

High Conservation Value Areas Assessment in West Mt. Bulanjao, Southern Palawan



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This High Conservation Value Areas Assessment of West Mt. Bulanjao, Southern Palawan was made through a tripartite joint study agreement by the Center for Conservation Innovations PH Inc. (CCIPH), Palawan Council for Sustainable Development (PCSD), and Conservation International Philippines Foundation Inc. (CIPFI).

This document was prepared for the sole purpose of generating information on High Conservation Value Areas of West Mt. Bulanjao, Southern Palawan.

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List of Acronyms

ADSDPP	Ancestral Domain Sustainable Development and Protection Plan
CADT	Certificate of Ancestral Domain Title
CCA	Canonical Correspondence Analysis
CCIPH	Center for Conservation Innovations Ph. Inc.
CIPFI	Conservation International Philippines Foundation, Inc.
CR	Critically Endangered (IUCN Red List)
CVT	Cultivated
DD	Data Deficient
EN	Endangered (IUCN Red List)
ESG	Early Secondary Growth Forest
HCV	High Conservation Value
HCVA	High Conservation Value Areas
GIS	Geographic Information System
IPMR	Indigenous People Mandatory Representative
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
LC	Least Concern (IUCN Red List)
LGU	Local Government Unit
MMPL	Mt. Mantalingahan Protected Landscape
MPSA	Mineral Production Sharing Agreement
NA	Not Assessed
NGO	non-governmental organization
NT	Near Threatened (IUCN Red List)
OG	Old Growth Forest
PA	Protected Area
PCSD	Palawan Council for Sustainable Development
PCSDS	Palawan Council for Sustainable Development Staff
PKP	Palawan Knowledge Platform
RTE	rare, threatened, or endangered
RS	Remote Sensing
SEP	Strategic Environmental Plan
SDM	Species Distribution Model
VU	Vulnerable (IUCN Red List)

About Center for Conservation Innovations PH Inc.

Center for Conservation Innovations PH Inc. (CCIPH) is a non-government organization (NGO) that aims to promote innovations and development of new biodiversity conservation approaches and regenerative livelihoods by developing partnerships and building capacities for science-based, nature-inspired, and socially appropriate conservation strategies. Currently, CCIPH provides technical support and organizational capacity development on various aspects of biodiversity conservation. This includes strengthening biodiversity and analytical skills of academic institutions and students by providing the ecological assessment tools and skills training. CCIPH is also collaborating with a number of individuals and organizations including national and local governments units to enhance their biodiversity conservation lenses both technically and organizationally. CCIPH also studies ecology of certain threatened species to develop action plans that will help in the survival of viable species populations.

About Palawan Council for Sustainable Development (PCSD)

The legitimization of Republic Act 7611 or the Strategic Environmental Plan for Palawan Act launched not only a distinct and proactive law but also introduced a unique body that carries powerful responsibility and locally working only in one province like Palawan. While SEP is a national law, its effectivity covers only Palawan. This body is called the Palawan Council for Sustainable Development (PCSD). The PCSD is a multi-sectoral and inter-disciplinary body, which under the law is charged with the governance, implementation and policy direction of the SEP.

About Conservation International Philippines Foundation Inc. (CIPFI)

Conservation International Philippines Foundation, Inc. (CIPFI) is an Affiliate of Conservation International (CI), a US-based environmental non-profit organization. With a mission “Building upon strong foundation of science, partnership and field demonstration, empower societies to responsibly and sustainably care for nature for the well-being of humanity.” CIPFI applies innovations in science, economics, policy and community participation to protect the earth’s richest regions of plant and animal diversity hotspots, major tropical wilderness areas and key marine ecosystems.

Executive Summary

The Center for Conservation Innovations PH Inc. (CCIPH), in partnership with the Palawan Council for Sustainable Development (PCSD) and Conservation International Philippines Foundation Inc. (CIPFI) conducted a High Conservation Value Areas assessment using HCVA approach (see pg.13). The assessment was done at municipality of Jose P. Rizal, Southern Palawan in November 2017 using standard field methodologies (see pg.16 and Annex7.2) to delineate areas of high conservation priorities.

All HCVAs are present in West Mt. Bulanjao. A total of 184 species (82 species of birds, 19 species of mammals, 11 species of amphibians, 11 species of reptiles, and 61 species of plants) were recorded during the survey. Of the 184 species, 24/184 (13%) are Philippine Endemic and 30/184 (16.3%) are Palawan Endemic species. There are also 6 (3.3%) Endangered, 17 (9.2%) Vulnerable, and 13 (7.1%) Near Threatened species listed under the IUCN Red List of Threatened Species (see HCV1 pg.22). The whole Mt. Bulanjao is suitable for supporting the survival of selected trigger species, however, there is a mismatch in the conservation requirements of target species and of ECAN zonation (see HCV2 pg.26). Forest degradation and fragmentation in West Mt. Bulanjao is evident with the forest cover change analysis due to rapid land use changes (see HCV3 pg.29). Canipaan river basin serve as main water source for household and domestic use. Other indirect ecosystem services include: protective barriers; supports survival of ecologically important species; maintenance of biogeochemical functioning; and support to wildlife species (see HCV4 pg.32). Livelihood guilds analysis identified *kaingin*, logging and swidden farming as sources of income by the indigenous communities in West. Mt. Bulanjao (see HCV5 pg.34). West Mt. Bulanjao is located within the titled ancestral domain of the Pala'wan tribe. The forest of West Mt. Bulanjao plays a significant role in the tribal economy and socio-cultural practices of the Pala'wan tribe (see HCV6 pg.39).

All High Conservation Value Areas (HCVA) in West Mt. Bulanjao are in clear present danger and warrants immediate measures to ensure its security.

1. All HCVAs in West Mt. Bulanjao are under rapid degradation due to land use change.
2. There's an imminent threat of massive conversion of all HCVAs in West Mt. Bulanjao because of the MPSA.
3. There's a clear mismatch between the conservation requirements of the HCVAs of West Mt. Bulanjao and the conservation prescriptions offered by the ECAN zonation (i.e. HCVAs 1,2, and 3 are outside Core Zone, and conversely, there are areas designated are Core Zone but do not overlap with HCVAs).

1. Introduction

This report narrates the results of the High Conservation Value Areas Assessment in West Mt. Bulanjao, Jose Rizal, Southern Palawan. This assessment was conducted last November 22-28, 2017 by the Center for Conservation Innovations Ph., Inc. (CCIPH) in partnership with the Palawan Council for Sustainable Development (PCSD), and Conservation International Philippines Foundation, Inc. (CIPFI).

Rationale and Background

The Palawan Island is hailed as “the last ecological frontier” of Philippine biodiversity because of its high level of endemism and rich composition of fauna and flora (Sandalo and Baltazar, 1997; Diesmos and Palomar, 2004). It is recognized as a Biosphere Reserve and has the largest remaining forest in the Philippines (Eder, 1990; Diesmos and Palomar, 2004). However, increasing occurrences of forest degradation through land use conversion (Birdlife International, 2003; Fitzherbert et al., 2008; Mallari et al., 2010) and illegal wildlife hunting and trade, especially in Southern Palawan (van den Beukel et al., 2006; Widmann, 2006; Cruz et al., 2007), resulted to a drastic loss of valuable ecosystems and biodiversity (Eder, 1990; Naeem et al., 1999; Myers et al., 2000).

Mt. Bulanjao, located at the southern region of Palawan, covers two municipalities: Jose P. Rizal in the west and Bataraza on the east. Mt. Bulanjao is characterized as forests over ultrabasic rocks and is home to a diverse species of flora and fauna, including thriving vegetations of ultrabasic plant indicators (Amoroso et al., 2011; Amoroso and Aspiras 2011). It is also under extreme anthropogenic pressures and is identified as one of the biodiversity hotspots in Palawan.

The Palawan Council for Sustainable Development (PCSD) through its Palawan Knowledge Platform (PKP) for Biodiversity and Sustainable Development in partnership with Conservation International Philippines Foundation, Inc. (CIPFI) and Center for Conservation Innovations PH, Inc. (CCIPH) formed a tripartite joint study on identifying High Conservation Value Areas (HCVA) in the western side of Mt. Bulanjao. The information collected from the assessment will be used as basis for management recommendations that will strengthen existing policies in the protection and conservation of biological, ecological, and socio-cultural values in Mt. Nacolod.

The High Conservation Values Concept

In 1999, Forest Stewardship Council (FSC) introduced the High Conservation Value concept primarily for forest management certification and was therefore ratified in identifying priority areas for conservation and natural resource management (UNEP-WCMC, 2013). High Conservation Value Areas (HCVAs) are natural habitats that possess inherent conservation values, including the presence of rare or endemic species, provisioning of ecosystem services, sacred sites, or resources harvested by local residents. The key to the concept of HCVAs is the identification of High Conservation Values (HCVs). These HCVs are defined below (HCV Resource Network, 2005):

- **HCV 1 Species diversity:** Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels;
- **HCV 2 Landscape-level ecosystems and mosaics:** Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance;
- **HCV 3 Ecosystems and habitats:** Rare, threatened, or endangered ecosystems, habitats or refugia;
- **HCV 4 Ecosystem services:** Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes;
- **HCV 5 Community needs:** Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc...), identified through engagement with these communities or indigenous peoples;
- **HCV 6 Cultural values:** Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

Study Area

The HCVA assessment was conducted in the western side of Mt. Bulanjao, Jose P. Rizal Municipality, Southern Palawan. The biodiversity survey was conducted in Barangay Latud covering five Sitios: (1) Tuno, (2) Kukudugan, (3) Minilabag, (4) Masimbur, and (5) Katagbakan. Each transect line was positioned to cover different habitat types, and varying altitudinal and disturbance gradients. Figure 1 shows the spatial distribution of all surveyed transect routes. Each transect line is located crossing the core and multiple use ECAN zones (Environmentally Critical Areas Network), that is within and outside the boundaries of the approved Mineral Production Sharing Agreement (MPSAs), and within the awarded Certificate of Ancestral Domain Title (CADT) areas of West Mt. Bulanjao, Southern Palawan.

For the socio-economic survey, the assessment was conducted in Sitios Tagpas and Camantian in Barangay Latud, and Sitios Magkalip and Bahonbonan in Barangay Taburi. Both Sitio Tagpas and Camantian are within the Traditional use zone of the Environmentall Critizal Areas Network (ECAN), whilst Sitio Magkalip is within ECAN controlled use zone and Sitio Bahonbonan is near the ECAN buffer zone (Figure 1).

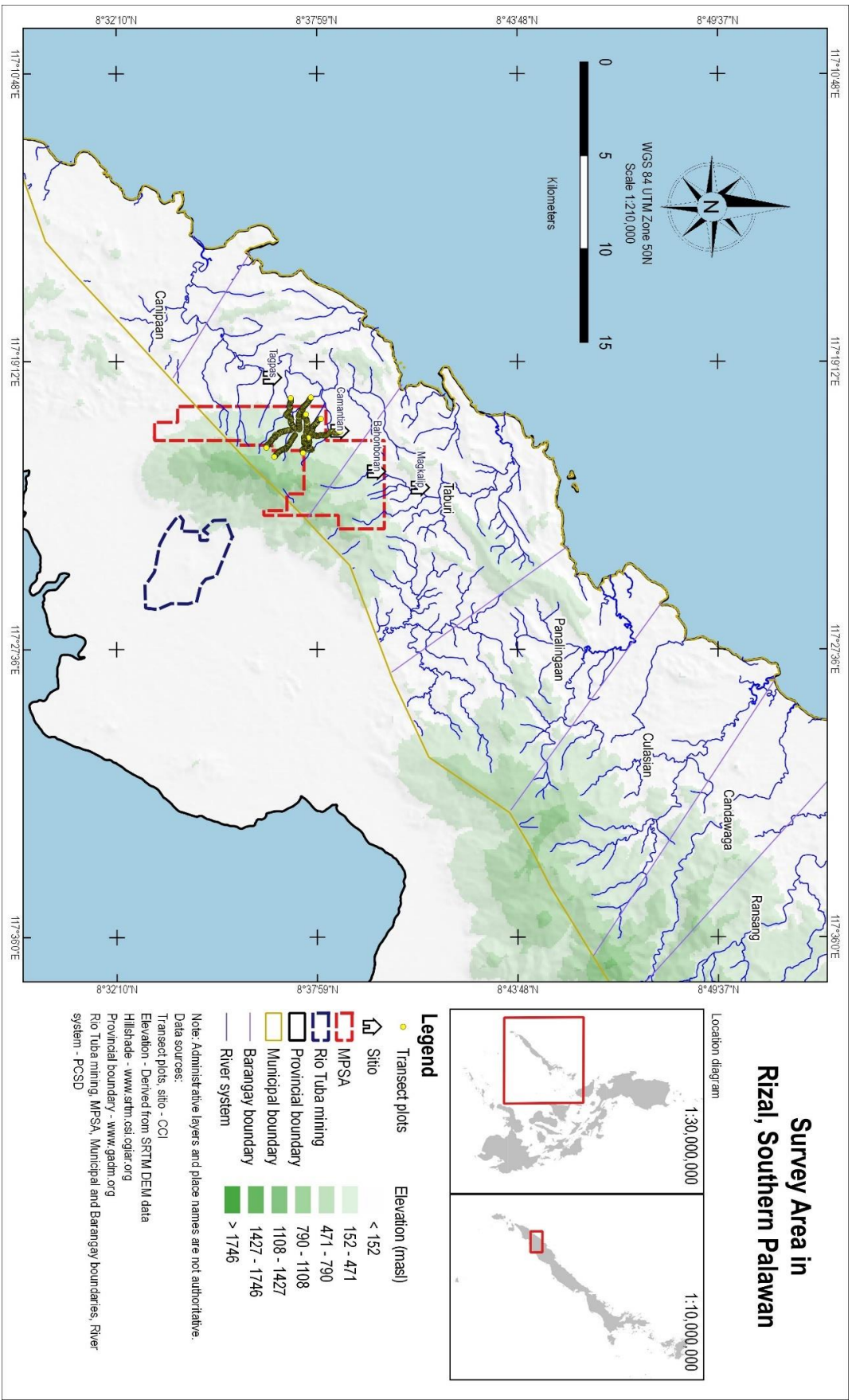


Figure 1. Sampling areas in West Mt. Bulanjao.

2. Methodology

Various field assessment techniques were used to identify HCVAs in West Mt. Bulanjao. Table 1 shows the summary of efforts per activity.

- For the biodiversity assessment, a total of 52 kilometers of transect lines with 560 transect point sections were surveyed. Area per transect surveyed is 8 hectares (ha). The total area surveyed for all transect lines is 56 ha.
- For forest cover change assessment, a total of 480 points based on land cover classification systems (tree/non-tree cover data; Hansen, 2015) were collected. This was used to detect and analyze changes in forest cover using satellite images.
- For the socio-economic survey on indigenous community, a total of 100 respondents were interviewed.

Table 1. Total sampling effort for HCVA Assessment in West Mt. Bulanjao, Jose P. Rizal, Southern Palawan.

Site	Habitat Assessment	Avifaunal Survey	Mammal Survey	Herpetofaunal Survey	Community Perception
Barangay Latud	14km (56 point stations and 560 point sections)	28km (112 point stations and 1120 point sections)	54 net nights and 56 trap nights	10km (40 point stations and 400 point sections)	50 respondents
Barangay Taburi	-	-	-	-	50 respondents

2.1. Field Survey Methods

2.1.1. Biodiversity Assessment

- Seven main biodiversity transect lines were established using random stratified sampling. Each transect line covers various disturbance and elevational gradients.
- Point stations were marked every 250 meters while transect sections were marked at every 25 meters.

- Habitat assessment was conducted at every point station of the transect line by assessing the following: (i) broad habitat types, (ii) detailed habitat structures, and (iii) tree diversity and stand composition.
- In bird surveys, a combination of variable transect width method (transect walk) and the variable circular width method (point count) with a plot radius of 25m was conducted in all main biodiversity transect. Transect lines were surveyed twice (forward and reverse sampling).
- Herpetofaunal survey used transect, plot and microhabitat sampling. The survey was performed in daytime and nighttime. Frogs, froglets, and lizards were collected by hand while snake hooks or sticks were used to capture snakes.
- Survey technique for mammal survey used mist nets and live traps.
- All captured individuals were immediately processed for morphometric measurements and photo-documentation. Captured individuals were then released in the same habitat where they were captured.
- A detailed survey methodology is described in Annex 2.

2.1.2. Socio-economic assessment

- The socio-economic survey was done among indigenous communities residing within vicinities of Mt. Bulanjao to collect data on their socio-economic profile, demographic profile and forest interaction/forest use. Information on climate change issues and conservation efforts in their respective communities were also noted
- Interviewers followed a guided survey questionnaire (See Annex 5 for the questionnaire)

2.2. Data Analyses

To illustrate flora and faunal association in West Mt. Bulanjao, various ecological models were used. Predicted species distribution modeling for selected rare, threatened and endangered (RTE) species were performed. Principal component analysis was performed to identify livelihood scenarios in the community. The results of these models were used as references for identifying critical habitats in West Mt. Bulanjao.

2.2.1. Species Distribution Modeling

- Species Distribution Modeling (SDM) is a technique that is used to predict potential distribution of species using presence-only data (i.e. geographic coordinates) obtained during the survey and a set of interpolated environment variables as predictors from WoldClim

database were used to train the model (Hijmans, 2005; Elith and Leathwick 2009). See Annex 4 for the list of environmental predictors, the unit of measurement used, and their sources.

- SDM was performed using Maximum Entropy Algorithm (Maxent v.3.3.3k; Phillips et al 2006; Elith et al 2006; Hernandez et al 2006). To evaluate the performance of the model, the value of area under curve (AUC) of the receiver operating characteristics (ROC) was calculated. Threshold values were determined based from the lowest predicted value (LPV) of occurrence (Pearson 2007) to ensure that no occurrence records are omitted. The extent of habitat suitability of species was generated through reclassification of model output based from arbitrary values set for each class (Kumar and Stohlgren 2009).

2.2.2. Livelihood Guilds Analysis

- The livelihood guilds represent the inclination of an individual to select an economic endeavor over another. Data obtained from household interviews were extrapolated to establish Livelihood Guilds. The following variables were extracted from the household interviews to determine the livelihood guilds: age, gender, educational attainment, activities or source of income during wet and dry season, frequency of forest visit and reasons of their visit, observation to climatic changes, experiences in natural calamities, knowledge and perception toward forest and wildlife protection, involvement to conservation activities, and community participation towards these conservation programs.
- Principal Component Analysis, a multivariate analysis, (PCA; Pallant, 2017) was performed using the Paleontological Statistics Software Package (Hammer et al., 2001). Correlation matrix and bootstraps (N=500) were applied to the data. The first four axes created were extracted and used as the bases for the livelihood guilds.

2.2.3. Forest Cover Change Analyses

- Due to the limited time available and funding constraint in purchasing high resolution satellite imagery for pursuing localized forest-cover change detection, CCIPH resorted to readily accessible global-scale datasets identifying extent of tree cover and change in local areas around the Philippines (Hansen/UMD/Google/USGS/NASA, 2017). These do not exactly represent the forest cover in the country because they are based from tree canopy estimates. Global scale tree-cover change mapping was implemented using a combination of threshold approach and decision tree algorithms in discriminating forest and non-forest cover (Hansen et al., 2013; Hansen et al., 2008; Hansen et al., 2002).

- CCIPH has accessed Landsat 8 imagery taken last February 22, 2017. This enabled CCIPH to interpret the habitat cover classes from the satellite imagery present in the Bulanjao area at no additional cost. The interpretation used a similar non-parametric, decision-tree algorithm using habitat cover classes gathered from the field as training data. The habitat cover classes were then translated into a forest cover map representing the 2017 era. The 2017 forest cover, thus, comprise the aggregated, three main habitat-cover classes of Old Growth Forest (OGF), Advanced Secondary Growth (ASG) Forest and the Early Secondary Growth (ESG) Forest. These cover types were amalgamated in a single forest cover map, as representing the forest extent in 2017.
- Therefore, any tree cover loss from the global dataset of Hansen present within the confines of the boundaries of the amalgamated forest should represent tree clearing of the forest inside. The global dataset has tree cover loss maps from ca. 2000 to ca. 2016, while CCIPH's forest cover map is ca. February 2017. The time gap is short enough to visualize those tree cover loss as part and parcel of loss in the early 2017s. Hence, we infer the forest cover loss of the Bulanjao area from the recent tree cover loss data to show the spatial pattern of forest cover loss. Any loss detected between 2001 and 2016 should by now either remained as is or might show signs of forest recovery in 2017; thus, forest cover gain might be in the offing for some of the sites in the Bulanjao area, subject to further ground validation.

2.2.4. Mapping of HCVAs

- To identify critical areas for West Mt. Bulanjao, the following maps were merged: species richness, forest cover change, critical ecosystems that provides services to the community, and sacred sites.
- HCV overlaps were characterized to set priorities for conservation and management (high, medium, low) in West Mt. Bulanjao.

3. High Conservation Value Areas (HCVA) in West Mt. Bulanjao

This section presents the outcomes of the HCVA assessment based on statistical analyses and interviews. Results suggest that West Mt. Bulanjao is a priority for conservation because of the HCVs identified across the landscape. Table 2 shows the summary of HCVs present in the area.

Table 2 Summary of HCV assessment findings.

HCV	Present	Potential	Absent	Justification
1 – Species Diversity	√	X	X	Presence of 36 globally threatened species, and 54 Philippine endemics, of which, 30 species are unique to the Palawan faunal region.
2 – Landscape-level Ecosystem and Mosaics	√	X	X	Forest habitats within West Mt. Bulanjao is able to support viable populations of several threatened and endemic species (<i>Anthracocercos marcheii</i> , <i>Pardaliparus amabilis</i> , <i>Cyornis lempreiri</i> , <i>Polypectron napoleonis</i> , <i>Dinopium everetti</i> , <i>Irena tweeddallii</i> , <i>Treron vernans</i> , <i>Erythropitta erythrogaster</i> , <i>Iole palawanensis</i> , <i>Tersiphone cyanescens</i> , <i>Chrysocolaptes erythrocephalus</i> , <i>Leptobrachium tagbanorum</i> , <i>Alculus mariae</i> , <i>Megophrys ligayae</i> , <i>Limnonectes acanthi</i> , <i>Staurois nubilus</i> , <i>Artocarpus blancoi</i> , <i>Intsia bijuga</i> , <i>Palaquium luzonense</i> , and <i>Mangifera monandra</i>). This is evinced by high species congruence predicted across the landscape.
3 – Rare and Threatened Ecosystems and Habitats	√	X	X	Rapid degradation and fragmentation due to imminent land use conversion resulted to drastic loss of forest areas.

4 – Ecosystem Services	√	X	X	The Canipaan River and forest areas of West Mt. Bulanjao provide various ecosystem services (clean water source for household and domestic use, protective barriers, supports survival of ecologically important species, maintenance of biogeochemical functioning, and support to wildlife species) that directly or indirectly affect the livelihoods and health of the Pala'wan tribe and other residents living in West Mt. Bulanjao.
5 – Community Needs	√	X	X	The Pala'wan tribe are dependent on forest resources for their basic needs and economic activities. Primary livelihood for the community include <i>kaingin</i> , swidden farming, and logging.
6 – Cultural Values	√	X	X	The whole West Mt. Bulanjao landscape is within the boundaries of the Pala'wan tribe's Certificate of Ancestral Domain Title (CADT).

3.1. HCV 1 (Species Diversity)

This section presents the key findings for the HCV 1 assessment in West Mt. Bulanjabo. Results show that there are high concentrations of biological diversity, including occurrences of rare, threatened and endangered species. The following data are summarized in Table 3 (number of threatened species) and 4 (number of endemic species).

Key Findings:

Flora

- A total of sixty-one (61) species of plants were recorded during the survey (see Annex 3 for complete list). Of these, eleven (11) species are endemic to the Philippines, including Two (2) species are restricted to Palawan. These were, Kandis/Batuan (*Garcinia lateriflora*) and Palawan Mangkono (*Xanthostemon speciosus*).
- Three (3) species are classified as Endangered (IUCN 2017-3), including Manggis (*Koompassia excelsa*), Pasi (*Guioa acuminata*), and Palawan mangkono (*Xanthostemon speciosus*). Eleven (11) species are listed as Vulnerable (IUCN, 2017).

