue and Conservation Center  
 (PWRCC), Palawan Council for Sustainable Development  
 (PCSD) and Crocodylus porosus Philippines  
 Date : October 23-25, 2019

Title : **Training of Trainers on Carbon Sequestration and Bamboo  
 Production**  
 Provider : Department of Environment and natural Resources –  
 Environmental Research and Development Bureau  
 Date : October 23-25, 2019

Title : **Deputation Training for Environment and Nature Resources  
 Officers in the Province of Palawan**  
 Provider : Department of Environment and natural Resources –  
 Mines and geosciences Bureaua MIMAROPA REGION IV-B  
 Date : July 26, 2019

Title : **Seminar Workshop on Environmental Rights in good Local  
 Governance**  
 Provider : Commission on Human Rghts  
 Date : July 22, 2019

Title : **2018 Society of Filipino Forester, Incorporated (SFFI)  
 National Conference with Theme "FORESTRY  
 RECALIBRATED"**  
 Provider : Society of Filipino Foresters, Inc.  
 Date : October 25-27, 2018



Title : **Cross-visit and Learning Enhancement Capacity of the FLUPTWG in the Formulation of Forest Landuse Plan**  
 Provider : Protect Wildlife  
 Date : September 17-24, 2018

Title : **Wildlife and Environmental Law Enforcement Training for DENR Palawan Forest Protection Officers**  
 Provider : Department of Environment and Natural Resources – MIMAROPA REGION IV-B  
 Date : May 21-25, 2018

Title : **2017 Society of Filipino Forester, Incorporated (SFFI) National Conference with Theme "FOREST IS LIFE"**  
 Provider : Society of Filipino Foresters, Inc.  
 Date : October 19-21, 2017

Title : **Training Workshop on Forest Land-use Plan Data Analysis** Provider : Department of Environment and Natural Resources – MIMAROPA REGION IV-B  
 Date : October 10-13, 2017

Title : **Planning Workshop in the Formulation of the Comprehensive Landuse Plan of the Municipality of Quezon, Palawan**  
 Provider : Municipal Government of Quezon, Palawan  
 Date : August 8-10, 2017

Title : **Training Cum Conference of Forest Officers in Law Enforcement and Forest**  
 Provider : Department of Environment and Natural Resources – MIMAROPA REGION IV-B  
 Date : June 11-15, 2017

Title : **Forest Fire Response Management Training**  
 Provider : Department of Environment and Natural Resources – MIMAROPA REGION IV-B- Forest Management Bureau  
 Date : February 20-24/2017

Title : **Gender Sensity Training**  
 Provider : Department of Environment and Natural Resources – Community Environment and Natural Resources Office Quezon, Palawan  
 Date : September 20, 2016

Title : **Training on Forest Land-use Planning**  
 Provider : Department of Environment and Natural Resources – MIMAROPA REGION IV-B  
 Date : October 10-12, 2016

Title : **Palawan Wildlife Management Program Development Training Workshop (WILD-PRO-DEV)**  
 Provider : Katala Foundation, Inc and Palawan Council for Sustainable Dev't (PCSD) (PCSD)  
 Date : October 23, 2015

Title : **Data Capture for Efiling and monitoring System for Illegal Logging and Wildlife Cases**  
 Provider : Department of Environment and Natural Resources – Human Resource Services  
 Date : January 1-3, 2016

Title : **Orientation Training on Forest Land-use Planning**  
 Provider : Department of Environment and Natural Resources – MIMAROPA REGION IV-B- Forest Management Bureau  
 Date : September 15-17, 2014

Title : **Basic Customer Service Skills Training (BCSST)**  
 Provider : Human Resource Management Office (HRMO)-Palawan Provincial Government  
 Date : November 18-19, 2014

Title : **Orientation Training on Forest Land-Use Planning**  
 Provider : DENR-Forest Management Bureau  
 Date : September 15-17, 2014

Title : **Natural Resource Assessment**  
 Provider : Climate Change Commission  
 Date : November 16-21, 2013

Title : **Workshop on Plan Vivo and EU-Emerging Champions for Biodiversity Conservation and improved Ecosystem Services**  
 Provider : Enterprise Works Worldwide—Philippines (EWW-Phils)  
 Date : February 21, 2012

Title : **Training on Managerial Capability for Public Administration**  
 Provider : Western Philippines University  
 Date : January 17, 2009

Title : **Basic Biodiversity Assessment Methodology**  
 Provider : Conservation International-Phils and Palawan Council for

Date : Sustainable Dev't  
 February 10-12, 2007

Title : **Deputation Training for Caves Protection and Enforcement Officers**

Provider : Palawan Tropical Forestry Protection Programme  
 Date : June 27-29, 2004

Title : **Stakeholders Planning Workshop for Cabigaan Catchment**  
 Provider : Palawan Council for Sustainable Development and Palawan Tropical Forestry Protection Programme (PTFPP)  
 Date : August 18-19, 1999

Title : **Multiple Land-Use Survey & Streamflow Measurements of Sagpangan Catchment**  
 Provider : State Polytechnic College of Palawan (SPCP)  
 Date : January 26-28, 1999

Title : **Land-Use and Household Survey & Mapping of El-Salvador Catchment**  
 Provider : Palawan Tropical Forestry Protection Programme  
 Date : April 20, 1998 - May 20, 1998

Title : **Orientation Workshop on Environmentally Critical Areas Network and Environmental Impact assessment**  
 Provider : Palawan Tropical Forestry Protection Programme  
 Date : April 20, 1998 - May 20, 1998

## Personal Information

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Gender : Male  
 Age : 51 years old  
 Birth date : May 13, 1969  
 Birth place : Coron, Palawan  
 Civil Status : Married  
 Nationality : Filipino  
 Religion : Christian  
 Height : 1.61 meters  
 Weight : 60 kgs  
 Blood Type : "O"  
 Father : Valeriano Ocop, Jr.  
 Mother : Yolanda Abe Ocop (deceased)  
 Spouse : Annie Leah Degal Ocop  
 No of children : Three (3)  
 Language : Filipino, & English  
 Local dialogue Spoken : Cuyuno, Tagbanua and Ilongo

Person to be contacted in case of emergency:

**Annie Leah D. Ocop**  
+63 9466040743

## **References**

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**FOR. FELIZARDO B. CAYATOC**

Barangay Milagrosa,  
Puerto Princesa City

**ATTY. NOEL E. AQUINO**

Barangay Sta. Monica,  
Puerto Princesa City