Amphibians

- A total of eleven (11) species of amphibians were recorded during the survey (see Annex 3 for complete list). Six (6) endemic species were identified, of these, five (5) are endemic to Palawan. These were the Palawan Horned Frog (*Megophrys ligayae*), Philippine Toad (*Ingerophrynus philippinicus*), Mary's Frog (*Alcalus mariae*), *Leptobrachium tagbanorum* and *Staurois nubilus*.
- Two (2) Palawan endemic frogs are globally threatened: Palawan Horned Frog (*Megophrys ligayae*) IUCN Endangered and the Busuanga Wart Frog (*Limnonectes acanthi*) IUCN Vulnerable (IUCN, 2017-3).
- *Philautus longicrus* and Everette's Flying Frog (*Philautus everetti*) are non-endemic species but are classified as Near Threatened (IUCN, 2017-3).

Reptiles

- Eleven (11) species of reptiles were recorded during the survey (see Annex 3 for complete list). Of these, two (2) species are endemic to Palawan: the Palawan Bent-toed Gecko (*Cryptodactylus redimiculus*) and the White-striped Snake (*Sibynophis bivittatus*).

Mammals

- Nineteen (19) species of mammals were recorded (see Annex 3 for complete list). Seven (7) species are endemic to the Philippines. Of these, six (6) are found only in Palawan.
- Pangolin tracks (*Manis culionensis*) were observed. This species is classified as Endangered (IUCN 2017-3) because of intensive hunting pressures and wildlife trafficking.
- Tracks and calls from the Palawan bearded pig (*Sus ahoenobarbus*) were observed in several transect lines. Near the camp site, the Palawan Tree Flying Squirrel (*Hylopetes nigripes*) was observed gliding from one tree to another. Both species are classified as Near Threatened (IUCN, 2017-3).

Birds

- Eighty-two (82) species of birds were identified (see Annex 3 for complete list). Twenty-six (26) are Philippine endemic species. Of these, fifteen (15) are only found in Palawan.
- The Red-headed Flameback (*Chrysocolaptes erythrogaster*) was the only Endangered (IUCN, 2017) bird identified during the survey.
- Five (5) species of birds are classified as Vulnerable (IUCN, 2017-3), including the Palawan Peacock-pheasant (*Polypectron napoleonis*), Palawan hornbill (*Anthracoceros marchei*), Falcated-wren babbler (*Ptilocichla falcata*), Blue-headed racquet-tail (*Prioniturus platenae*), and Great Slaty woodpecker (*Mulleripicus pulverulentus*). Eight (8) species are listed as Near Threatened (IUCN, 2017-3).

Figure 2 shows the spot map of birds, amphibians, and tree species found in sampling areas of West Mt. Bulanjao. These represents species encounter rates over established transect routes.

Table 3. Summary of threatened species recorded in West Mt. Bulanjao Southern Palawan.

Taxa	CR	EN	VU	NT	LC	DD	NA	Total
Flora	0	3 (4.9%)	11 (18.0%)	0	5 (8.2%)	3 (4.2%)	39 (63.9%)	61
Birds	0	1 (1.2%)	5 (6.1%)	8 (9.8%)	68 (82.9%)	0	0	82
Mammals	0	1 (5.3%)	0	2 (10.5%)	16 (84.2%)	0	0	19
Amphibians	0	1 (9.1%)	1 (9.1%)	2 (18.2%)	4 (36.4%)	1 (9.1%)	2 (18.2%)	11
Reptiles	0	0	0	1 (9.1%)	5 (45.5%)	3 (27.3%)	2 (18.2%)	11
Total	0	6 (3.3%)	17 (9.2%)	13 (7.1%)	98 (53.3%)	7 (3.8%)	43 (23.4%)	184

*CR – Critically Endangered; EN – Endangered; VU – Vulnerable; NT – Near Threatened; LC – Least Concern; DD – Data Deficient; NA – Not Assessed

Note: Values in parentheses are percentages relative to the total number of species in a taxonomic group.

Table 4. Summary of extent of occurrences of the species recorded in West Mt. Bulanjao, Southern Palawan.

Taxa	Philippine Endemic	Palawan Endemic	Near Endemic	Widespread	Migratory	Not Assessed	Total
Flora	11 (18%)	2 (3.3%)	N/A	46 (75.4%)	N/A	2 (3.3%)	61
Birds	11 (13.4%)	15 (18.3%)	12 (14.6%)	36 (43.9%)	8 (9.8%)	0	82
Mammals	1 (5.3%)	6 (31.6%)	0	12 (63.2%)	N/A	0	19
Amphibians	1 (9.1%)	5 (45.5%)	0	5 (45.5%)	N/A	0	11
Reptiles	0	2 (18.2%)	0	8 (72.7%)	N/A	1 (9.1%)	11
Total	24 (13%)	30 (16.3%)	12 (6.5%)	107 (58.2%)	8(4.3%)	3 (1.6%)	184

Note: Values in parentheses are percentages relative to the total number of species in a taxonomic group.

N/A: Not Applicable for Criteria

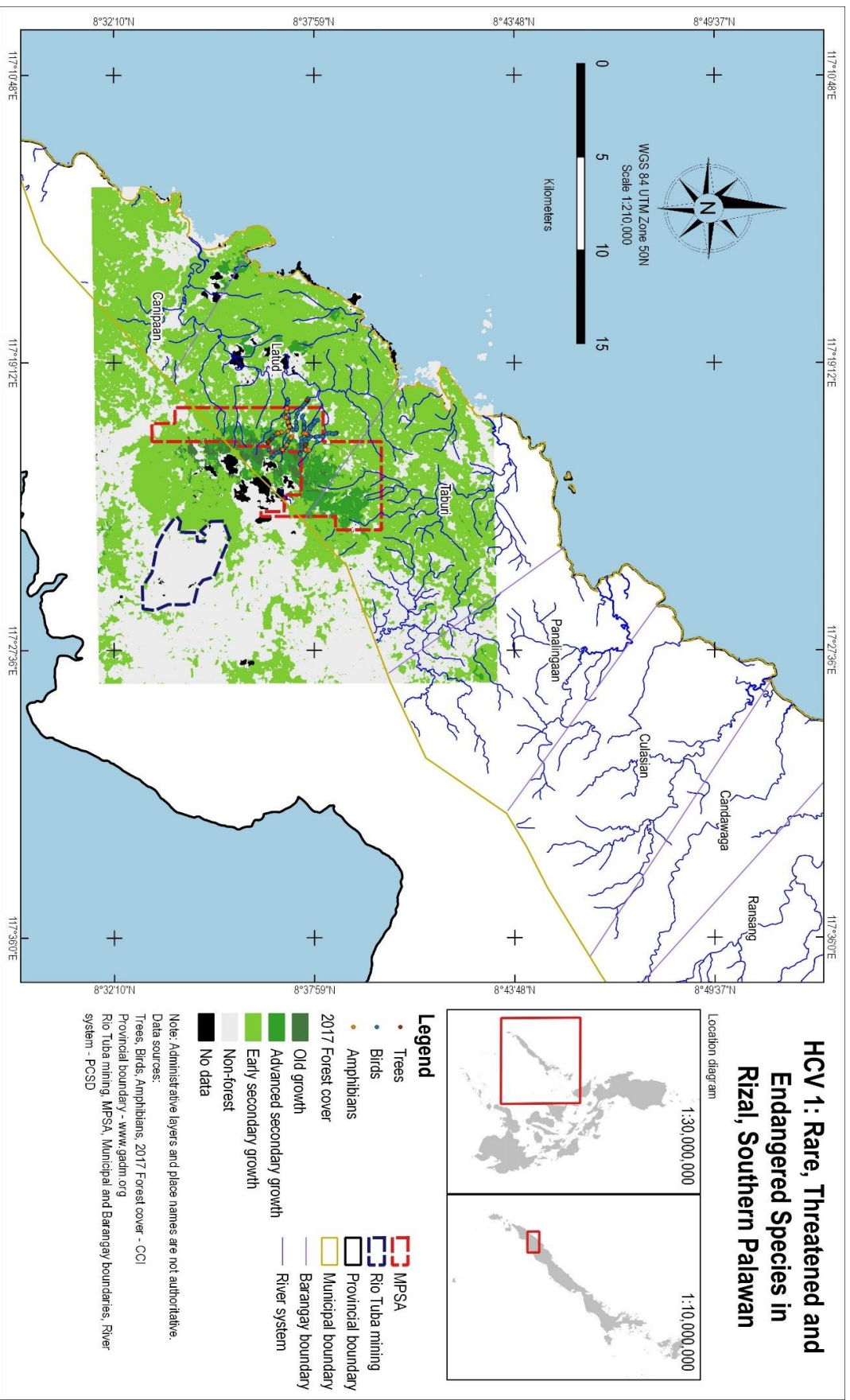


Figure 2. HCV A 1: Spot map of rare, threatened, and endangered species of trees, birds, and amphibians in Southern Palawan.

3.2. HCV 2 (Landscape-level Ecosystems Mosaics)

This refers to natural landscapes with a capacity to maintain and ensure natural ecological processes and dynamics through ecosystem diversity and viable populations of threatened and endemic species.

Key Findings:

- Twenty (20) trigger species were used for species distribution modeling to predict habitat suitability and likelihood of survival using the following criteria: (1) species endemic to the Philippines (Kennedy et al., 2000; IOC World Bird List, 2017); (2) species that are restricted to the Palawan faunal region (Checklist of the Birds of the Philippines, 2017); (3) threatened species according to the IUCN Red List of Threatened Species (2017-3); and, (4) forest specialist species (Mallari et al., 2011; Kennedy et al., 2000).
- SDM analysis generated habitat suitability maps of the twenty (20) selected trigger species based on their suitable habitats (Table 5). Results show that there is a high concentration of selected trigger species across West Mt. Bulanjao in the Municipality of Jose P. Rizal and extends to the eastern region of the landscape to the Municipality of Bataraza. This suggests that climate conditions in Mt. Bulanjao are suitable to support the survival of selected trigger species.
- There is a clear mismatch between HCVA 2 and the ECAN zones. At least half of HCVA 2 is covered by the ECAN Core zone while the other half overlaps with the ECAN Multiple Use Zones. This suggests that the ECAN zonation system is not appropriately positioned to protect HCV species and their suitable habitats.
- The Mineral Production Sharing Agreement (MPSA) completely overlaps (75% overlap) with HCVA 2 which poses a threat to the survival of trigger species.

Table 5. List of trigger species for distribution modeling.

Scientific Name	Common Name	Habitat	Conservation Status	Endemicity
<i>Anthracoceros marchei</i>	Palawan Hornbill	ASG	Vulnerable	Palawan Endemic
<i>Pardaliparus amabilis</i>	Palawan Tit	ASG	Near Threatened	Palawan Endemic
<i>Cyornis lemprieri</i>	Palawan blue flycatcher	ASG	Near Threatened	Palawan Endemic
<i>Polypectron napoleonis</i>	Palawan peacock pheasant	ASG	Vulnerable	Palawan Endemic
<i>Dinopium everetti</i>	Spot- throated flameback	ASG	Near Threatened	Palawan Endemic
<i>Irena tweedallii</i>	Palawan fairy bluebird	ASG	Near Threatened	Palawan Endemic
<i>Chrysocolaptes erythrocephalus</i>	Red-headed Flameback	ASG	Endangered	Palawan Endemic
<i>Treron vernans</i>	Pink-necked green pigeon	ASG	Least Concern	Philippine Endemic
<i>Erythropitta erythrogaster</i>	Red bellied pitta	ASG-FE	Least Concern	Philippine Endemic
<i>Iole palawanensis</i>	Sulphur-bellied bulbul	FE	Least Concern	Palawan Endemic
<i>Terpsiphone cyanescens</i>	Blue paradise flycatcher	FE	Least Concern	Palawan Endemic
<i>Leptobrachium tagbanorum</i>		ESG-ESG	Not Evaluated	Palawan Endemic
<i>Alculus mariae</i>	Mary's Frog	ASG-ESG	Data Deficient	Palawan Endemic
<i>Megophrys ligayae</i>	Palawan Horned Frog	ASG	Endangered	Palawan Endemic
<i>Staurois nubilus</i>		ESG	Not Evaluated	Palawan Endemic
<i>Limnnectes acanthi</i>	Busuanga Wart Frog	ESG	Vulnerable	Philippine Endemic
<i>Artocarpus blancoi</i>	Antipolo	ESG	Vulnerable	Philippine Endemic
<i>Intsia bijuga</i>	Ipil	ASG	Vulnerable	Widespread
<i>Palaquium luzoniense</i>	Nato	ASG	Vulnerable	Philippine Endemic
<i>Mangifera monandra</i>	Mangga paho, Malapaho	ASG	Vulnerable	Philippine Endemic

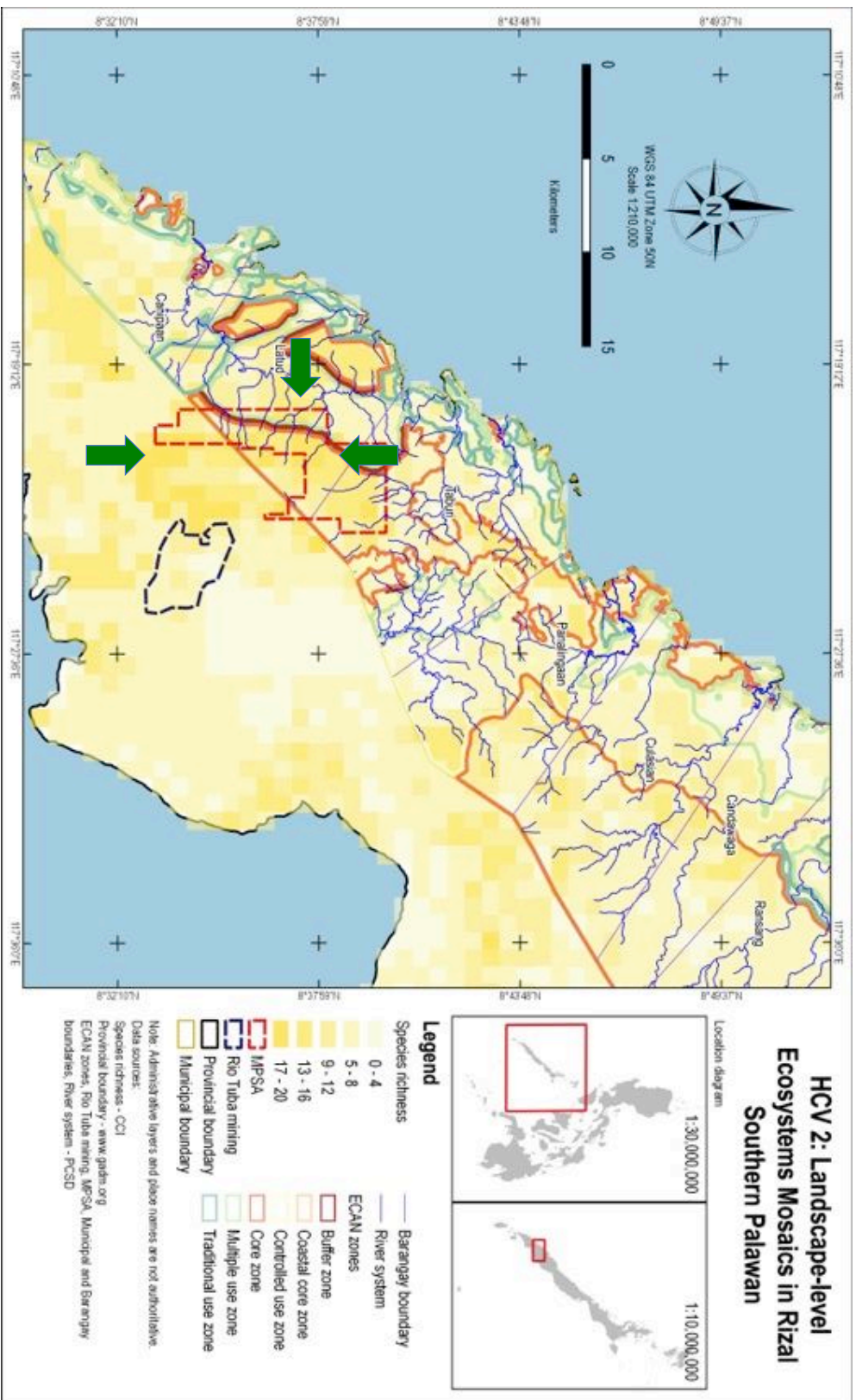


Figure 3. HCV A 2: distribution of species richness in the Mt. Bularjao landscape.

3.3. HCV 3 (Ecosystems and Habitats)

HCV 3 refers to the rare, threatened, or endangered ecosystems and habitats. HCVA 3 are areas that are uncommon or poorly understood and at serious risk of extinction because of anthropogenic or natural threats. West Mt. Bulanjao fits this criterion – naturally rare forest over ultramafic rocks with high species richness and endemism, threatened or endangered because of current human interventions in the landscape (*i.e.* mining, quarrying, logging, *kaingin*). To aid in identifying the specific locations of HCVA 3 in West Mt. Bulanjao, forest cover change was analyzed from year 2000 to 2017 (Figure 3).

Key Findings:

- There is marked degradation and widespread fragmentation of the natural forests across the landscape.
- Forest cover loss observed (with the forest cover change map) within the ECAN Multiple Use Zone but there are substantial losses within the Core Zones especially in Brgy. Taburi.
- Forest loss and degradation are observed in lowland areas (approx. <150masl; Figure 4) and near the forest edge of intact forest which happen to be within buffer zones suggesting that: in areas where management is relaxed, degradation happens. Forest cover loss was also observed in the Core Zones where management is supposed to be strict suggesting that: the ECAN Zones do not necessarily corresponds to actual management.
- Although there is evidence of forest cover loss, there are also areas that show forest gain. This can be attributed to:
 - reforestation programs of stakeholders involved (*i.e.* the National Greening Program of DENR);
 - abandoned *kaingin* areas where natural regeneration occurs; and
 - plantations.
- This suggests that rapid degradation in West Mt. Bulanjao is a threat to natural habitat and ecosystems of rare, threatened, and endangered species.

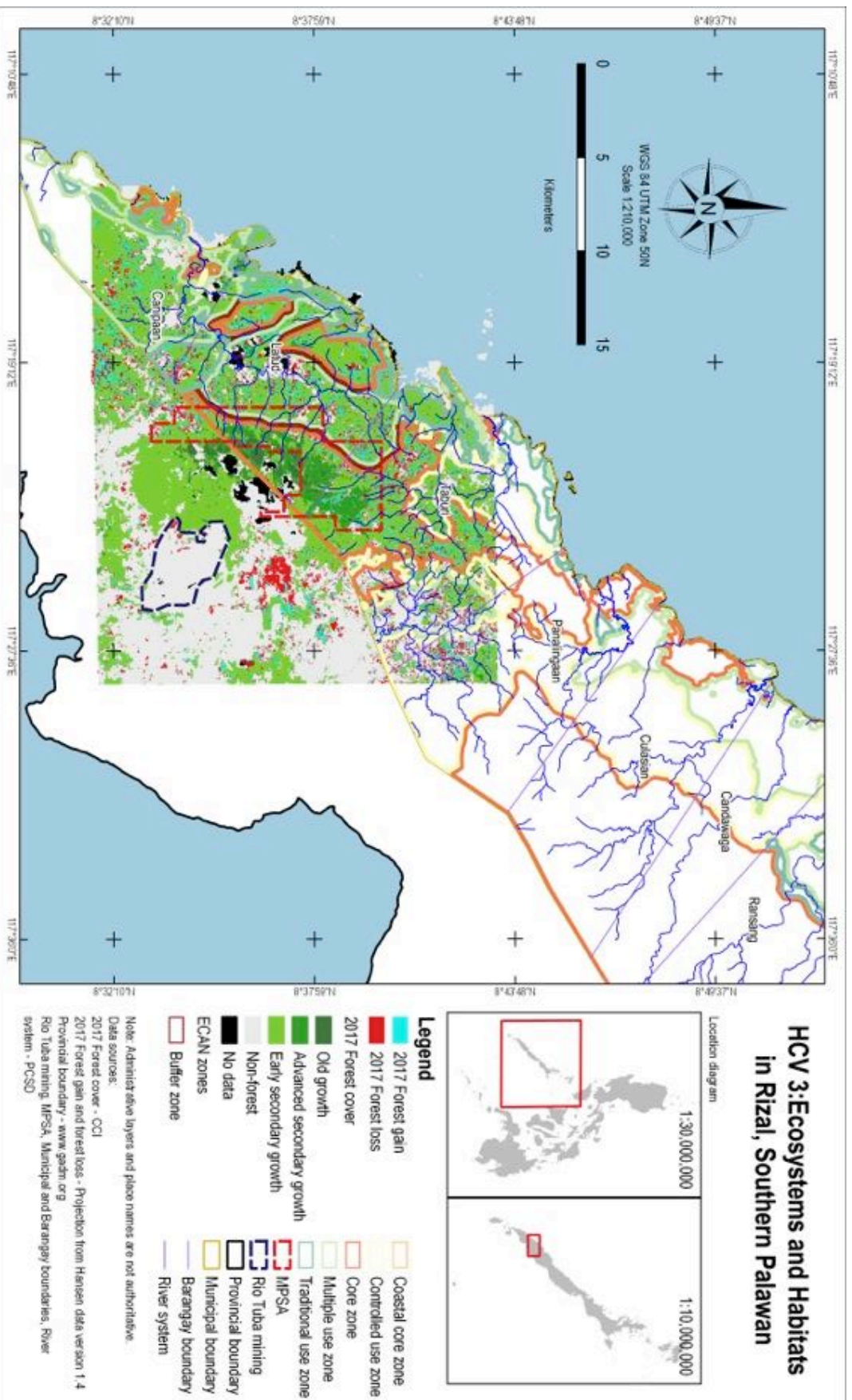


Figure 4. HCVA 3: Rare, threatened and endangered ecosystems and Habitats in West Mt. Bulanjao.

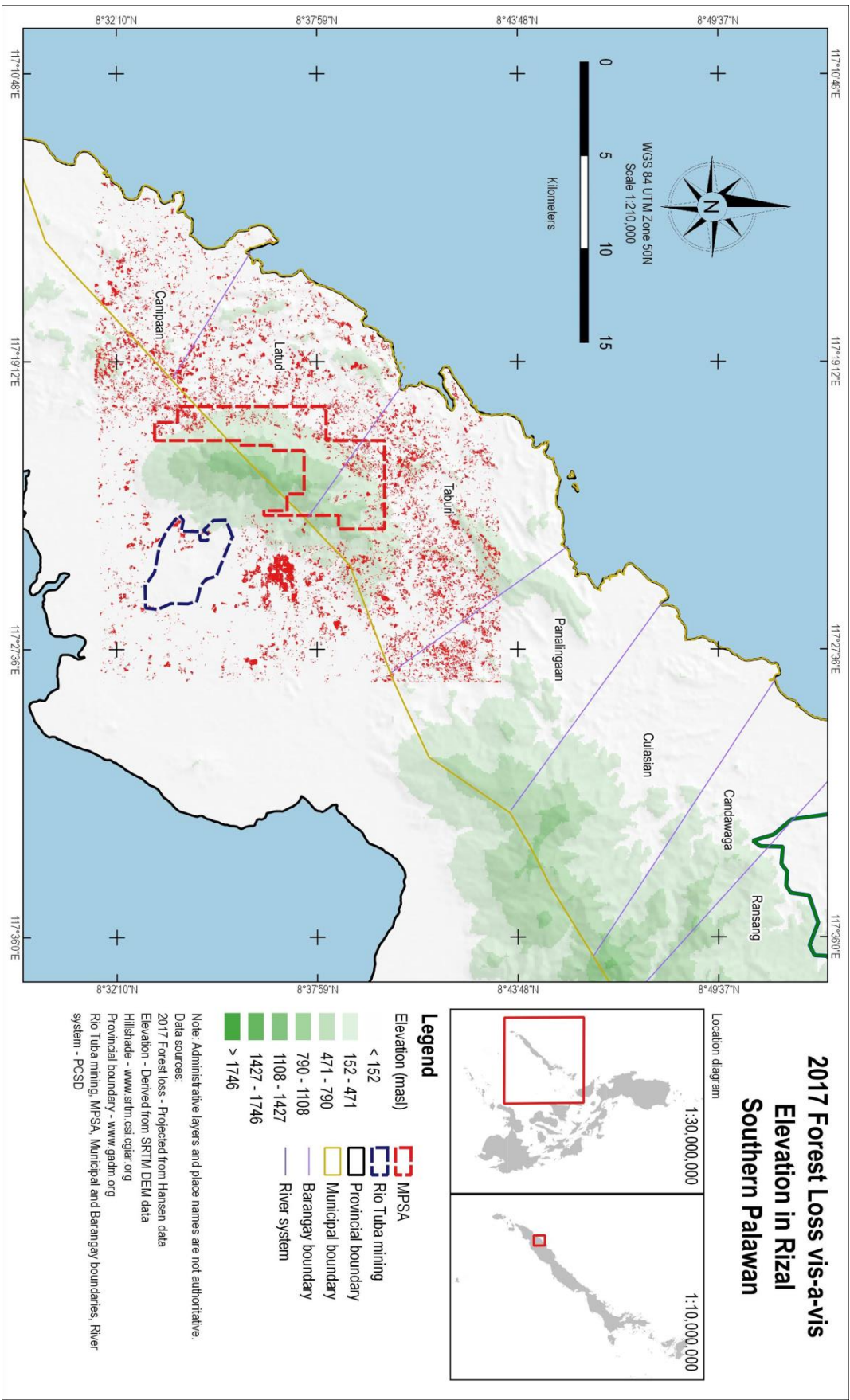


Figure 5. Forest loss and degradation along elevational gradient Mt. Bulanjao, Rizal, Southern Palawan.

3.4. HCV 4 (Ecosystem Services)

HCV 4 includes basic services or benefits that people obtain from natural resources that contribute to human well-being. West Mt. Bulanjao is an important watershed for the municipality of Jose P. Rizal. This is further validated by interviews with the community, where they recognized Canipaan river and the forest areas of Mt. Bulanjao as important sources of ecosystem services (Figure 5).

The following are list of ecosystem services that were identified by the community:

- Canipaan river basin is the main water source for the communities in the Municipality of Jose P. Rizal.
- Canipaan river basin as water catchments, especially areas that are considered as vegetated riparian buffer zones.
- Plots for crop production.
- Forests as protective barrier against landslides, flood, and air pollution.
- Forests as breeding grounds of ecologically and economically important wildlife species.
- Forests as potential barrier against forest fires.
- Forests and river basins needed to maintain biogeochemical functions for carbon storage, nutrient cycling, and water and air purification.

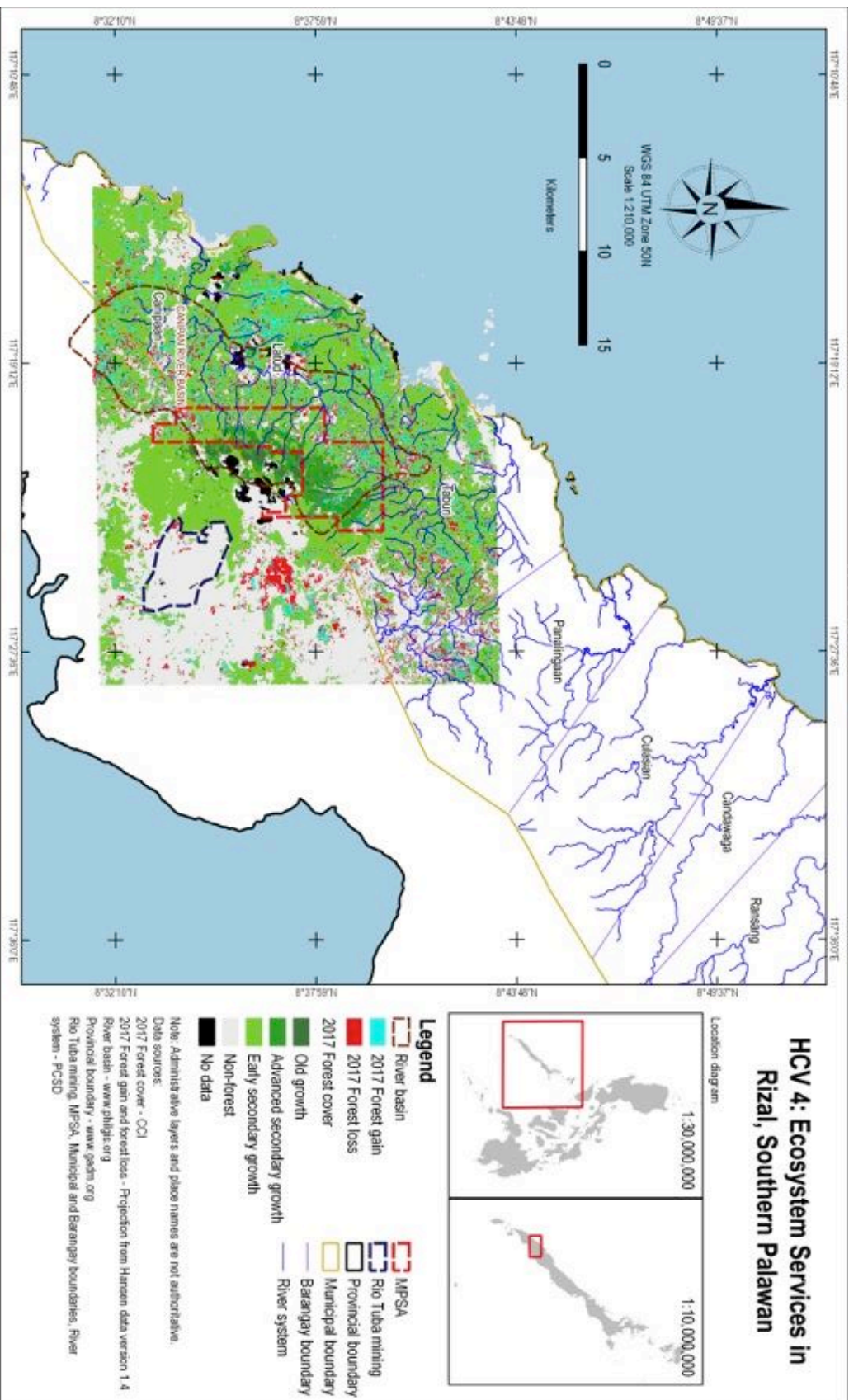


Figure 6. HCV4: areas that are sources of ecosystem services in West Mt. Bulanjao.

3.5. HCV 5 (Community Needs)

HCV 5 denotes the basic needs of the local community or indigenous peoples. This includes natural resources (timber, non-timber products, water, wildlife) that provide provisioning services to the community such as food, building materials, medicine and livelihood. For example, upland communities are dependent on headwater streams as source of potable drinking water. While lowland communities rely on Canipaan river as source of water for domestic use.

3.5.1. Livelihood Guilds Analysis

PCA results suggest that the indigenous people living within West Mt. Bulanjao are dependent on forest resources for their fundamental needs. Four Livelihood Guilds that accounted for 40.57% of the variations of the demographic and livelihood variables were identified (Table 5).

- **Livelihood Guild 1** corresponds to **Male *Kaingin* Farmers**, which accounts for 12.13% of the variation. Their main source of income is *kaingin* farming during dry seasons. During wet seasons, additional sources of income are carpentry and labor. They respond positively to activities related to forest and wildlife protection. They also actively participate in community meetings and decision-making discussion.
- **Livelihood Guild 2** corresponds to **Loggers and Farmers**. This guild accounts for 12.03% of the variation. Their primary sources of income are farming and logging for fuelwood, and building materials during dry seasons. While during wet seasons, they perform farm or labor work. This guild responds positively to forest and wildlife protection but does not participate in conservation activities. They are also not involved in community discussions and planning.
- **Livelihood Guild 3** corresponds to **Young Seasonal Swidden Farmers**, which accounts to 9.3% of the variation. Members of this guild are not dependent on forest and biodiversity resources. Their primary sources of income are farming and labor work during dry seasons, and fishing and logging during wet seasons. Members of this guild are able to attend primary to secondary education and have positive response to forest and biodiversity protection. They actively participate in conservation activities but are not involved in community assemblies.
- **Livelihood Guild 4** corresponds to **Female *Kaingin* Farmers**, which accounts for 7.11% of the variation. Members of this guild are likely to be more mature female community members that practice traditional *kaingin* farming that are

likely associated with Livelihood Guild 1 (male *kaingin* farmers). They showed interest in climate change issues and are most affected by natural calamities. This guild responds positively to forest and wildlife protection, with the most active participation in community meetings and activities.

3.5.2. Livelihood guilds across West Mt. Bulanjao

The IP community in Barangay Latud practices traditional *kaingin* farming as their primary source of livelihood. During wet season, there's a tendency for the community members to engage in casual labor work. The IP community in Barangay Taburi also practices traditional *kaingin* farming but are more dependent on other sources of income such as logging, fishing and lowland farming.



Plate 1. The community harvest timber products for house construction but they also use non-timber forest products such as Palm leaves and bamboo as building materials (Figure 6A and 6B.)



K.M. Pregon

Plate 2. A local Pala'wan weaving a basket using pandan. Women use pandan, yantok, abaca and buri for weaving baskets, bags, and ropes. *Nanay Norma* is making preparations for the wedding of her daughter. The basket she is weaving will be used to store the gifts that the couple will receive during the wedding.



K.M. Pregon

Plate 3. Canipaan River. Sitio Tagpas and Sitio Camantian rely on the Canipaan River for water supply for their domestic use – cleaning, backyard gardening, etc. Photo was taken after the rain that caused the water to be murky.



K.M. Pregon

Plate 4. *Tabuan* or market day. During market day, the locals sell their local produce (vegetables, fruits, meat, fish, honey, etc.).

Table 6. Summary results from PCA of Livelihood Guilds of the respondents. Four factors with the highest eigenvalues were extracted, and the correlation coefficients between individual variables and factor scores are displayed.

	Livelihood Guild 1	Livelihood Guild 2	Livelihood Guild 3	Livelihood Guild 4
Eigenvalues	2.54	2.52	1.95	1.49
Variation explained	12.13%	13.03%	9.3%	7.11%
FACTOR LOADINGS FOR INITIAL VARIABLES				
Demography				
Age	+0.253		-0.448	+0.234
Male	+0.512			
Female				+0.291
Educational Attainment			+0.101	
Livelihood				
Dry season logging activities		+0.184	-0.174	
Dry season farming activities		+0.382	+0.249	
Dry season “ <i>kaingin</i> ” activities	+0.104	-0.481	-0.182	+0.169
Dry season “as laborers”		+0.236	+0.121	-0.310
Wet season logging activities			+0.118	-0.278
Wet season farming activities		+0.348	+0.120	
Wet season “ <i>kaingin</i> ” activities	-0.102	-0.386	+0.181	+0.111
Wet season “as laborers”	+0.106			
Wet season fishing			+0.154	
Forest visits/activity	+0.226			-0.257
Perception on -				
Climate change	+0.155	+0.131		+0.478
Experience in calamities		+0.242		+0.172
Forest protection	+0.300	+0.195	+0.212	+0.187
Wildlife protection	+0.304	+0.244	+0.175	+0.169
Forest conservation activities	+0.246	-0.185	+0.475	+0.120
Community participation	+0.149			+0.320

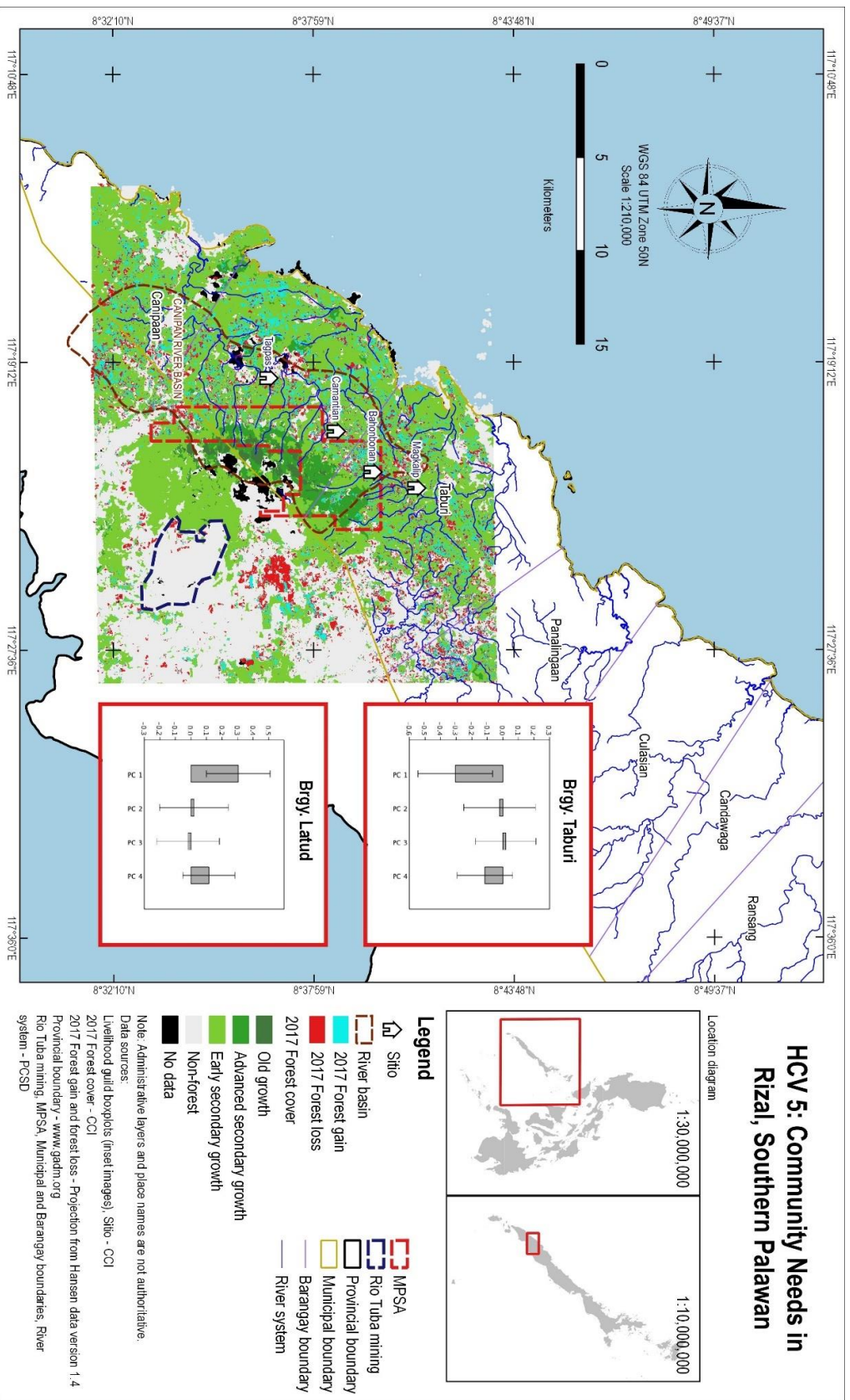


Figure 7. HCV 5: Livelihood guilds distribution in West Mt. Bulanjao, Rizal, Southern Palawan.

3.6. HCV 6 (Cultural Values)

This section presents annotated cultural values, activities, and activity patterns to natural resource use. These data were gathered through community surveys and focused group discussions.

Mt. Bulanjao is a CADT (Certificate of Ancestral Domain Title) site covering 69,733.74 hectares of ancestral land and waters (see Figure 8). The CADT recognizes the rights of the Pala'wan tribe over their ancestral domain in terms in accordance with the law. Their Ancestral Domain Sustainable Development and Protection Plan (ADSDPP) defines the use of their ancestral land waters by identifying areas for cultivation, fishing, hunting, communal forests, community development, and sacred sites. Most residents of this ancestral land are Pala'wans, but they believe Tau't Bato (rock/cave dwellers) inhabit other remote areas of the land.

Tribal laws are imposed by the community's *Panglima*. They are held with high regard and command respect from the members of the community. *Panglima* also provides the basic and initial knowledge for environmental conservation and raises awareness at the community level.

6.1. Traditional practices associated with various activities by the Pala'wans within the ancestral domain land

6.1.1. Swidden Farming

Kaingin or slash and burn farming is the most practiced clearing activity for cultivation in the area. In Southern Palawan, March to April is the *kaingin* season which coincides with the normal dry season. However, the community observed changes in the seasonal pattern so they have to adjust their farming activities. Their *kaingin* practice involved an 8-10 years lay-over time. This is to permit



Plate 5. Aerial view of the land post-kaingin.

forest recovery and restore soil fertility. After 8 or 10 years, the land is ready for *kaingin* again.

Rituals on farming tradition is still practiced by the Pala'wan tribe. They have specific rituals from preparing the area before *kaingin* takes place until the harvesting of produce.

A ritual called *Tornab* is performed before clearing the land, most specially a forested land. Here, the *balyan* scouts the desired place for the presence of spirits and other elements that will be affected or displaced once the land is converted. During this ritual, clearance from the spirits are asked. After the ritual, farmers can start the clearing process of the understory called *ririk*. Another ritual among the Pala'wans is the *Pahayag* or *Pasalamat* which is done on the first harvest of the land. This ritual starts at the evening where all products are collected and placed in a *bilao* or woven basket. The *balyan* blesses the harvest with prayers and incantations, accompanied with the playing of the *agong* or brass gongs. Locals will dance to the beat of the gongs in a ritual dance called *tarak*. The ceremony ends as soon as the sun breaks the dark sky.



Other farming rituals include “sagda” which is performed every after a major calamity, “pamugay” when the weather appears to be not conducive for growing crops (e.g nonstop rain or no rain at all). *Pamugay* is also performed when the farmer had a bad dream about his farmland or crops. Pala'wans still practice the “bayanihan” system, especially when planting their crops.

6.1.2. Cutting of Trees

In cutting of trees, the Pala'wans also believe in a pre-custom ritual. They perform prayers led by the *balyan* to drive away spirits residing inside the trees. Generally, they avoid cutting large trees because they believe that these are homes of forest spirits. Prior to cutting the trees, they place an axe or “palakol” on the tree and leave it there overnight. If the axe is still there when they return the next day, it is considered as a sign that the tree is a source of *good* wood or that the spirits gave their consent. If the

axe falls to the ground, they refrain from cutting the tree. There are also sacred places inside the forest called *lihiyan*. This is where all the tree spirits driven away are relocated. These areas are off-limits and people are not allowed to gather forest resources from these areas. The specific locations of the *lihiyan* were not divulged during the survey.

6.1.3. Herbal Medicines

Only when needed, locals visit the forest to gather non-timber products that will be used as medicine. It is believed that only those plants gathered from the forest are effective in alleviating sickness. Propagating these plants on their garden removes its natural healing ability. In addition, mentioning the names of these plants decreases its effectivity, and thus the team was not able to gather names of the medicinal plants that the communities are using.

6.1.4. Hunting and Wildlife Poaching



K.M. Pregon

Traditional hunting methods such as *supok* (blow dart made of bamboo), *budjak* (machete), *silo* (traps), *pana* (Bow and arrow) and *tubli* (using natural, plant-based poison) are used to catch wildlife for family consumption. Wild animals hunted include wild boars, quails, ground pigeons, red junglefowls, pheasants, fruit bats and squirrels. Modern methods such as the air gun are being employed in hunting but used seldomly. When there is plenty of meat for the entire family, rations are given within the tribal community to signify unity and the value of sharing. According to the locals, hunting of wildlife has declined over the years because of strict restrictions such as banning hunting of wildlife during their breeding season.

Plate 7. A local Pala'wan demonstrates how to use their traditional supok when hunting.

6.1.5. Coastal Activities

Though most of the Pala'wans reside upland, during the months of November to December, local communities go to nearby shores for a week. They practice fishing and shell collection in a tradition called "nanginginhas" or "pangatyan". The locals recognized that their continuous "kaingin" practice resulted to fewer sources of wood and encouraged the entry of "diwans" (their term for people outside their tribe). The competition for their timber resources pushed these indigenous communities to harvest of mangrove bark as alternative sources of wood.

The locals acknowledged that their traditions are changing because of availability of another livelihood means. The elders lamented that while they ensure that their cultural values are passed onto the younger members of their tribe, it is difficult to embolden the youth because of opportunities that are made available to them outside the tribe.

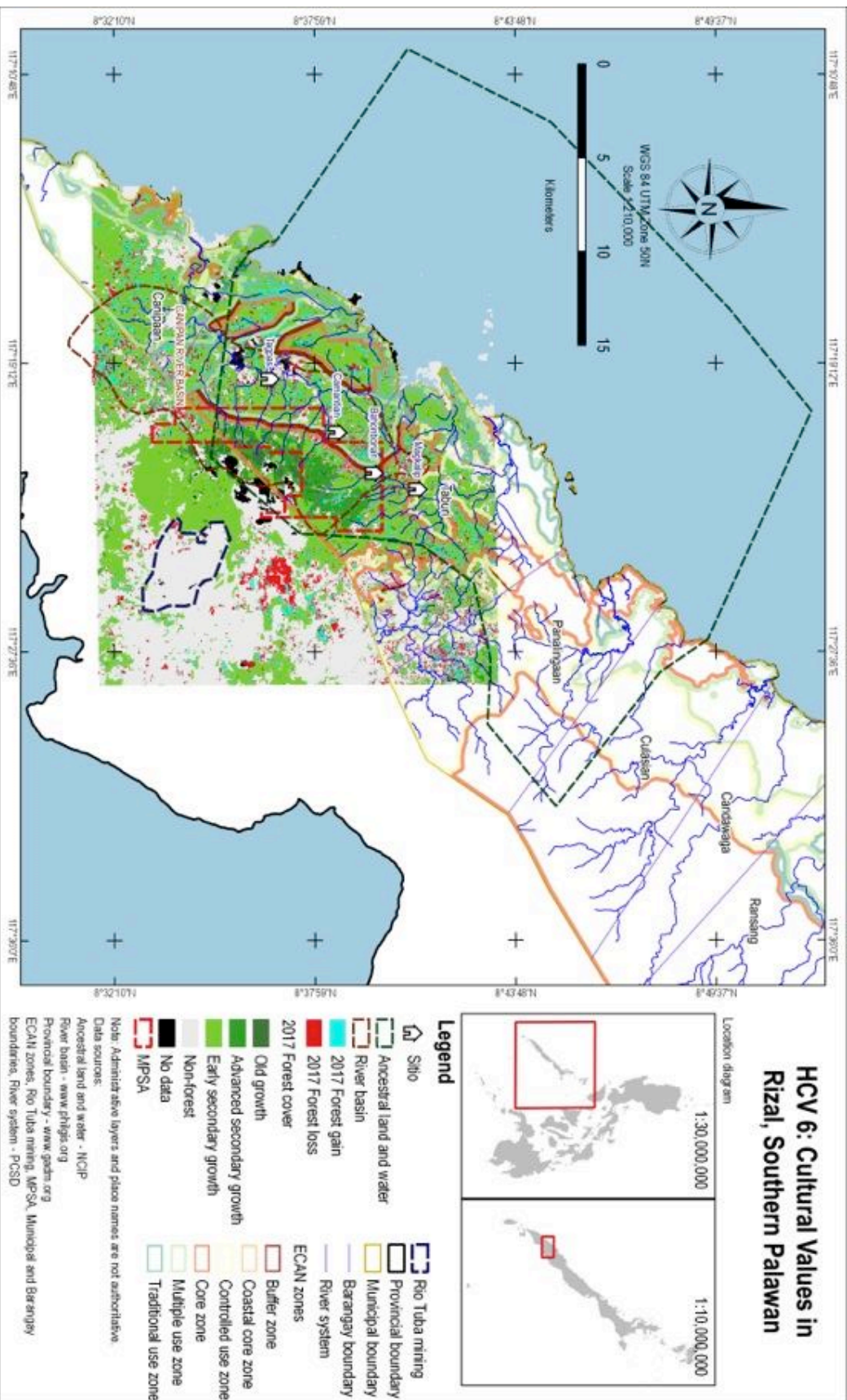


Figure 8. HCV 6: Approved ancestral domain title (CADT) of both ancestral land and waters in Rizal, Southern Palawan.

4. Implications of the HCVA Findings

This section provides implications for each HCVA. Table 7 details proposed interventions to identified threats as a precautionary approach in devising management actions to prevent deprivation of conservation values. This can be used as a tool in crafting management and monitoring plan as a guiding principle securing high conservation value in the area.

All High Conservation Value Areas (HCVA) in West Mt. Bulanjao are in clear present danger and warrants immediate measures to ensure its security.

1. All HCVAs in West Mt. Bulanjao are under rapid degradation due to land use change.
2. There's an imminent threat of massive conversion of all HCVAs in West Mt. Bulanjao because of the MPSA.
3. There's a clear mismatch between the conservation requirements of the HCVAs of West Mt. Bulanjao and the conservation prescriptions offered by the ECAN zonation (i.e. HCVAs 1,2, and 3 are outside Core Zone, and conversely, there are areas designated as Core Zone but do not overlap with HCVAs).

Biodiversity conservation aims to protect the species and ecosystem functionality as all components of biodiversity are interconnected. The success of these strategies directly and/or indirectly influences human perception in dealing with sustainable use of ecosystem services. Presence of abundant species in an ecosystem is a substantial risk in maintaining ecosystem services, however, the ability to predict indicator species for a particular ecosystem service has limited studies and the cost of ecosystem service loss can be at high stake (McNeely et al., 1990; Wood 1997).

Human population generally benefits from the products of biodiversity and a lot of ecosystem services are linked to biodiversity, from the provision of clean water supply, habitat and food support, alteration of climate regime, soil fertility, flood control, pest control, biotransformation, genetic integrity, crop production, support to human cultures, ecotourism, and aesthetic values (National Research Council (US) Committee on Noneconomic and Economic Value of Biodiversity 1999).

With the identified high conservation value areas in West Mt. Bulanjao, it is important for decision making bodies to take action in securing and enhancing these HCVAs. The amalgamated map in Figure 8 showing all HCVs revealed the presence of all six HCVAs thereby increasing the value of this landscape in ecological, biological, and socio-cultural and economic context. Pressing threats from habitat and forest degradation, land use conversion, illegal hunting and trade, mining, and human

habitation can be damaging to these HCVA's and biological diversity in general. The following are HCVA threat justification if conservation agenda does not meet the conservation requirements of HCVA's.

- **Threat to Habitat** – the importance of secured habitat is essential to the survival of endemic and threatened species. Overexploitation of timber and non-timber forest products resulted to a drastic decline of forest areas is a dramatic example of how human activities are causing species and habitat decline. These need to be mitigated immediately.
- **Threat to Human-Biodiversity Interaction** – loss of natural habitats is the primary cause of species. Forest areas have been declining over the years to meet the demands of an increasing population resulting to rapid urbanization, forest fragmentation, altered disturbance regimes, water and nutrient availability, pollution, increase in competition from non-native species, and changes in herbivory and predation (McKinney 2002, 2006, Pickett and Cadenasso 2009).
- **Threat to Ancestral Land** – many protected areas are inhabited by indigenous people, collaboration with these communities in mobilizing conservation programs for endemic species (Flora 2001; Cepeda et al., 2008) and ecosystem health (Gutierrez-Montez 2005) are important to foster HCVA's for biodiversity conservation. They are keepers of ancestral knowledge and wisdom about biodiversity and better conserved ecosystems through ancestral land ownership rights. In the Philippines, there is a recognition of ancestral domain sites for traditional use of indigenous people, and West Mt. Bulanjao is an ancestral land and water of the Pala'wans which gives access to forest and water resources.

The ECAN (Environmentally Critical Areas Network) Zoning was adopted through the PCSD Resolution No. 94-44 as the main strategy of Strategic Environmental Plan (SEP) for Palawan. It aims to conserve and protect forest areas, rare and endangered species and their habitat, watersheds, and tribal communities and culture. Mapping these areas following the criteria of delineating ECAN Zones imposes commercial logging ban and maximum protection of restricted use zones.

The HCVA's strong empirical data support the argument against the approval of MPSAs. The HCV analysis clearly shows the incompatibility of the mining activity with the long-term survival of key species and unique natural habitats in Mt. Bulanjao.

The basis of ECAN Zones should not be confined to elevation or mere presence/absence of mere species, rather should be a zone whereby long-term survival of species, habitats, and ecosystems are ensured. It must strictly follow

the criteria set forth in the guidelines of implementing ECAN zones. HCVA 1,2,3,4, and 6, should automatically be classified as ECAN Core Zones whilst HCVA 5 is for multiple use zone. The analysis shows (through the HCVA amalgamated map Figure 8), there is a clear mismatch between the conservation requirements of the HCVA of West Mt. Bulanjao and the conservation prescriptions offered by the ECAN zonation. This suggests delineation gaps of ECAN zones that needs substantial evidence to meet the requirements of establishing these zones. This output could be used to further validate and review the ECAN zones of Palawan.

Table 7. HCV management objectives, threats, interventions, means of monitoring, and performance targets of each HCV. Statements in quotation (“”) are suggestions made by the indigenous community.

Conservation Value	Management Objectives	Threats	Management/ Mitigating Interventions
HCV 1: Species Diversity	Enhance and conserve significant areas for viable populations of rare, threatened, and endangered species.	<ul style="list-style-type: none"> • Habitat and forest degradation. • Land use conversion. • Illegal hunting and trade activities. 	<ul style="list-style-type: none"> • Rehabilitation of areas with increased forest cover loss through assisted natural regeneration (ANR). • Review area of Multiple Use Zone (ECAN) to limit further expansion of land use conversion. • Review of ADSDPP “to include provisions on <i>hunting and trade of wildlife</i>”. • Create a biodiversity and habitat monitoring plan. • Areas with high conservation value of RTE should be a “no go zone”.
HCV 2: Landscape-Level Ecosystem Mosaic	Avoid further forest fragmentation to ensure survival of species rich areas in enhanced biodiversity corridors.	<ul style="list-style-type: none"> • Habitat and forest degradation. • Land use conversion • MPSA (Mineral Production Sharing Agreement) 	<ul style="list-style-type: none"> • Enhanced forest rehabilitation targeting indicator species’ habitat requirements. • Review Core and Buffer Zones (ECAN) for protection of natural forest and wildlife. • Areas of high conservation value of indicator species should be a “no go zone”.
HCV 3: Rare and Threatened Ecosystems	Decelerate and avoid severe rates of forest degradation.	<ul style="list-style-type: none"> • Overexploitation of timber forest products. • Infiltration of large agricultural business sectors. 	<ul style="list-style-type: none"> • Areas with accelerated forest degradation should limit harvest of timber products. • Land acquisition of non-native farmers should undergo proper documentation of community consultation to avoid conflict of interest in the use of land.

		<ul style="list-style-type: none"> • Swidden Farming • Expansion of human habitation 	<ul style="list-style-type: none"> • Review the Multiple Use Zones (ECAN) for cultivation and community development.
HCV 4: Ecosystem Services	Security of basic ecosystem services.	<ul style="list-style-type: none"> • Disturbance of natural ecological processes • Over exploitation of ecosystem services 	<ul style="list-style-type: none"> • Knowledge capacity of indigenous communities on the direct and indirect benefits of various ecological processes. • Ecological Management Plan
HCV 5: Community Needs	Manage levels of forest dependency.	<ul style="list-style-type: none"> • High prevalence dependency of indigenous groups in the use forest resources. • Overexploitation of natural resources. 	<ul style="list-style-type: none"> • Delineate specific areas for timber and NTFP through enhanced ECAN zones. • Introduce other livelihood opportunities that are suitable and sustainable for the indigenous groups
HCV 6: Cultural Values	Strengthening indigenous people's rights and knowledge of cultural practices in forest resource use.	<ul style="list-style-type: none"> • Cultural degradation through loss of land for traditional and cultural use. • Intervention of modern methods in obtaining timber and non-timber forest products. 	<ul style="list-style-type: none"> • Defined areas of sacred places for traditional and cultural use. • Strengthening cultural integrity in parallel with technological capacities through culture-based education

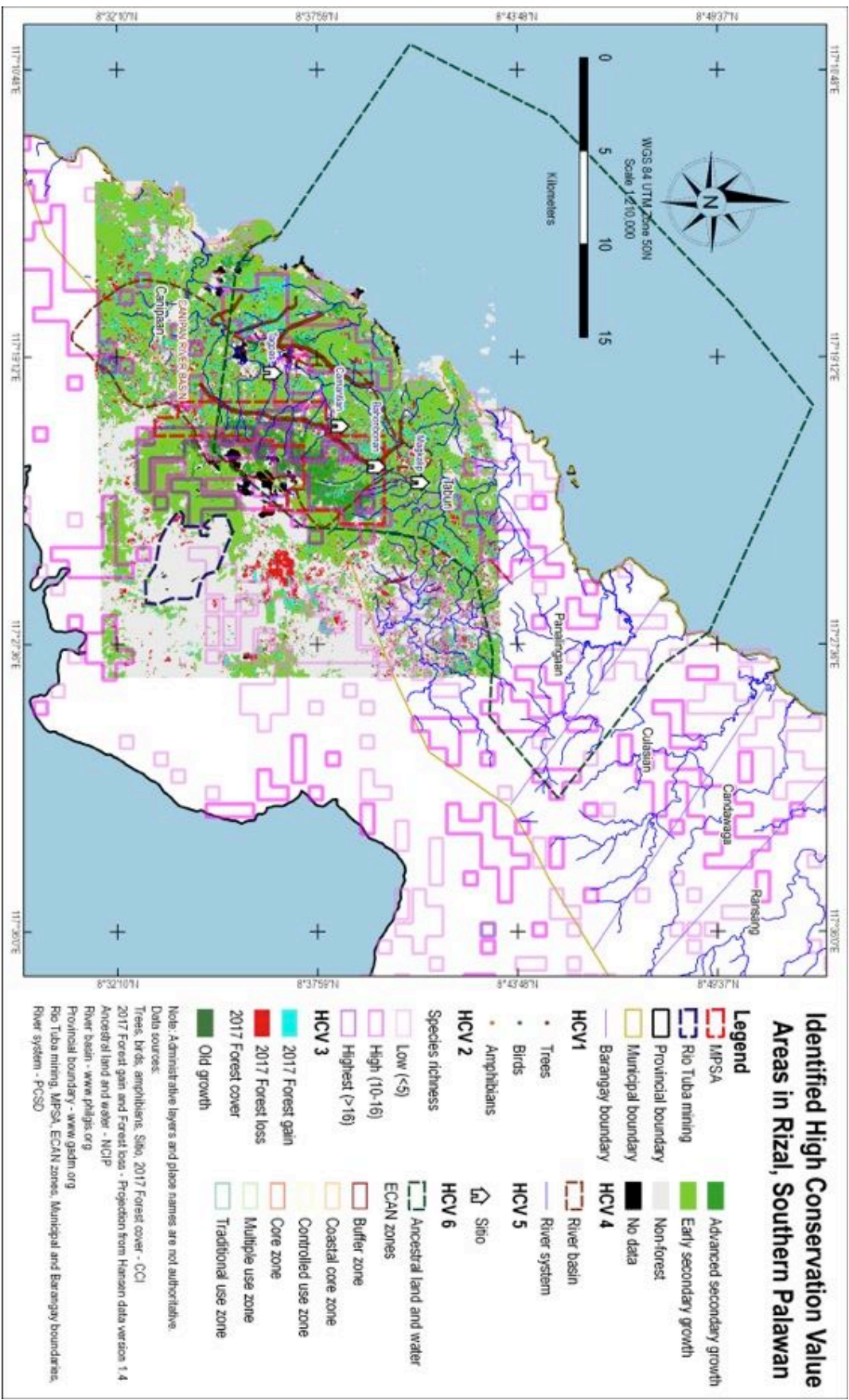


Figure 9. High Conservation Values Areas in West Mt. Bulanjao.

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6. Glossary of Terms

Akaike's Information Criterion (AIC) – Measure of relative quality of a statistical model. It is used to choose the best species abundance and occupancy models for the study.

Biodiversity – The variety and variability among living organisms and the ecological complexes in which they occur.

Canonical Correspondence Analysis (CCA) – A multivariate statistical method used to explain the relationships between biological assemblages of species and their environment.

Conservation hotspot – areas where high concentrations of trigger and endemic species which facing extraordinary loss of habitats.

Critically Endangered (CR) – An IUCN threat category stating that there is an extremely high possibility of the taxon's extinction in the wild because all available data meets criteria A to E for Critically Endangered. (Please see section V of the "IUCN Red List Categories and Criteria" at http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf for a detailed explanation of criteria A to E for Critically Endangered.)

Data Deficient (DD) – An IUCN category stating that there is insufficient information to make an assessment of the possibility of extinction based on the available data for distribution and/or population status of the taxon.

Degraded Forest – Forests or grasslands that have been overused or poorly managed, and are likely to have reduced biomass densities.

Eigenvalues - they are calculated and used in deciding how many factors to extract in the overall factor analysis.

Endangered (EN) – An IUCN threat category stating that there is a very high possibility of the taxon's extinction in the wild because the best available data meets any of the criteria A to E for Endangered. It is one step below Critically Endangered and one step above Vulnerable. (Please see section V of the "IUCN Red List Categories and Criteria" at http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf for a detailed explanation of criteria A to E for Critically Endangered.)

Endemic – a species that is only found in a given region or location and nowhere else in the world.

Forest – A portion of land more than half a hectare in size with trees that are at least 5 meters in height and having a canopy cover of more than 10% of the land area.

Forest dependent – relating to a species that is restricted in forest habitat.

Forest edge – refers to the interface or boundary between the forest and non-forest area.

Habitat – The place where a population (e.g. human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

High Conservation Value Area (HCVA) – natural habitat of outstanding significance and critical importance to species conservation because it is the habitat of threatened

and/or endemic species. Any major habitat changes in this area will almost certainly lead to species extinctions and should therefore become non-negotiable protected areas.

Introduced – a species living outside its native distributional range, which has arrived there by human activity, either deliberate or accidental.

Key Biodiversity Areas (KBA) – nationally identified sites of global significance. The identification of KBAs is an important approach to address biodiversity conservation at the site scale i.e. at the level of individual protected areas, concessions, and land management units.

Least Concern (LC) – An IUCN threat category stating that the possibility of the taxon's extinction in the wild is low. This is because it does not qualify as Near Threatened, Vulnerable, Endangered, or Critically Endangered. This category includes widespread and abundant taxa.

Livelihood guilds – A method of determining the propensity of a particular group to engage in specific economic activity based on their ethnic background and location in given area (i.e. forest).

Migratory - are species which perform cyclical movements between two distinct geographical areas, one of which is usually the area in which they breed.

Near Endemic – are species that are unique to a defined geographic region such as an island or a state in a country but are still found elsewhere in the world. For example, the Hill Myna can only be found in Palawan Island and not in other islands in the Philippines but it is common in Southeast Asia.

Not Assessed (NA) – An IUCN threat category which has not yet been evaluated.

Near Threatened (NT) – An IUCN threat category stating that the possibility of a taxon's extinction in the wild is medium, being worse than Least Concern taxa but not as bad as Vulnerable taxa. Although it does not qualify as Vulnerable, Endangered, or Critically Endangered, it is close to being threatened and may be classified as such in the near future.

Niche width – refers to theoretical range of conditions that a species could inhabit and successfully survive and reproduce in.

Non-forest – all land that is not classified as forest area (i.e cultivated, wooded grassland, built-up area, grassland, barren, fallow land).

Open Forest – Forest where the canopy cover is between 10 and 40 percent of the area.

Species Occupancy Modelling – A method to show the proportion of an area, patches, or sampled units that is occupied by a species.

Trigger Species - Species of high conservation importance. In this study, the trigger species were chosen based on their distribution and IUCN Red List Classification: the species (or subspecies) are endemic and/or threatened according to their IUCN Red List classification. In addition, these species should be manageable as a distinct unit.

Vulnerable (VU) – An IUCN threat category stating that the possibility of a taxon's extinction in the wild is high. This is because the best available data meet any of the criteria A to E for Vulnerable. It is one step below Endangered. (For a detailed explanation of criteria A to E for Vulnerable, please see section V of the "IUCN Red

List Categories and Criteria” at
http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf.

Widespread – are species that are found or distributed over a large area or species that are not endemic to a specific geographical location.

7. ANNEXES

ANNEX 7.1. HCV Assessment Team

Designation	Members
HCV Specialist	Dr. Neil Aldrin Mallari
Project Manager	Edmund Leo Rico
Project Coordinator	Johnny Wyne Edaña
Avifauna	Dennis Tablazon, Medel Sylvosa, Augusto Asis Jr., Nevong Puna
Herpetofauna	Uldarico Carestia, Bernard Redoblado, Christian Supsup
Mammals	Rochelle May Tabi, Jhonny Wyne Edano, Harold Centeno
Habitat	Harold Centeno, Bernard Redoblado, Manolito , Jack Avancenía, Manolito Victorino Sandoval
Community Survey	Karl Mikel Pregon, Ronaldo Ponoy
Geospatial Team	Dr. Oliver Coroza, Clark Jerome Jasmin, Angelica Kristina Monzon, John Floyd Porras
Technical Editor	Jennica Paula Masigan, Adryon Rozz Javier
Local Field Guides	Angelito Sanchez, Ludin Paniang, Lumindong Igao, Jamil Rajmia, Laha Igao, Orlando Biat, Liyasan Igao, Kisin Rinsi, Sintaran Janicai, Benno Rinsi, Linsongan Sandahe, Junior Rinsi, Romil Barantay, Filemon Vilonte, Jefry Sanchez

ANNEX 7.2. DETAILED METHODOLOGIES

A. Main Biodiversity Transect Lines

Seven main biodiversity transects were established by stratified random sampling. Transects were established along various disturbance and elevational gradients, such that each would cover different habitat types. Transects comprised of a two-kilometer line with point stations marked at every 250 meters (0.0, 1.0... 8.0) while transect sections were marked at every 50 meters (0.1, 0.2, 0.3... 7.9).

B. Vegetation Survey

A total of 7 transects were surveyed covering a full range of habitat and disturbance gradients across West Mt. Bulanjao. The vegetation survey was conducted in three phases: (i) the Broad Habitat Classification, (ii) the Detailed Habitat Assessment, and (iii) Tree Diversity and Stand Composition.

1. Broad Habitat Classification

Broad habitat types (cultivation, early second growth, advanced second growth, old growth dipterocarp, and old growth mossy forest) were identified for every point station and transect section. Below is a description of these habitat types as adapted from Mallari et al. (2011):

Table 8. Description of the different habitat types adapted from Mallari et al. (2011).

Habitat types	Description
Cultivation (CVT)	- areas with active or recently abandoned farmland; included grasslands, brushlands, agricultural plots, and small orchards with fruit trees \leq 4 meters tall.
Early Second Growth forests (ESG)	- areas of newly regenerating forest (< 20 years old) dominated by saplings and other small- to medium-sized trees
Advanced Secondary Growth forests (ASG)	- forests that are c. 20–40 years old, which have a less dense understorey and are dominated by medium to large trees
Old Growth forests (OGF)	- Divided in two categories, namely mixed-dipterocarp forest and mossy forest. a. Mixed Dipterocarp forest (OGD) - Members of the family Dipterocarpaceae dominate this forest type in terms of biomass and emergents. This also includes the five recognised subtypes, namely: <i>Lauan forest</i> , <i>Lauan-apidong forest</i> , <i>Yakal-lauan forest</i> , <i>Lauan-hagakhak</i> , and <i>Montane forest</i> (Razal et al., 2003). Extent of the area is not limited to the lower and upper altitudinal limit of the dipterocarp forest but also includes primary forest or forests >40 years old which are dominated by large to very large trees and have a less complex understorey compared to ESG and ASG. b. Mossy forest (OGM) - consists of dwarfed and stunted trees with trunks and branches commonly covered with epiphytes (mosses and liverworts) and occur in high elevation areas (usually above 1000 m elevation with the upper limits varying depending on the locality and height of the mountains) having relatively low temperature, high and uniform humidity, short sunshine duration, and strong winds (Razal et al., 2003).

2. Detailed Habitat Assessment

Habitat variables were recorded at every point station using the variable circular plot method and modified point-center quarter method, which is nested within a 10-meter, and 20-meter radius. The variable circular plot was run in an imaginary line perpendicular to the transect. This line and the transect divide the plot into four quarters (NW, NE, SE and SW). Table 6 summarizes the physical and structural habitat parameters sampled:

Table 9. Summary list of habitat parameters that were sampled in every point station with its corresponding coverage.

Habitat parameters	Coverage
a. General Habitat (Forest threat parameters) <ul style="list-style-type: none"> • Presence of dead wood and fallen trees >30 cm dbh (natural and cut) • Presence of fruiting trees and flowering trees • Percentage cover of canopy, midstorey, and understorey • Humus or leaf litter thickness • Signs of anthropogenic disturbances occurring in the plot 	20 m
b. Understorey Parameters* <ul style="list-style-type: none"> • Percentage ground cover of moss, ferns, grass, herbs, rock, leaf litter and ground (bare soil) • Number of saplings, palms, and pandan per strata • Number of clumps of rattan and bamboo per strata 	20 m
c. Overstorey Parameters** <ul style="list-style-type: none"> • Tree species name • Tree height, merchantable height, canopy height, crown cover and diameter (DBH) • Presence of scarring, lianas and climbing bamboo in each measured tree 	10 m
d. Biophysical parameters <ul style="list-style-type: none"> • Distance of water (<100 m) from the center point of the plot • Distance from the forest edge, valley bottom, and the ridge tops • Position and altitude of the point station using a global positioning system (GPS) receiver 	

Notes:

* The parameters were measured vertically in each quadrat within the range of 0-0.5m, 0.5-2m, 2-5m and 5-12m

** Five nearest trees in each quarter with greater than 25 cm diameter at breast height (DBH) were measured in this parameter. The distance from the center point of the plot to the nearest tree was at least 0.1meter.

3. Tree Diversity and Stand Composition

The number of trees within the given radius and DBH range including its species name were also recorded. Trees with >25<50 cm, >50<100 cm, and > 100 cm DBH were tallied within a 20-meter radius while >6<12 cm and >12<25 cm DBH were recorded within 10-m radius.

C. Bird Survey

All main biodiversity transect lines were sampled for this survey. A combination of the Variable Transect Width Method (transect walk) and the Variable Circular Width Method (point count)

were employed. Transect walks were done by pacing the transects at a speed of 1 km/hr while recording all birds that were observed visually or aurally. The perpendicular distances from the bird(s) to the transect line were also recorded. Point counts were done by recording all birds observed for eight minutes at every point station and measuring the distance from the sample to the point station. The number of birds in a group, type of contact, height from where the sample was first encountered, and its activity were also noted. Samplings were conducted at dawn when bird activity is highest (Loiselle & Blake, 1991). These were repeated on a different day in the reverse direction to minimise bias due to route direction (Karr, 1981), bird activity, and the time of day.

D. Herpetofauna survey

A combination of methods was used to sample reptiles and amphibians:

- Transect sampling. This method was used to generate information on species assemblages and richness of the different survey sites. Transects were traversed intensively; thereby recording all individuals on the main path.
- Microhabitat sampling. Specific microhabitats were searched intensively for any occupying reptile or amphibian species. Sampling was conducted within 5 to 30 minutes in areas where the herpetofauna are most likely to be encountered, such as tree holes, barks, tree buttresses, forest floor, palm and aroid leaf axils, epiphytes, tree ferns, aerial ferns, puddles, as well as lotic and lentic bodies of water (Diesmos, 1998).

The herpetofauna surveys were performed during the night-time (1900-2300H). Frogs, froglets, tadpoles, and lizards were collected by hand. Snake hooks were used to capture snakes and only experienced field technicians were allowed to handle snakes.

E. Mammals Survey

Volant Mammals

In capturing volant mammals (bats), mist nets with 6-m and 12-m were used. These mist nets were set along natural flyways and laid at varying points within the designated main transect line. A total of two transects (T1 and T4) were sampled in assessing the mammalian fauna within the project site. Three netlines were laid out in Transect 1 and two netlines in Transect 4, of which, a total of 54 net nights were set. Nets were left open daily for two to three consecutive nights per transect. During which, nets were checked and serviced (trapped animals removed and kept for identification and biometrics) every 30 minutes (more frequent if necessary). Ground nets, sky nets and V-nets were set for these transects. *Ground nets* were set at 0.3 m above the ground (Alviola, 2000; Duya et al., 2009), *sky nets* were established at higher levels, near tree canopies and *V-nets* were set with two mist nets forming the letter "V". V-netting technique was adapted from Duya et al., 2011 to capture insectivorous bats, although fruit bats are also captured this way.

Non-volant mammals

For non-volant mammals (rodents), live traps baited with roasted coconut coated with peanut butter were used to capture target species. Two trap lines were laid per transect line (T1, T4 and T6). Each trap line is composed of at least ten eight live traps that were set in strategic areas (i.e. tree stumps, natural pathways, tunnels at the base of vegetation, dead logs, etc.), where target species are more likely to be observed or encountered. Traps were set 5–10 m apart within the trap line, noting the distance of each of the traps from the nearest transect

section of the main transect line. Baiting and re-baiting of traps were done twice daily - in the afternoon and in the morning, after the traps were checked for possible catch. Trapped animals were brought to the camp for biometrics and proper identification.

Other pertinent data per transect that were recorded include the following:

- i. specific coordinates of each of the established net line and trap line,
- ii. photograph of species caught from the mist net or live trap, and
- iv. presence or absence of fruiting tree/s and cave/s in the area.

ANNEX 7.3. SPECIES LISTS

Table 10. List of all flora species recorded from West Mt. Bulanjao. Also shown is the species conservation status and based on IUCN 2017. A single asterisk (*) denotes the species is a Philippine endemic, and (**) for Palawan Endemic Species.

Family	Scientific Name	Common Name	Conservation Status
Anacardiaceae	<i>Mangifera indica</i>	Mangga	Data Deficient
Anacardiaceae	<i>Mangifera monandra</i>	Mangga paho, Malapaho	Vulnerable
Anacardiaceae	<i>Koordersiodendron pinnatum</i> *	Amugis	Not Assessed
Annonaceae	<i>Cananga odorata</i>	Tamyaw/ ilang- ilang	Not Assessed
Apocynaceae	<i>Alstonia scholaris</i>	Dita	Least Concern
Apocynaceae	<i>Voacanga globosa</i> *	Bayag-usa	Not Assessed
Araliaceae	<i>Polyscias nodosa</i>	Malapapaya	Not Assessed
Arecaceae	<i>Arenga pinnata</i>		Not Assessed
Arecaceae	<i>Cocos nucifera</i>	Coconut	Not Assessed
Asclepiadaceae	<i>Asclepias curassavica</i>	Ari-aritis	Not Assessed
Bursaceae	<i>Canarium asperum</i>	Pagsahingin	Least Concern
Bursaceae	<i>Canarium luzonicum</i> *	Piling-liitan	Vulnerable
Caryophyllales	<i>Nepenthes</i> sp.	Pitcher plant	Not Assessed
Casuarinaceae	<i>Gymnostoma rumphianum</i>	Agoho Del Monte	Not Assessed
Casuarinaceae	<i>Casuarina equisetifolia</i>	Maribuhok	Not Assessed
Clusiaceae	<i>Calophyllum blancoi</i>	Bitanghol	Not Assessed
Clusiaceae	<i>Garcinia lateriflora</i> **	Kandis/Batuan	Not Assessed
Combretaceae	<i>Terminalia catappa</i>	Talisay	Not Assessed
Cyatheaceae	<i>Cyathea</i> sp.		Data Deficient
Cyperaceae	<i>Scleria scrobiculata</i>	Arat/Sarat	Not Assessed
Ebenaceae	<i>Diospyros blancoi</i> *	Kamagong/mabolo	Not Assessed
Euphorbiaceae	<i>Macaranga tanarius</i>	Binunga	Not Assessed
Euphorbiaceae	<i>Manihot esculenta</i>	Cassava	Not Assessed
Euphorbiaceae	<i>Macaranga hispida</i>	Hindang	Not Assessed
Euphorbiaceae	<i>Jatropha curcas</i>	Tuba-tuba	Not Assessed
Euphorbiaceae	<i>Euphoria didyma</i> *	Ulayan/Kukuris/Alupag	Not Assessed
Euphorbiaceae	<i>Macaranga tanarius</i>	Binunga	Not Assessed
Euphorbiaceae	<i>Euphorbia hirta</i>	Tawa-tawa	Not Assessed
Fabaceae	<i>Intsia bijuga</i>	Ipil	Vulnerable
Fabaceae	<i>Koompassia excelsa</i>	Manggis	Endangered
Fabaceae	<i>Azalia rhomboidea</i>	Tindalo	Vulnerable
Gleicheniaceae	<i>Dicranopteris linearis</i>	Kilob	Least Concern
Lamiaceae	<i>Vitex parviflora</i>	Molave	Vulnerable
Lauraceae	<i>Neolitsea vidalii</i> *	Puso-puso	Vulnerable
Lauraceae	<i>Litsea philippinensis</i>	Bakan	Not Assessed
Malvaceae	<i>Durio graveolens</i>	Dugyan (Pal)	Not Assessed
Malvaceae	<i>Durio testudinarum</i>	Pakpak/ Upak-upak	Vulnerable
Meliaceae	<i>Toona calantas</i>	Kalantas (Pal)/ Philippine Cedar	Data Deficient
Moraceae	<i>Artocarpus blancoi</i> *	Antipolo	Vulnerable
Moraceae	<i>Ficus nota</i>	Tibig	Not Assessed
Moraceae	<i>Ficus septica</i>	Malahawili	Not Assessed
Moraceae	<i>Ficus balete</i> *	Balete	Not Assessed
Moraceae	<i>Parartocarpus woodii</i>	Malanangka	Not Assessed
Musaceae	<i>Musa textilis</i>	Abaca	Not Assessed
Myristicaceae	<i>Myristica simiarum</i>	Anuping	Vulnerable
Myrsinaceae	<i>Ardisia squamulosa</i> *	Tagpo	Vulnerable
Myrtaceae	<i>Syzygium hutchinsoni</i>	Malatambis	Not Assessed

Myrtaceae	<i>Xanthostemon speciosus</i> **	Palawan mangkono	Endangered
Phyllantaceae	<i>Bischofia javanica</i>	Tuai	Not Assessed
Pittosporaceae	<i>Pittosporum pentandrum</i>	Mamalis	Not Assessed
Poaceae	<i>Bambusa sp</i>	Bamboo/ Kawayan	Not Assessed
Rhizophoraceae	<i>Carallia brachiata</i>	Bakawang-gubat	Not Assessed
Sapindaceae	<i>Nephelium lappaceum</i>	Rambutan	Least Concern
Sapindaceae	<i>Cubilia cubili</i>	Kubili	Least Concern
Sapindaceae	<i>Guioa acuminata</i> *	Pasi	Endangered
Sapindaceae	<i>Nephelium sp.</i>	Kulimawa	Not Assessed
Sapotaceae	<i>Palaquium luzoniense</i>	Nato	Vulnerable
Sapotaceae	<i>Pouteria villamilli</i> *	Nato Puti/ Willamil nato	Not Assessed
Simaroubaceae	<i>Ailanthus triphysa</i>	Tala-tala/ Malakamias	Not Assessed
Simaroubaceae	<i>Eurycoma longifolia</i>	Tongkat-ali	Not Assessed
Urticaceae	<i>Leucosyke capitellata</i>	Alagasi	Not Assessed

Table 11. List of all amphibian species recorded from West Mt. Bulanjao. Shown also is the species conservation status based on IUCN 2017. A single asterisk (*) denotes the species is Philippine endemic while (**) denotes for Palawan Endemic species.

Family	Scientific Name	Common Name	Conservation Status
Bufoidea	<i>Ingerophrynus philippinicus</i> **	Philippine Toad	Least Concern
Ceratobatrachidae	<i>Alcalus mariaae</i> **	Mary's Frog	Data Deficient
Dicroglossidae	<i>Occidozyga laevis</i>	Common Small-headed Frog/Yellow Bellied Puddle Frog	Least Concern
Dicroglossidae	<i>Limnonectes acanth</i> *	Busuanga Wart Frog	Vulnerable
Dicroglossidae	<i>Limnonectes palawanensis</i>		Least Concern
Megophryidae	<i>Megophrys ligayae</i> **	Palawan Horned Frog	Endangered
Megophryidae	<i>Leptobranchium tagbanorum</i> **		Not Assessed
Ranidae	<i>Staurois nubilus</i> **		Not Assessed
Ranidae	<i>Sanguirana sanguinae</i>	Calamianes Frog	Least Concern
Rhacophoridae	<i>Philautus longicrus</i>		Near Threatened
Rhacophoridae	<i>Philautus everetti</i>	Everette's Flying Frog	Near Threatened

Table 12. List of all reptilian species recorded from West Mt. Bulanjao. Shown also is the species conservation status based on IUCN 2017. A single asterisk (*) denotes the species is Philippine endemic while (**) denotes for Palawan Endemic species.

Family	Scientific Name	Common Name	Conservation Status
Gekkonidae	<i>Gekko gekko</i>	Tokay Gecko	Data Deficient
Scincidae	<i>Eutropis indeprensa</i>	Brown's Mabuya	Not Assessed
Agamidae	<i>Bronchocela cristatella</i>	Green lizard	Data Deficient
Gekkonidae	<i>Cyrtodactylus redimiculus</i> **	Palawan Bent-toed Gecko	Near Threatened

Gekkonidae	<i>Gekko monarchus</i>	Spotted House Gecko	Data Deficient
Scincidae	<i>Eutropis multifasciata</i>	Many-lined Sun Skink/ East Indian Brown Mabuya	Least Concern
Colubridae	<i>Boiga cynodon</i>	Dog-toothed Cat Snake	Least Concern
Colubridae	<i>Lycodon subcinctus sealei</i>		Not Assessed
Elapidae	<i>Dryocalamus tristrigatus</i>	Banded Malayan Coral Snake	Least Concern
Viperidae	<i>Tropidolaemus subannulatus</i>	Bornean Keeled Green Pit Viper	Least Concern
Viperidae	<i>Sibynophis bivittatus</i> **	White-Stiped Snake	Least Concern

Table 13. List of all mammalian species recorded from West Mt. Bulanjao. Shown also is the species conservation status based on IUCN 2017. A single asterisk (*) denotes the species is Philippine endemic while double asterisks (**) denotes Palawan endemic.

Family	Scientific Name	Common Name	Conservation Status
Cercopithecidae	<i>Macaca fascicularis</i>	Nicobar Crab-eating Macaque	Least Concern
Manidae	<i>Manis culionensis</i> **	Philippine Pangolin	Endangered
Mephitidae	<i>Mydaus marchei</i> **	Palawan stink badger	Least Concern
Muridae	<i>Mus musculus</i>	House Mice	Least Concern
Muridae	<i>Maxomys panglima</i> **	Palawan Maxomys, Palawan Spiny Rat	Least Concern
Sciuridae	<i>Hylopetes nigripes</i> **	Palawan Tree Flying Squirrel	Near Threatened
Suidae	<i>Sus ahoenobarbus</i> **	Palawan Bearded Pig	Near Threatened
Tupaiaidae	<i>Tupaia palawanensis</i> **	Palawan Tree Shrew	Least Concern
Viverridae	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	Least Concern
Hipposideridae	<i>Hipposideros diadema</i>	Diadem Lead-nosed bat	Least Concern
Megadermatidae	<i>Megaderma spasma</i>	Lesser False Vampire	Least Concern
Miniopteridae	<i>Miniopterus australis</i>	Little Long-fingered Bat	Least Concern
Pteropodidae	<i>Cynopterus brachyotis</i>	Lesser Dog-faced fruit bat	Least Concern
Pteropodidae	<i>Macroglossus minimus</i>	Dagger-toothed long- nosed bat	Least Concern
Pteropodidae	<i>Eonycteris spelaea</i>	Common Dawn Bat	Least Concern
Pteropodidae	<i>Rousettus amplexicaudatus</i>	Geoffrey's Rousette	Least Concern
Rhinolophidae	<i>Rhinolophus virgo</i> *	Yellow-faced horseshoe bat	Least Concern
Rhinolophidae	<i>Rhinolophus acuminatus</i>	Acuminate Horseshoe Bat	Least Concern
Vespertilionidae	<i>Murina cyclotis</i>	Round-eared tube-nosed bat	Least Concern

Table 14. List of all avifauna recorded from West Mt. Bulanjao. Shown also is the species conservation status based on IUCN 2017. A single asterisk (*) denotes that the species is Philippine endemic while double asterisks (**) denotes Palawan island endemics. A NE superscript (^{NE}) denotes Near Endemic species and M (^M) for migratory.

Family	Scientific Name	Common Name	IUCN Status
Accipitridae	<i>Spilornis cheela</i>	Crested serpent eagle	Least Concern
Accipitridae	<i>Accipiter trivirgatus</i> ^M	Crested goshawk	Least Concern
Alcedinidae	<i>Ceyx erithaca</i>	Oriental dwarf kingfisher	Least Concern
Apodidae	<i>Aerodramus vanikorensis</i>	Uniform Swiftlet	Least Concern
Apodidae	<i>Collocalia esculenta</i>	Glossy Swiftlet	Least Concern
Bucerotidae	<i>Anthracoceros marcheji</i> **	Palawan Hornbill	Vulnerable
Campephagidae	<i>Coracina striata</i>	Bar-bellied cuckoo-shrike	Least Concern
Campephagidae	<i>Pericrocotus cinnamomeus</i> ^{NE}	Small minivet	Least Concern
Campephagidae	<i>Lalage nigra</i>	Pied Triller	Least Concern
Campephagidae	<i>Pericrocotus igneus</i> **	Fiery minivet	Near Threatened
Caprimulgidae	<i>Caprimulgus macrurus</i> **	Large-tailed night jar	Least Concern
Chloropseidae	<i>Chloropsis palawanensis</i> *	Yellow-throated leafbird	Least Concern
Cisticolidae	<i>Orthotomus sericeus</i>	Rufous-tailed tailorbird	Least Concern
Cisticolidae	<i>Cisticola juncidis</i>	Zitting Cisticola	Least Concern
Columbidae	<i>Chalcophaps indica</i>	Common emerald dove	Least Concern
Columbidae	<i>Ducula aenea</i>	Green imperial pigeon	Least Concern
Columbidae	<i>Treeron vernans</i> *	Pink-necked green pigeon	Least Concern
Columbidae	<i>Ramphiculus leclancheri</i> *	Black-chinned fruit dove	Least Concern
Columbidae	<i>Macropygia tenuirostris</i>	Philippine cuckoo-dove	Least Concern
Columbidae	<i>Brachypteryx montana</i>	White-browed Shortwing	Least Concern
Columbidae	<i>Treeron curvirostra</i>	Thick-billed Green-Pigeon	Least Concern
Coraciidae	<i>Eurystomus orientalis</i>	Dollarbird	Least Concern
Corvidae	<i>Corvus enco</i>	Slender billed crow	Least Concern
Corvidae	<i>Corvus macrorhynchos</i>	Large-billed crow	Least Concern
Cuculidae	<i>Surniculus lugubris</i>	Square-tailed drongo-cuckoo	Least Concern
Cuculidae	<i>Centropus bengalensis</i>	Lesser coucal	Least Concern
Cuculidae	<i>Eudynamys scolopaceus</i>	Western Koel	Least Concern
Cuculidae	<i>Centropus sinensis</i>	Greater Coucal	Least Concern
Cuculidae	<i>Cacomantis variolosus</i>	Brush Cuckoo	Least Concern
Dicaeidae	<i>Dicaeum pygmaeum</i> *	Pygmy flowerpecker	Least Concern
Dicaeidae	<i>Prionochilus plateni</i> **	Palawan flowerpecker	Least Concern
Dicaeidae	<i>Dicaeum aeruginosum</i> *	Striped Flowerpecker	Least Concern
Dicruridae	<i>Dicrurus hottentottus</i>	Hair-crested Drongo	Least Concern
Dicruridae	<i>Dicrurus leucophaeus</i> ^{NE}	Ashy drongo	Least Concern
Estrildidae	<i>Lonchura leucogastra</i>	White-bellied Munia	Least Concern
Irenidae	<i>Irena tweedallii</i> **	Palawan fairy bluebird	Near Threatened
Irenidae	<i>Irena puella</i> ^{NE}	Asian fairy-Bluebird	Least Concern
Laniidae	<i>Lanius cristatus</i> ^M	Brown shrike	Least Concern

Monarchidae	<i>Hypothymis azurea</i>	Black naped monarch	Least Concern
Monarchidae	<i>Terpsiphone cyanescens</i> **	Blue paradise flycatcher	Least Concern
Motacillidae	<i>Dendronanthus indicus</i> ^M	Forest wagtail	Least Concern
Motacillidae	<i>Motacilla cinerea</i> ^M	Grey Wagtail	Least Concern
Muscicapidae	<i>Muscicapa dauurica</i> ^M	Asian brown flycatcher	Least Concern
Muscicapidae	<i>Cyornis lemprieri</i> **	Palawan blue flycatcher	Near Threatened
Muscicapidae	<i>Larivora cyane</i> ^M	Siberian blue robin	Least Concern
Muscicapidae	<i>Muscicapa griseisticta</i> ^M	Grey-streaked flycatcher	Least Concern
Muscicapidae	<i>Cyornis rufigastra</i>	Mangrove Blue-flycatcher	Least Concern
Muscicapidae	<i>Kittacincla nigra</i> **	White-vented Shama	Least Concern
Nectariniidae	<i>Arachnothera longirostra</i>	Pale spiderhunter	Least Concern
Nectariniidae	<i>Leptocoma calcostetha</i> ^{NE}	Copper-throated sunbird	Near Threatened
Nectariniidae	<i>Leptocoma sperrata</i>	Purple-throated sunbird	Least Concern
Nectariniidae	<i>Aethopyga shelleyi</i> *	Lovely Sunbird	Least Concern
Nectariniidae	<i>Cinnyris jugularis</i>	Olive-backed sunbird	Data Deficient
Nectariniidae	<i>Anthreptes malacensis</i>	Plain-throated sunbird	Least Concern
Oriolidae	<i>Oriolus chinensis</i>	Black-naped oriole	Least Concern
Oriolidae	<i>Oriolus xanthonotus</i> ^{NE}	Dark-throated Oriole	Least Concern
Paridae	<i>Pardaliparus amabilis</i> **	Palawan Tit	Near Threatened
Pellomeidae	<i>Trichastoma cinereiceps</i> *	Ashy-headed babbler	Least Concern
Pellomeidae	<i>Ptilocichla falcata</i> **	Falcated-wren babbler	Vulnerable
Pellomeidae	<i>Malacopteron palawanense</i> **	Melodious Babbler	Least Concern
Phasianidae	<i>Polypectron napoleonis</i> **	Palawan peacock pheasant	Vulnerable
Phasianidae	<i>Synoicus chinensis</i>	Asian Blue Quail	Least Concern
Phylloscopidae	<i>Phylloscopus borealis</i> ^M	Arctic warbler	Least Concern
Picidae	<i>Dryocopus javensis</i>	White-bellied Woodpecker	Least Concern
Picidae	<i>Chrysocolaptes erythrocephalus</i> **	Red-headed Flameback	Endangered
Picidae	<i>Mulleripicus pulverulentus</i> ^{NE}	Great slaty woodpecker	Vulnerable
Picidae	<i>Dinopium everetti</i> **	Spot- throated flameback	Near Threatened
Pittidae	<i>Pitta sordida</i>	Hooded Pita	Least Concern
Pittidae	<i>Erythropitta erythrogaster</i> *	Red-bellied pitta	Least Concern
Psittacidae	<i>Prioniturus platenae</i> **	Blue headed racquet-tail	Vulnerable
Psittacidae	<i>Tanygnathus lucionensis</i> *	Blue-naped parrot	Near Threatened
Pycnonotidae	<i>Alophoxius frater</i> *	Palawan Bulbul	Least Concern
Pycnonotidae	<i>Pycnonotus cinereifrons</i> *	Ashy-fronted bulbul	Least Concern
Pycnonotidae	<i>Brachypodius atriceps</i> ^{NE}	Black-headed bulbul	Least Concern
Pycnonotidae	<i>Alophoixus bres</i> ^{NE}	Brown-cheeked bulbul	Least Concern
Pycnonotidae	<i>Pycnonotus plumosus</i> ^{NE}	Olive-winged bulbul	Least Concern
Pycnonotidae	<i>Iole palawanensis</i> **	Sulphur-bellied bulbul	Least Concern
Sittidae	<i>Sitta frontalis</i>	Velvet-fronted Nuthatch	Least Concern
Strigidae	<i>Otus fuliginosus</i> **	Palawan Scops-Owl	Near Threatened
Sturnidae	<i>Aplonis panayensis</i>	Asian Glossy starling	Least Concern
Sturnidae	<i>Gracula religiosa</i> ^{NE}	Hill Myna	Least Concern
Timaliidae	<i>Mixornis gularis</i>	Pin-striped Tit-Babbler	Least Concern

ANNEX 7.4. REFERENCES USED FOR SPECIES DISTRIBUTION MODELING.

Environmental predictors were composed of climate data, land cover, altitude and slope (see Table 17), format in raster grids. All layers were in WGS 1984 standard projection and each layer has a spatial resolution of ca. 1 km². Quantum GIS v.2.14 was used to overlay and reclassify all the layers.

Table 15. List of 20 key species records acquired during the field survey and additional records from GBIF online database.

Key species	No. of records during the field survey	Data downloaded from GBIF database	Total # of points
Birds			
<i>Anthracosceros marchei</i>	11	11	22
<i>Chrysocolaptes erythrocephalus</i>	2	5	7
<i>Cyornis lemprieri</i>	21	12	33
<i>Dinopium everetti</i>	6	9	15
<i>Erythropitta erythrogaster</i>	14	3	17
<i>Iole palawanensis</i>	5	13	18
<i>Irena tweeddalii</i>	5	0	5
<i>Pardaliparus amabilis</i>	18	2	20
<i>Polypectron napoleonis</i>	4	7	11
<i>Terpsiphone cyanescens</i>	9	13	22
<i>Treron vernans</i>	2	14	16
Amphibians			
<i>Alculus mariae</i>	4	1	5
<i>Leptobranchium tagbanorum</i>	5	0	5
<i>Limnonectes acanthi</i>	14	8	22
<i>Megophrys ligayae</i>	13	3	16
<i>Staurois nubilus</i>	10	0	10
Trees			
<i>Artocarpus blancoi</i>	6	0	6
<i>Intsia bijuga</i>	5	2	7
<i>Mangifera monandra</i>	7	0	7
<i>Palaquium luzoniense</i>	7	1	8

Table 16. List of environmental predictors used in species distribution modeling.

Environmental predictors	Type	Unit	Geographic resolution	Source
Altitude	Continuous	Meter	ca. 90 m	Shuttle Radar Topography Mission (http://srtm.csi.cigar.org/) Rodriguez et al. 2005
Slope	Continuous			PhilGIS (http://philgis.org/)
Land cover	Categorical		ca. 1 km ²	NAMRIA Land Cover Classification of 2010
Annual mean temperature	Continuous	Degrees		WorldClim Version 2 bioclimatic database (http://www.worldclim.org/) Hijmans et al. 2016
Mean temperature of driest quarter				
Mean temperature of warmest quarter				
Temperature seasonality				
Isothermality				
Mean diurnal range				
Annual precipitation				
Precipitation of driest month				
Precipitation of wettest month				
Precipitation of driest quarter				
Precipitation of warmest quarter				
Precipitation seasonality				
Solar radiation				

ANNEX 7.5. COMMUNITY SURVEY QUESTIONNAIRE SHEETS



CONSERVATION
INTERNATIONAL
Philippines



PCSD

RESPONDENT'S PROFILE

Pangalan: _____

Ethnicity: _____

Edad: _____ Kasaria Lalaki Babae

Barangay: _____

Ilang taon nakatira sa barangay: _____

Gaano kalayo o ilang oras ang nilalakad mula sa bahay ninyo sa gubat? _____

Edukasyon

- Di nakapag-aral
- Elementary level
- Nakapagtapos ng elementarya
- High school level
- Nakapagtapos ng high school
- College level
- Nakapagtapos ng college
- Anong kurso? _____

LIVELIHOOD

PAGKABUHAYAN TUWING TAG-ARAW

(Pagsunod-sunorin. 1 bilang pinakapangunahing hanapbuhay)

- Pagtotroso / pangangahoy
Anong gamit ninyo sa pagputol ng kahoy?
 - Chainsaw
 - Palakol
 - Lagari
 - Itak
- Pagsasaka (lowland)
Ilang _____ hektarya _____ ang _____ sakahan?
Produkto: _____
- Pagsasaka (upland / kaingin)
Ilang _____ hektarya _____ ang _____ sakahan?
Produkto: _____
- Paghahayupan / livestock
Anu-anong _____ mga _____ hayop?
- Paggawa ng uling
Anong gamit ninyo sa pagputol ng kahoy?
 - Chainsaw
 - Palakol
- Lagari
- Itak
- Diretsong pagsusunog
 - Pagkuha ng mga produktong gubat/NTFP
Ano _____ ang _____ mga _____ ito?
 - Laborer (karpintero, driver, kargador, etc.)
 - Panghuhuli at pagbebenta ng mga hayop galing gubat
Anong _____ hayop?
 - Pagtitinda
 - Pangingisda / paninisid / panghuhuli ng lamang dagat
 - Empleyado
Saan? _____
- Tourism / turismo
 - Board and lodging
 - Tour operator
 - Tour guide
- Iba _____ pa _____

PAGKABUHAYAN TUWING TAG-ULAN

(Pagsunod-sunorin. 1 bilang pinakapangunahing hanapbuhay)

- | | |
|---|---|
| <input type="checkbox"/> Pagtotroso / pangangahoy
Anong gamit ninyo sa pagputol ng kahoy?
<ul style="list-style-type: none"> <input type="radio"/> Chainsaw <input type="radio"/> Palakol <input type="radio"/> Lagari <input type="radio"/> Itak | <ul style="list-style-type: none"> <input type="radio"/> Itak <input type="radio"/> Diretsong pagsusunog |
| <input type="checkbox"/> Pagsasaka
Ilang _____ hektarya _____ ang _____ sakahan?

Produkto: _____
_____ | <input type="checkbox"/> Pagkuha ng mga produktong gubat/NTFP
Ano _____ ang _____ mga _____ ito?
_____ |
| <input type="checkbox"/> Pagsasaka (upland / kaingin)
Ilang _____ hektarya _____ ang _____ sakahan?

Produkto: _____
_____ | <input type="checkbox"/> Laborer (karpintero, driver, kargador, etc.)
<input type="checkbox"/> Panghuhuli at pagbebenta ng mga hayop galing gubat
Anong _____ hayop?
_____ |
| <input type="checkbox"/> Paghahayupan / livestock
Anu-anong _____ mga _____ hayop? | <input type="checkbox"/> Pagtitinda
<input type="checkbox"/> Pangisingda / paninisid / panghuhuli ng lamang dagat
<input type="checkbox"/> Empleyado
Saan?
_____ |
| <input type="checkbox"/> Paggawa ng uling
Anong gamit ninyo sa pagputol ng kahoy?
<ul style="list-style-type: none"> <input type="radio"/> Chainsaw <input type="radio"/> Palakol <input type="radio"/> Lagari | <input type="checkbox"/> Tourism / turismo
<ul style="list-style-type: none"> <input type="radio"/> Board and lodging <input type="radio"/> Tour operator <input type="radio"/> Tour guide <input type="checkbox"/> Iba _____ pa
_____ |

Gaano ka kadalas pumunta sa kagubatan?

- | | |
|--|--|
| <input type="checkbox"/> PARATI (Araw-araw) | <input type="checkbox"/> BIHIRA (isang beses isang linggo) |
| <input type="checkbox"/> MADALAS (2-3 beses sa isang linggo) | <input type="checkbox"/> IBA PA _____ |
| <input type="checkbox"/> MINSAN (4-6 beses sa isang linggo) | |

Ano ang pangunahing dahilan kung bakit ka pumupunta sa kagubatan?

- | | |
|---|-----------------------------|
| <input type="checkbox"/> Kumukuha ng kahoy pang-hanapbuhay | <input type="checkbox"/> .. |
| <input type="checkbox"/> Kumukuha ng kahoy para gawing panggatong o uling | |
| <input type="checkbox"/> Kumukuha ng produkto galing sa gubat
Halimbawa: _____
_____ | |
| <input type="checkbox"/> Pupuntahan ang sakahan

Manghuli ng mga hayop
Halimbawa: _____
_____ | |
| <input type="checkbox"/> Bilang tour guide | |
| <input type="checkbox"/> .. Para mamasyal | |
| <input type="checkbox"/> .. Ano pa?

_____ | |

Ano ang mga nakukuha mo sa gubat?

Anong mga buwan ang tag-tuyot?

Anong mga buwan ang tag-ulan?

May napansin ka bang pagbabago sa klima?

.. Meron .. Wala naman .. Di ko masabi

Kung meron, ano ito?

Nakaranas ka na ba ng natural na kalamidad o delubyo?

.. Oo .. Wala

Ano ito?

Sa tingin ninyo, dapat ba nating pangalagaan ang kagubatan?

Oo Hindi Di ko alam

Bakit?

Mahalaga ba ang mga ibang buhay na makikita sa kagubatan?

.. Oo .. Dili .. Di ko alam

Bakit?

May mga aktibidad sa inyong lugar na isinusulong para protektahan ang ating kagubatan at buhay-ilang?

Oo Wala Di ko alam

Kung meron, anu-ano mga ito?

Sa kabuoan, matagumpay ba ito?

Oo Oo, pero kulang pa Hindi Walang ideya

May mga aktibidades bang nangyayari na sumisira sa kagubatan?

.. Oo .. Wala .. Di ko alam

Kung meron, anu-ano ang mga ito?

Bilang residente, paano kayo naapektuhan nito?

Sa iyong pananaw, ano ang pinaka mahalagang tugon para matigil ang pagkasira ng ating kalikasan?

1. Magkaroon ng partisipasyon ang komunidad sa pangangalaga ng kagubatan
 - a. Sang-ayon
 - b. Di sang-ayon
 - c. Di ko alam
2. Pamamahalaan ng gobyerno ang pangangalaga at pagprotekta ng kagubatan
 - a. Sang-ayon
 - b. Di sang-ayon
 - c. Di ko alam
3. gawain sa kagubatan o kabundukan
 - a. Sang-ayon
 - b. Di sang-ayon
 - c. Di ko alam
4. Kung ikaw ay magiging tagapangalaga ng kagubatan, ano sa tingin mo ang pinakamainam na tulong o benepisyong iyong matatagap?

5. Ano pa sa tingin ninyo ang pwede pang gawing kapakipakinabang sa bundok o kagubatan?

ANNEX 7.6. Species Photos and Field Photos

I. AMPHIBIANS



Common Name: Palawan Horned Frog
Scientific name: *Megophrys ligayae*
Endemicity: Island Endemic
Conservation Status: Endangered



Common Name: Busuanga Wart Frog
Scientific name: *Limnonectes acanthi*
Endemicity: Philippine Endemic
Conservation Status: Vulnerable



Common Name: Everette's Flying Frog
Scientific name: *Philautus everetti*
Endemicity: Resident
Conservation Status: Nearly Threatend



Common Name:
Scientific name: *Leptobrachium tagbanorum*
Endemicity: Island Endemic

II. BIRDS



Common Name: Palawan Scops-Owl
Scientific name: *Otus fuliginosus*
Endemicity: Island Endemic
Conservation Status: Nearly Threatened



Common Name: Hooded Pitta
Scientific name: *Pitta sordida*
Endemicity: Resident Species
Conservation Status: Least Concern



Common Name: Palawan Flowerpecker
Scientific name: *Prionochilus plateni*
Endemicity: Island endemic
Conservation Status: Least Concern



Common Name: Red Bellied Pitta
Scientific name: *Erythropitta erythrogaster*
Endemicity: Philippine Endemic
Conservation Status: Least Concern



Common Name: Yellow-throated leafbird
Scientific name: *Chloropsis palawanensis*
Endemicity: Palawan-resident Species
Conservation Status: Least Concern

III. REPTILES



Common Name: Palawan Bent-toed Gecko
Scientific name: *Cyrtodactylus redimiculus*
Endemicity: Island Endemic
Conservation Status: Nearly Threatened



Common Name: Bornean Keeled Green Pit Viper
Scientific name: *Tropidolaemus subannulatus*
Endemicity: Resident Species



Common Name: Banded Malayan Coral Snake
Scientific name: *Dryocalamus tristriatus*
Endemicity: Resident Species



Common Name: East Indian Brown Mabuya
Scientific name: *Eutropis multifasciata*
Endemicity: Resident Species
Conservation Status: Least Concern



Common Name: Dog-toothed Cat Snake
Scientific name: *Boiga cynodon*
Endemicity: Resident Species
Conservation Status: Least Concern

IV. Mammals



Common Name: House Mice
Scientific name: *Mus musculus*
Endemicity: Resident Species
Conservation Status: Least Concern



Common Name: Lesser False Vampire
Scientific name: *Megaderma spasma*
Endemicity: Resident Species
Conservation Status: Least Concern



Common Name: Round-eared tube-nosed bat
Scientific name: *Murina cyclotis*
Endemicity: Resident Species
Conservation Status: Least Concern



Common Name: Acuminate Horseshoe Bat
Scientific name: *Rhinolophus acuminatus*
Endemicity: Resident Species
Conservation Status: Least Concern



Common Name: Geoffrey's Rousette
Scientific name: *Rousettus amplexicaudatus*
Endemicity: Resident Species
Conservation Status: Least Concern



Common Name: Little Long-fingered Bat
Scientific name: *Miniopterus australis*
Endemicity: Resident Species
Conservation Status: Least Concern

Fieldwork Photos



Plate 8. Aerial shot of West Mt. Bulanjao showing forest edge transition.



Plate 9. Aerial shot of West Mt. Bulanjao showing forest fragmentation.



Plate 10. A view of sunrise in West Mt. Bulanjao, Rizal, Southern Palawan.



Plate 11. Expanding development areas in West Mt. Bulanjao.



Plate 12. CCIPH Biodiversity Team with the local indigenous guides.

ANNEX 7.7. Species Distribution Models of twenty (20) trigger species.

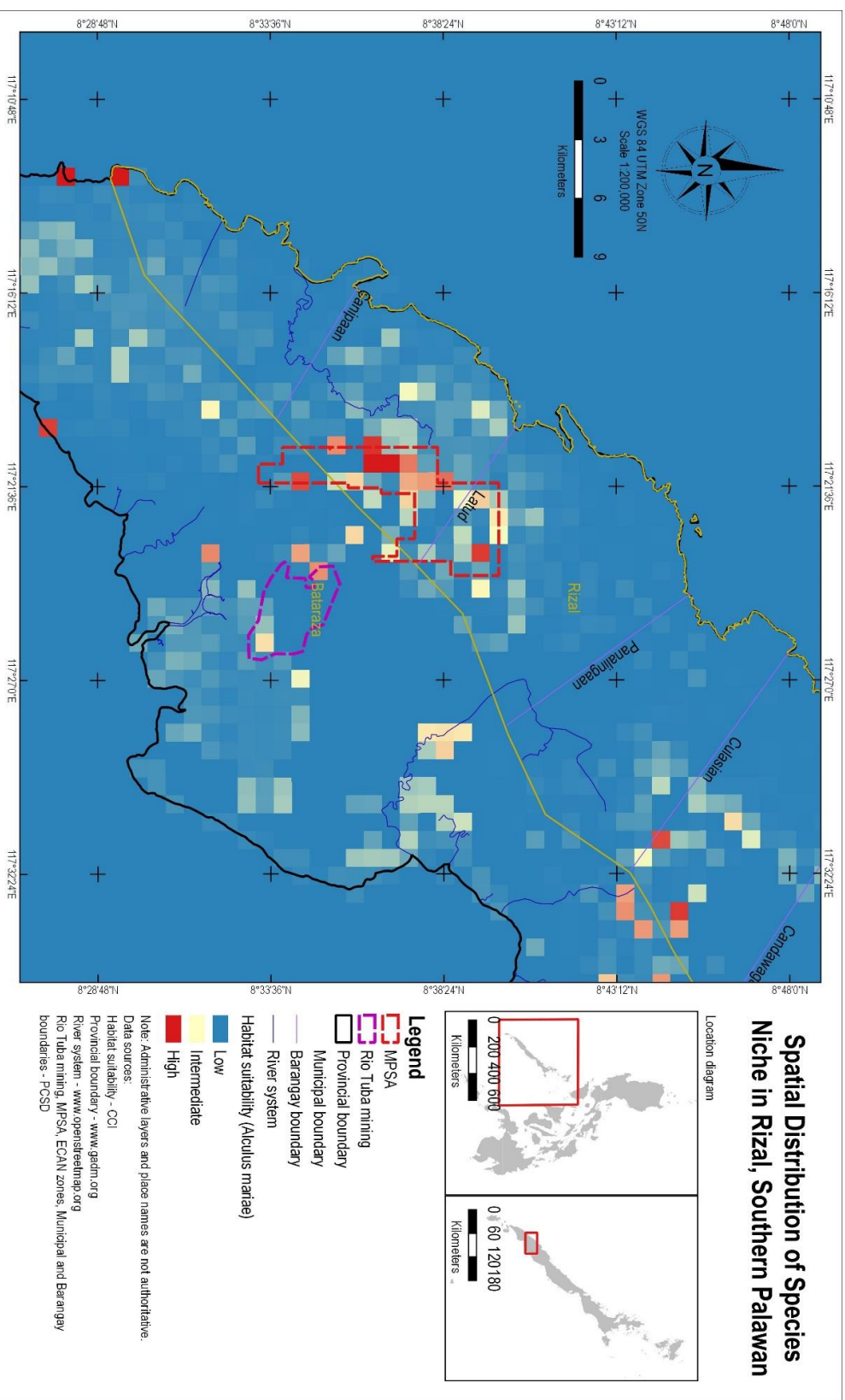


Figure 10. Species Distribution modelling of *Alculus mariae* in West Mt. Bulanjao, Rizal, Southern Palawan.

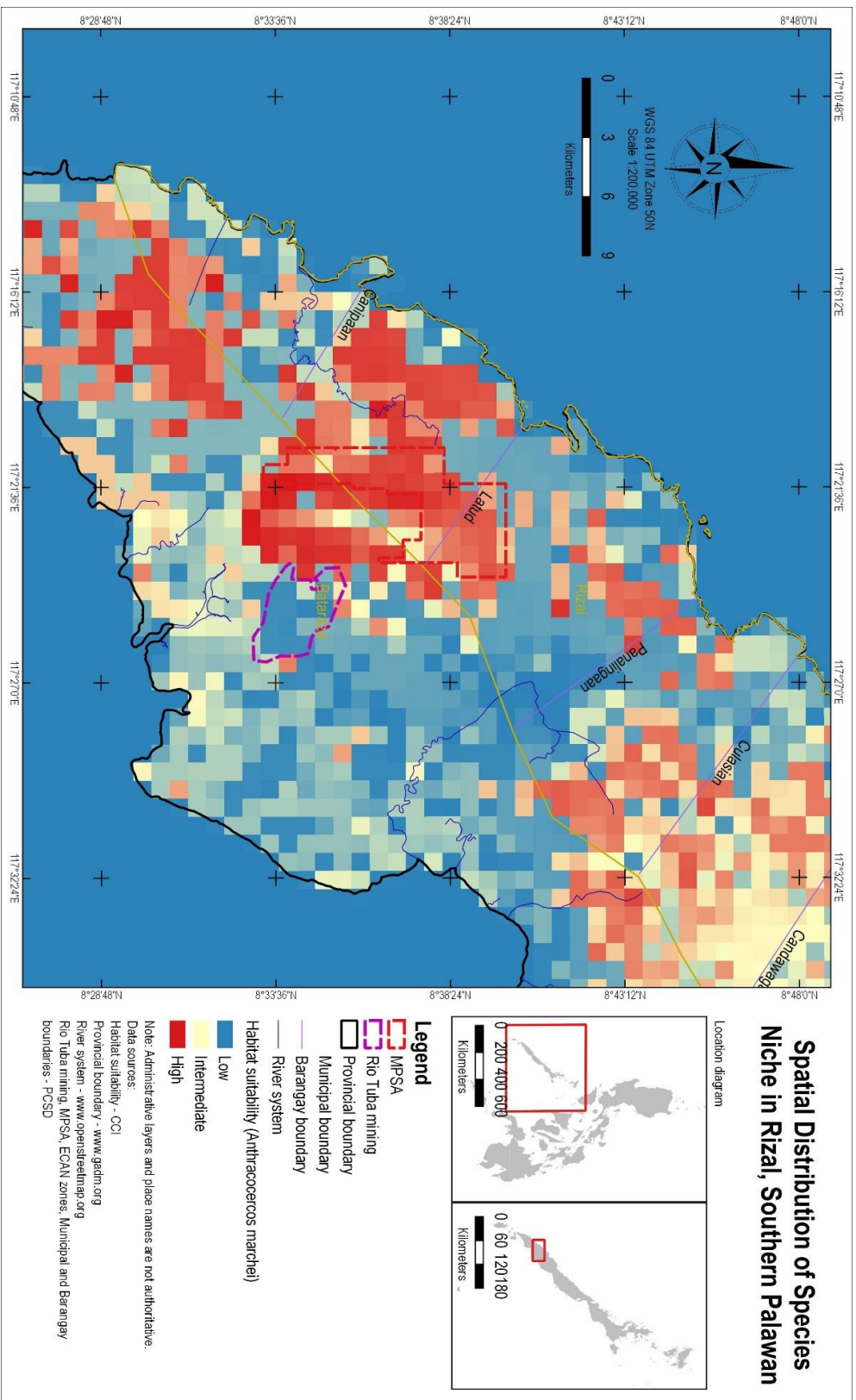


Figure 11. Species Distribution modelling of *Anthracoceros marchei* in West Mt. Bulanjao, Rizal, Southern Palawan.

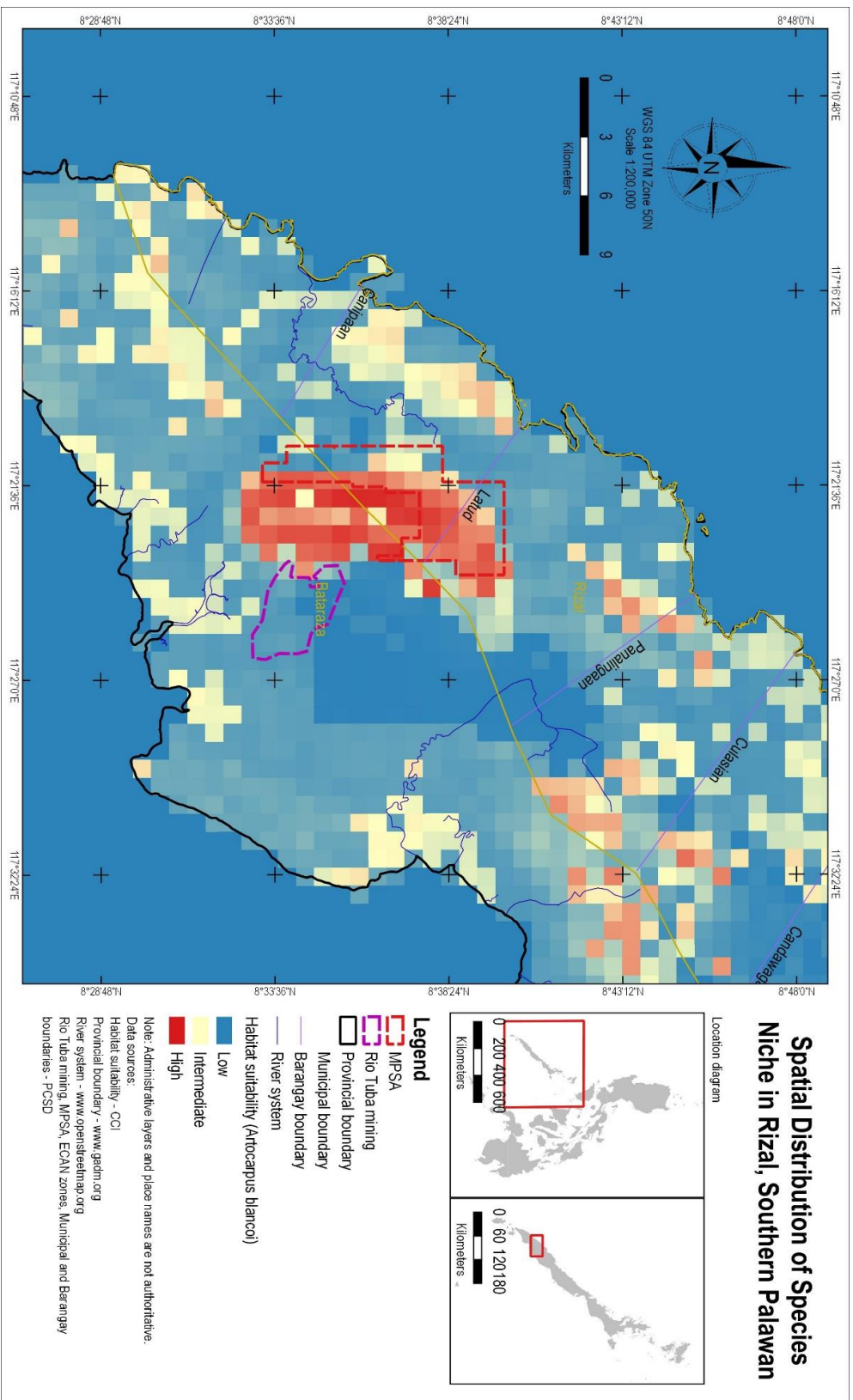


Figure 12. Species Distribution modelling of *Artocarpus blancoi* in West Mt. Bulanjao, Rizal, Southern Palawan.

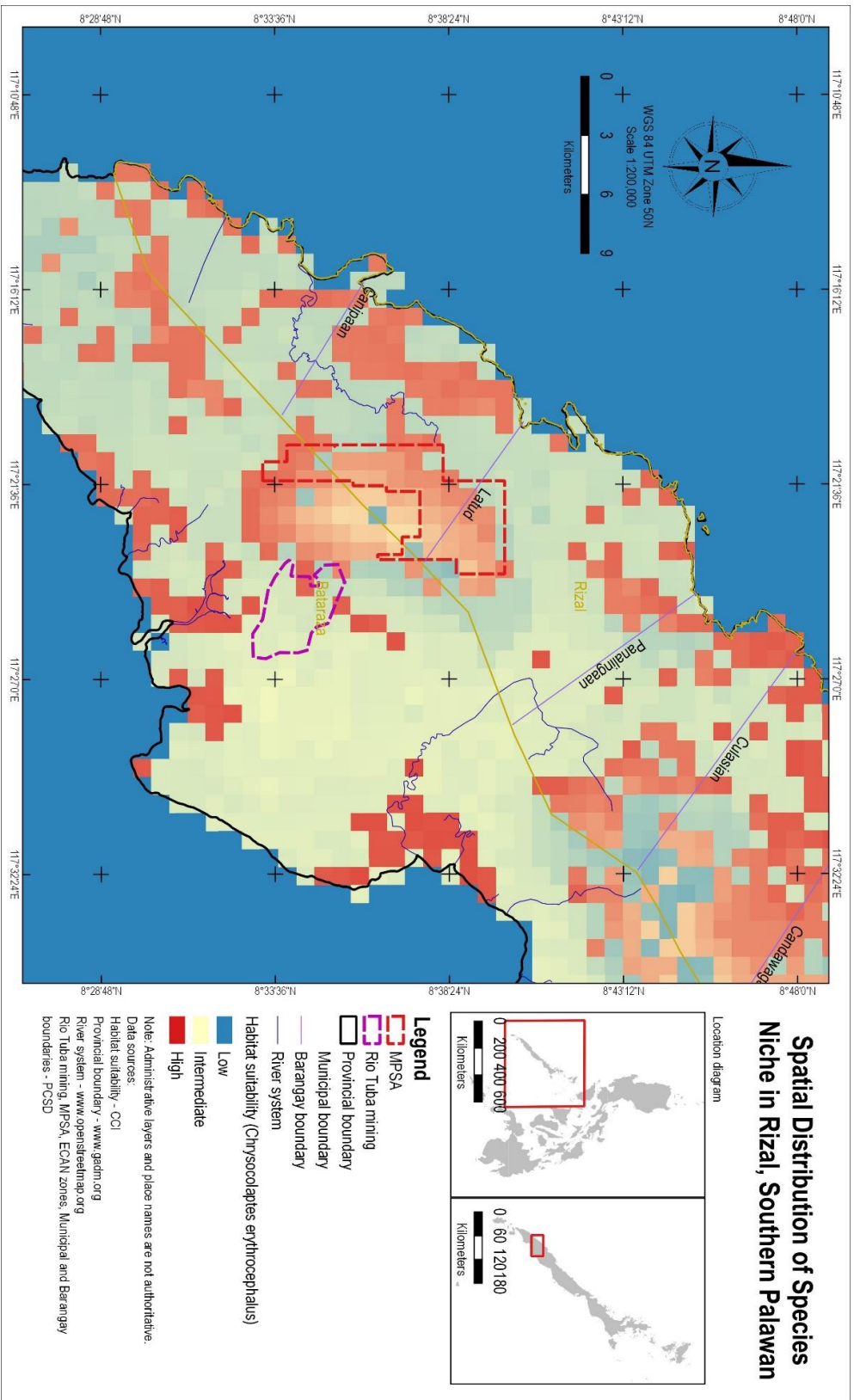


Figure 13. Species Distribution modelling of *Chrysocolaptes erythrocephalus* in West Mt. Bulanjao, Rizal, Southern Palawan.

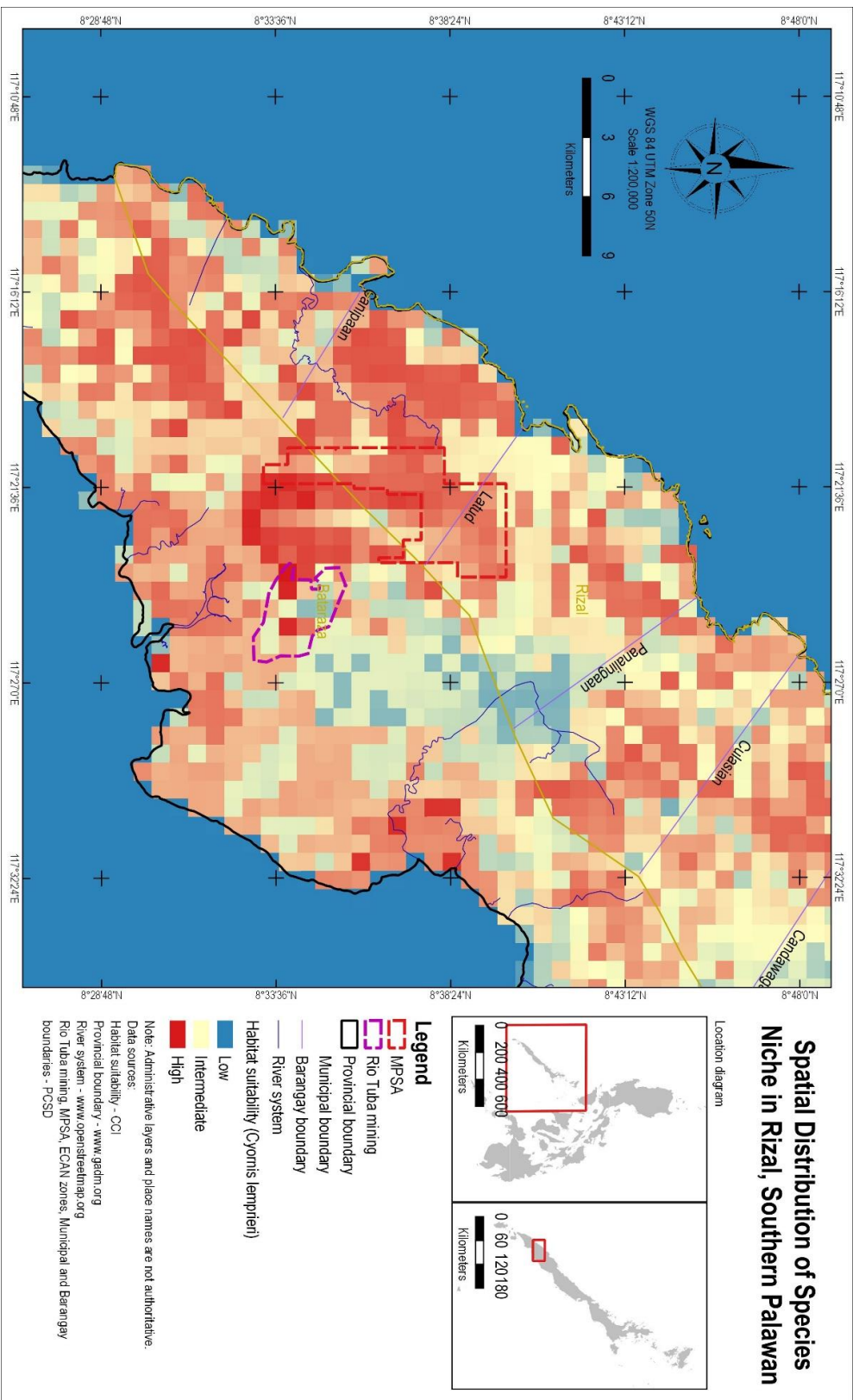
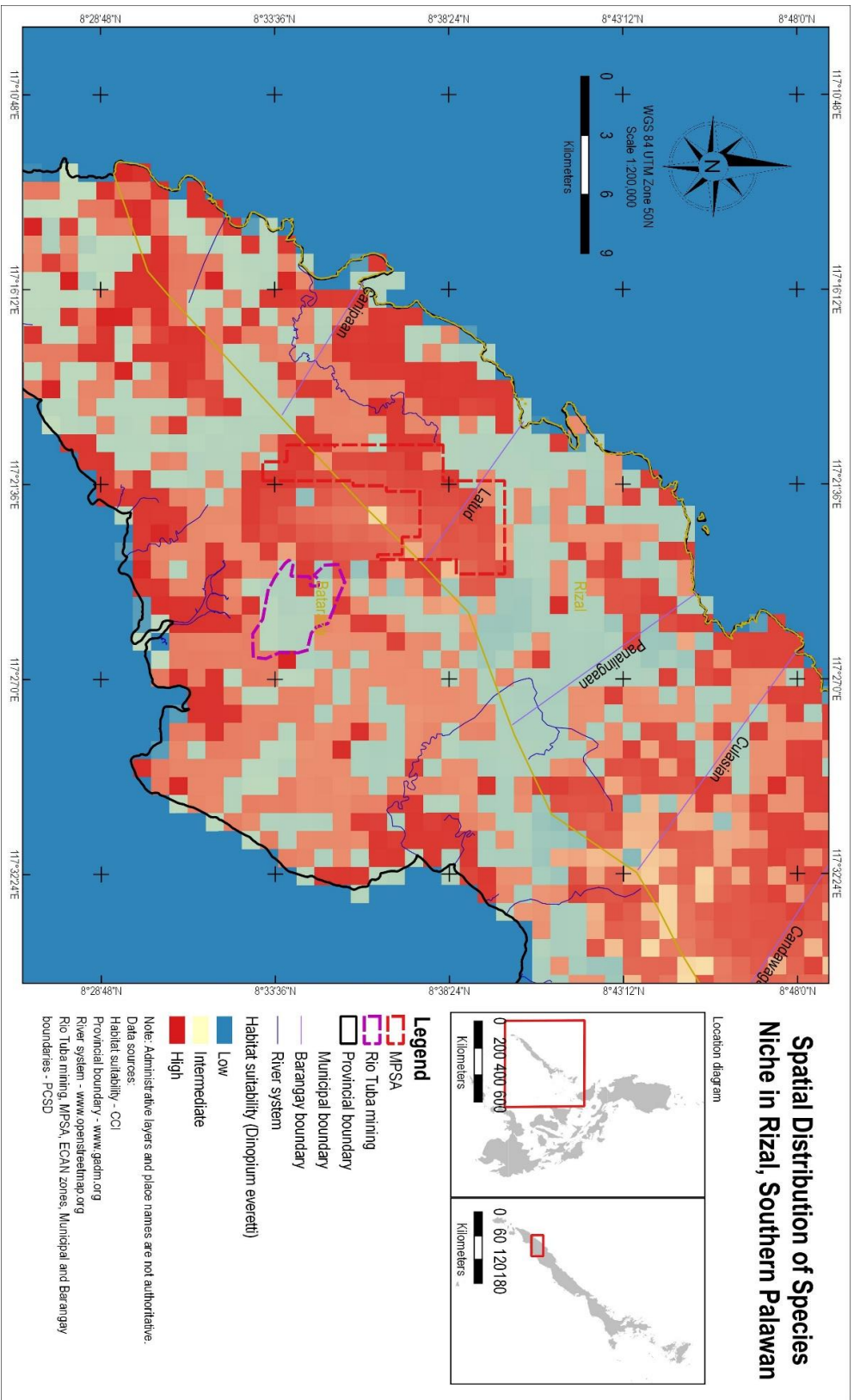


Figure 14. Species Distribution modelling of *Cyornis lemprieri* in West Mt. Bulanjao, Rizal, Southern Palawan.



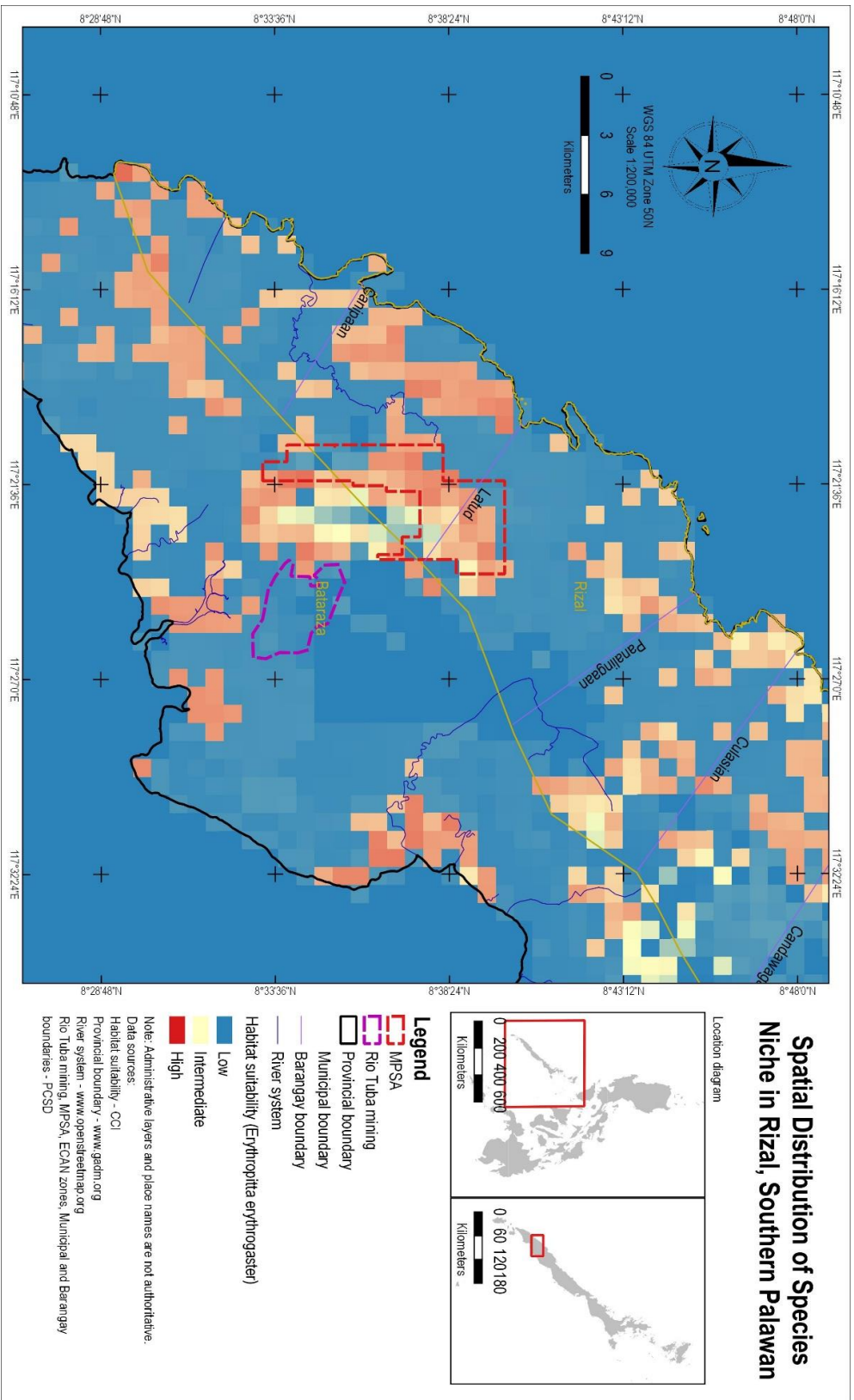


Figure 16. Species Distribution modelling of *Erythropita erythrogaster* in West Mt. Bulanjao, Rizal, Southern Palawan.

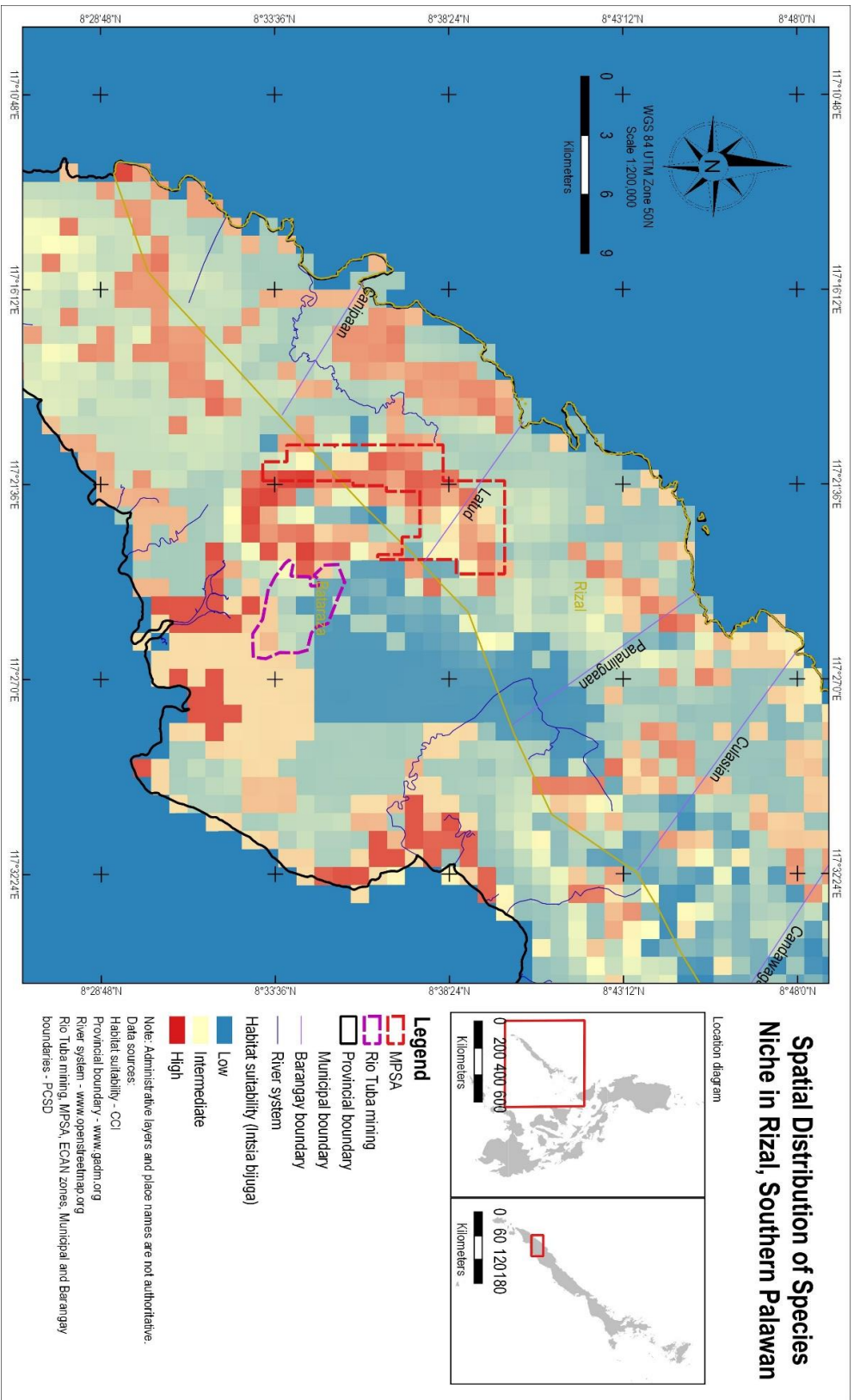


Figure 17. Species Distribution modelling of *Intsia bijuga* in West Mt. Bulanjao, Rizal, Southern Palawan.

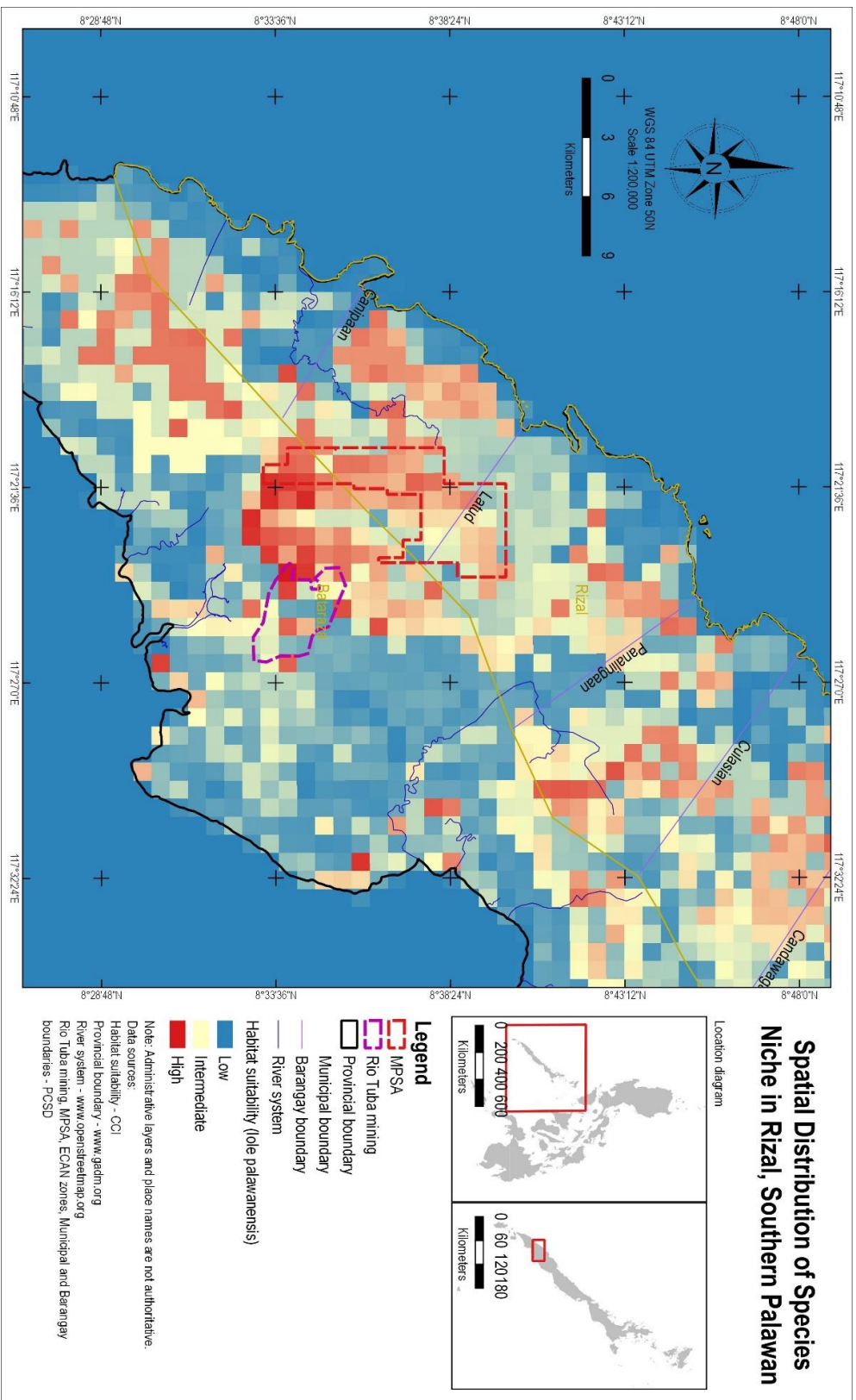


Figure 18. Species Distribution modelling of *Iole palawanensis* in West Mt. Bulanjao, Rizal, Southern Palawan.

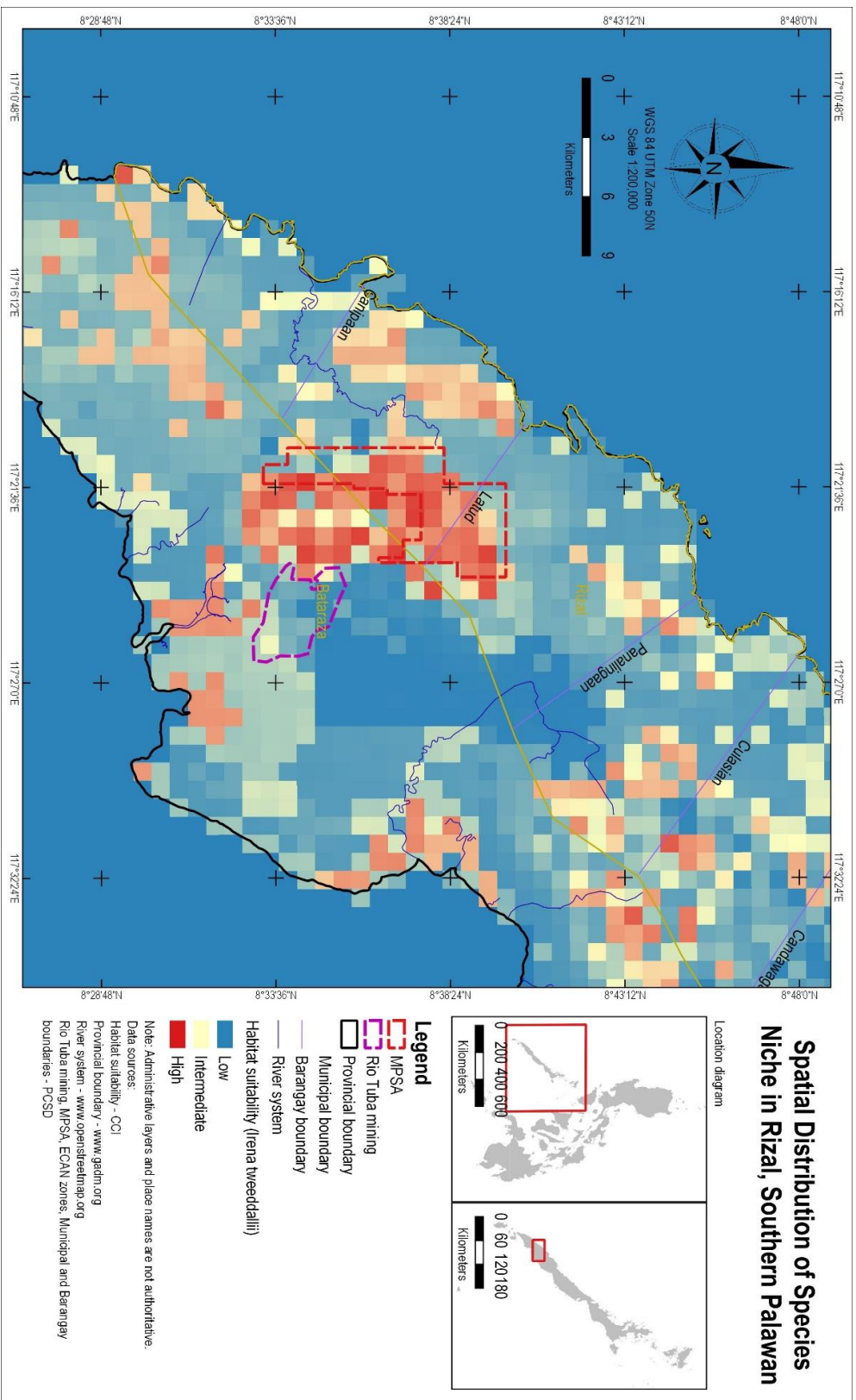


Figure 19. Species Distribution modelling of *Irena tweedallii* in West Mt. Bulanjao, Rizal, Southern Palawan.

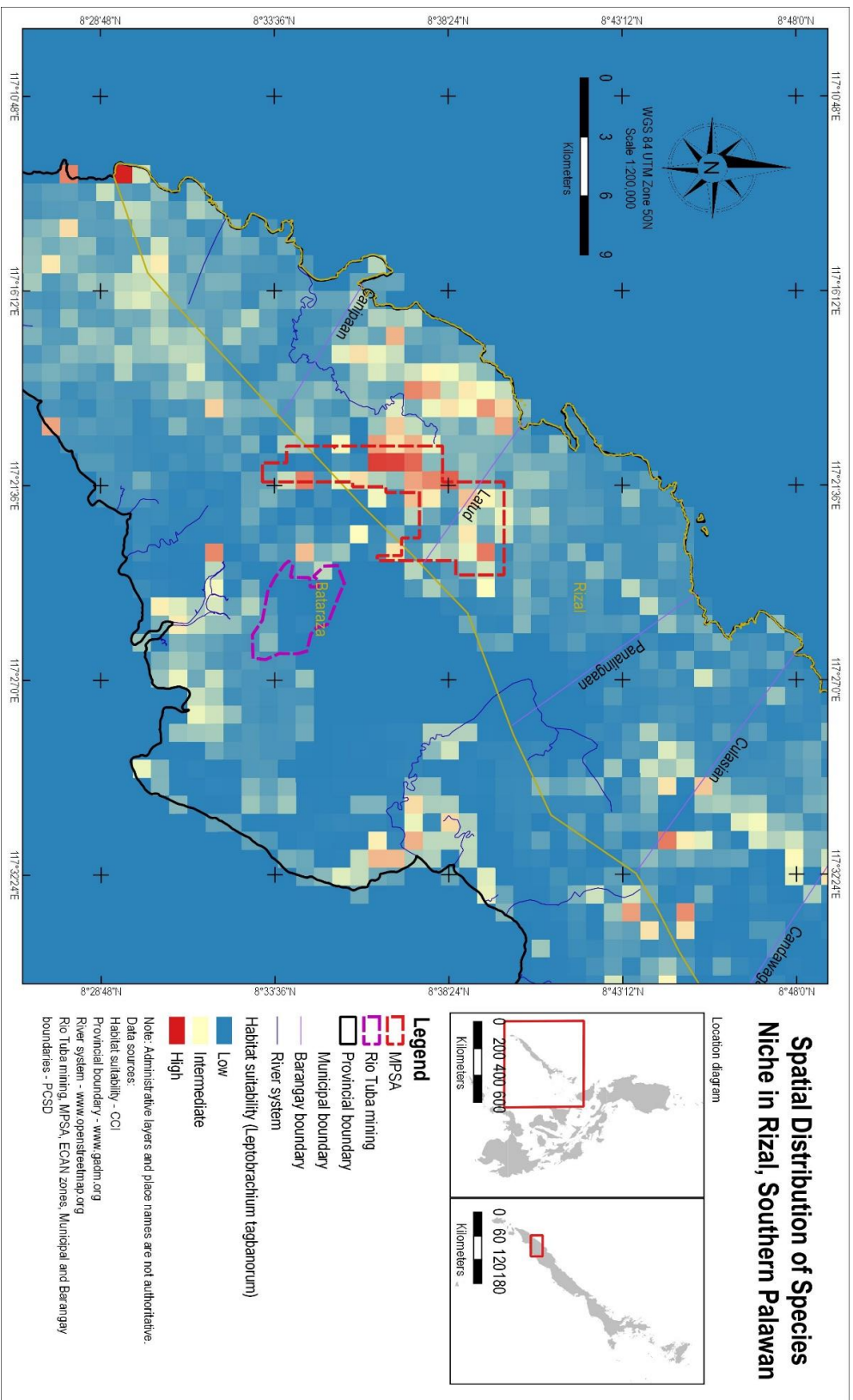


Figure 20. Species Distribution modelling of *Leptobrachium tagbanorum* in West Mt. Bulanjao, Rizal, Southern Palawan.

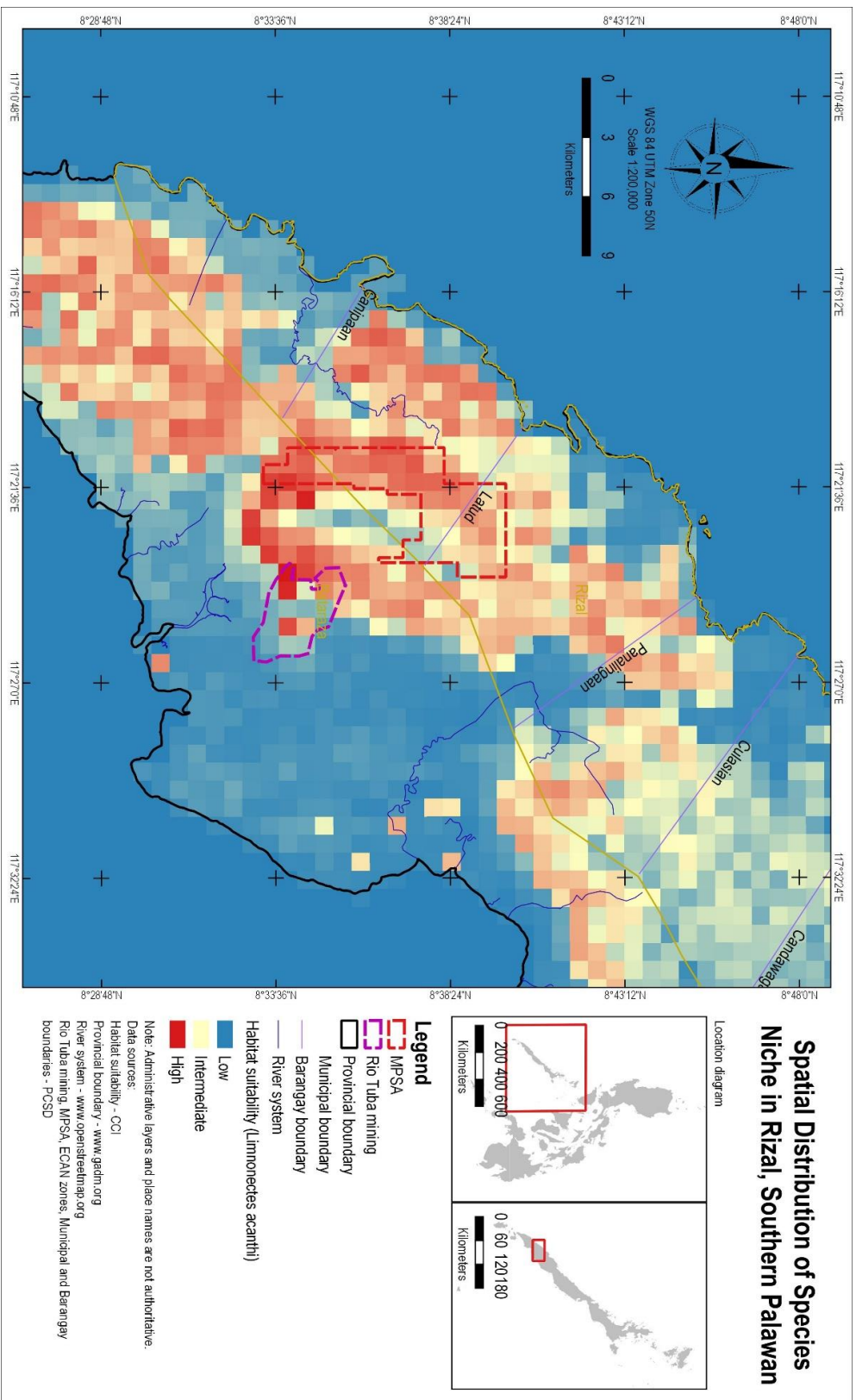


Figure 21. Species Distribution modelling of *Limnonectes acanthi* in West Mt. Bulanjao, Rizal, Southern Palawan.

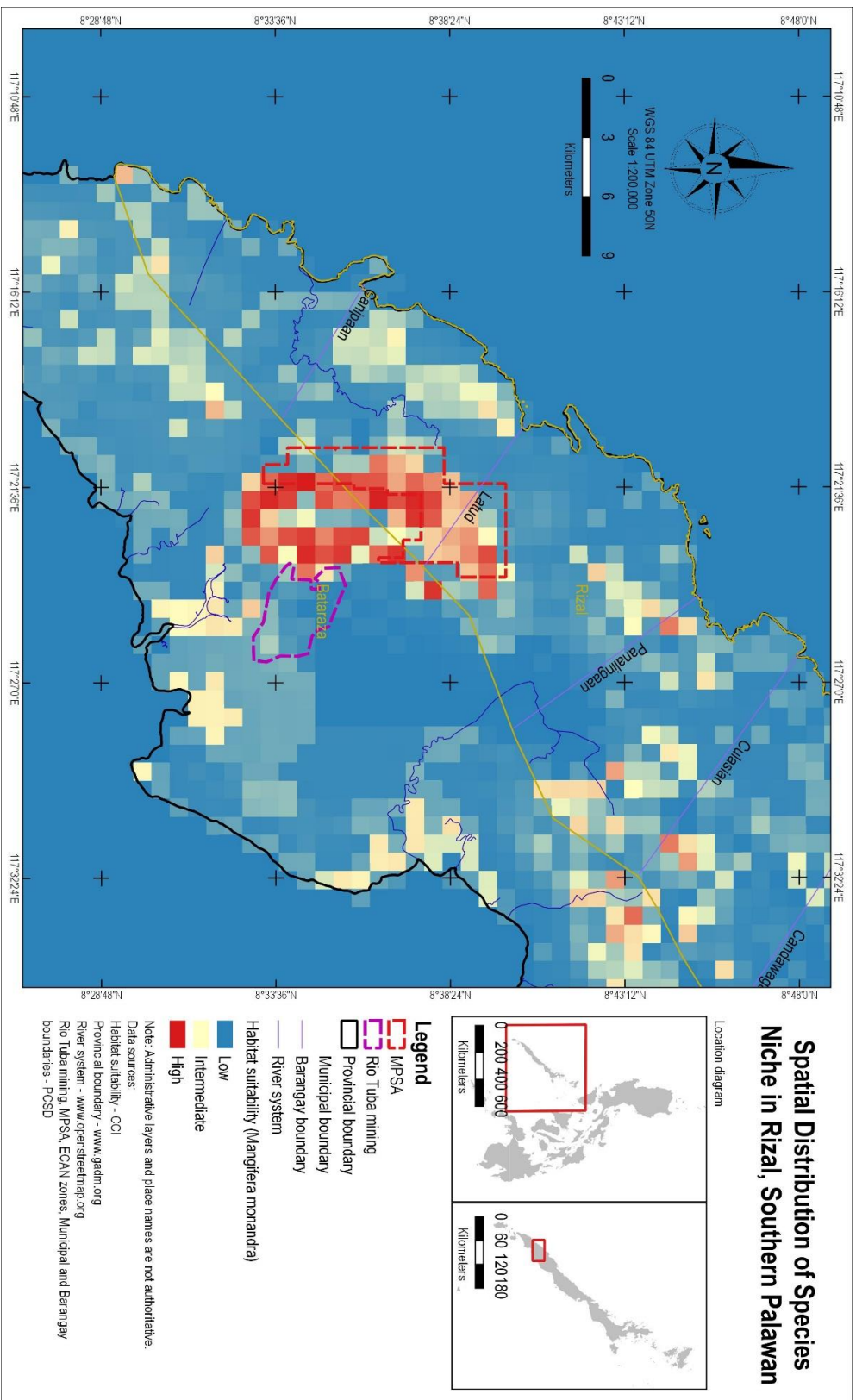


Figure 22. Species Distribution modelling of *Mangifera monandra* in West Mt. Bulanjao, Rizal, Southern Palawan.

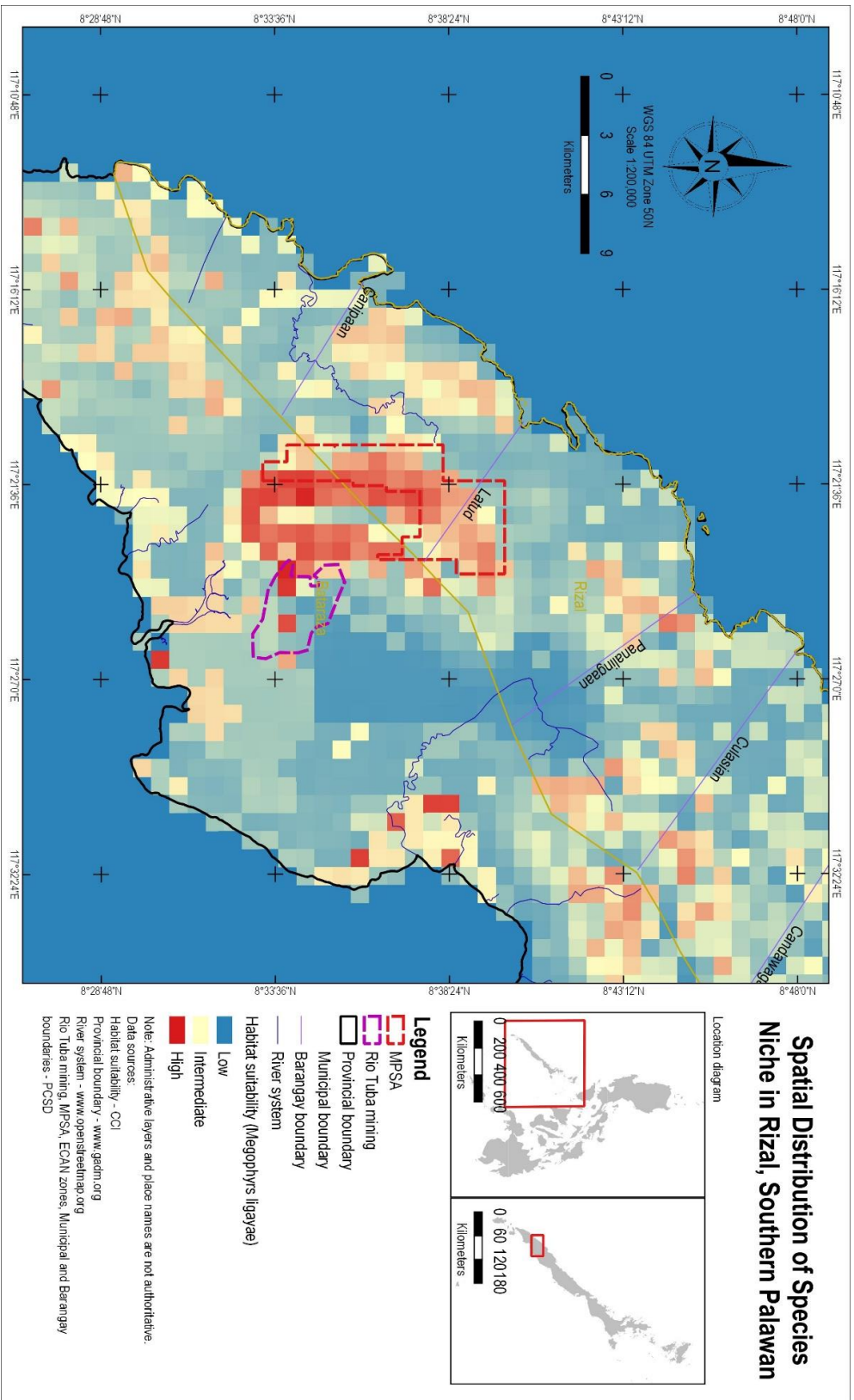


Figure 23. Species Distribution modelling of *Megophrys iligayae* in West Mt. Bulanjao, Rizal, Southern Palawan.

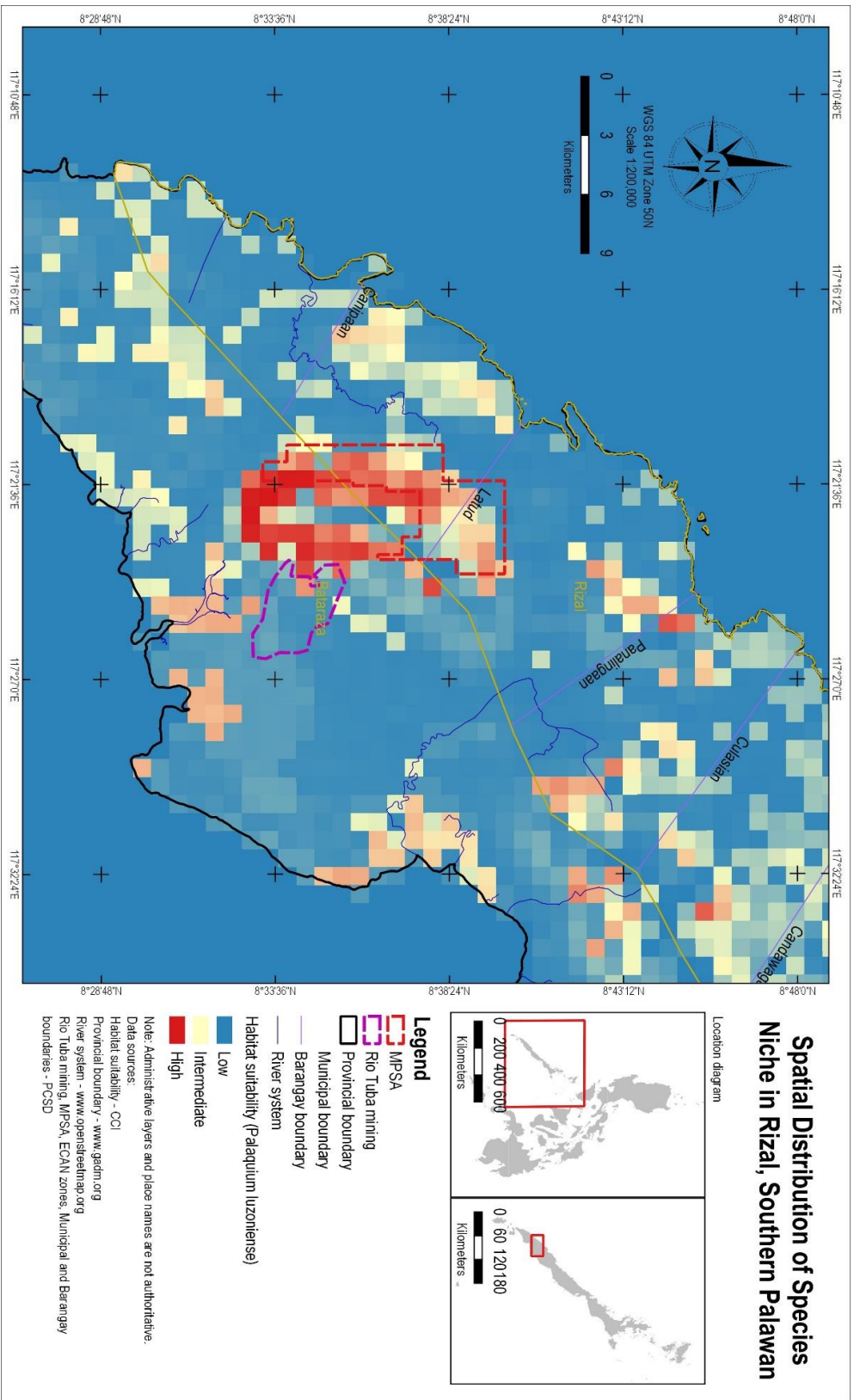


Figure 24. Species Distribution modelling of *Palaequium luzoniense* in West Mt. Bulanjao, Rizal, Southern Palawan.

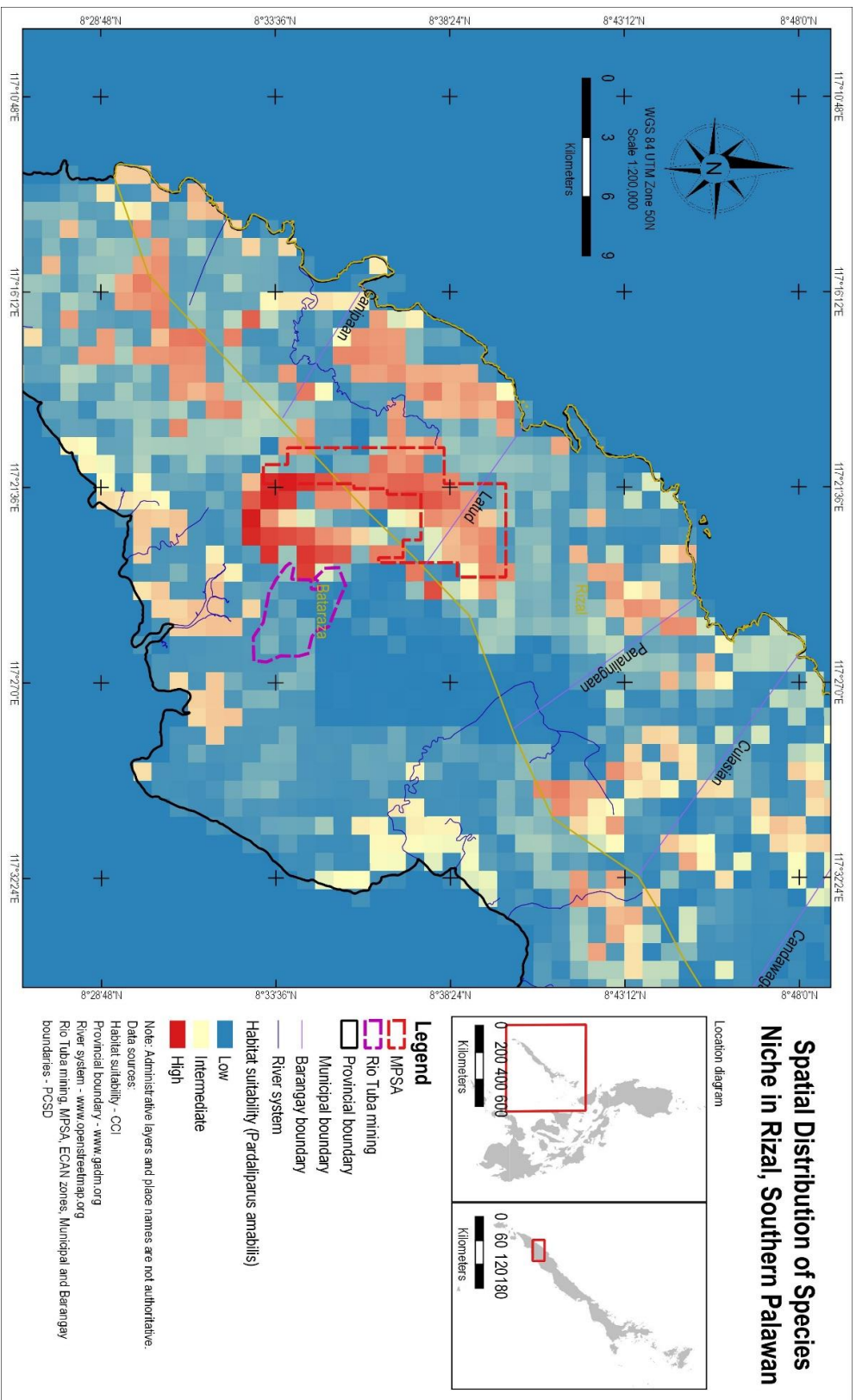


Figure 25. Species Distribution modelling of *Pardaliparus amabilis* in West Mt. Bulanjao, Rizal, Southern Palawan.

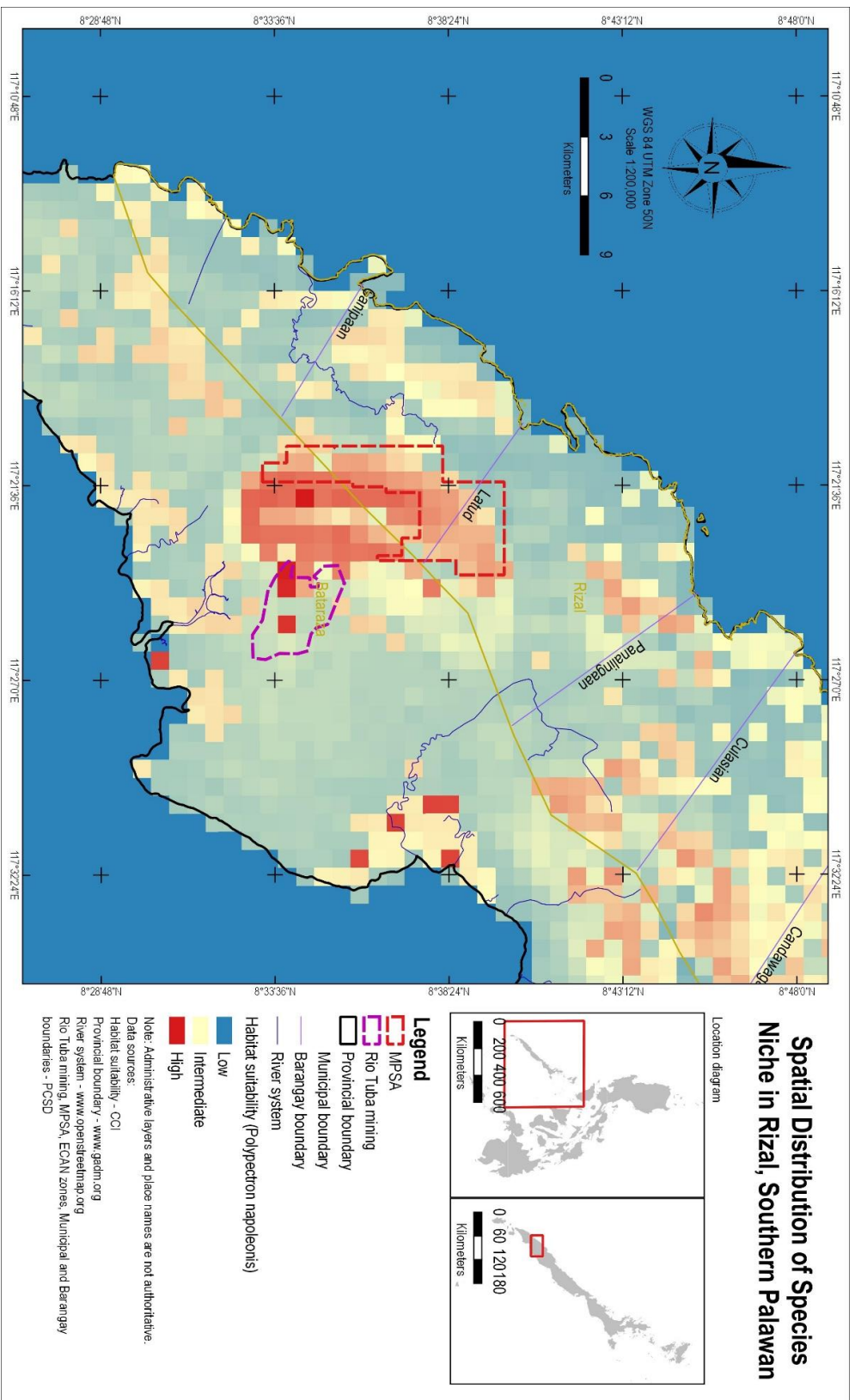


Figure 26. Species Distribution modelling of *Polypectron napoleonis* in West Mt. Bulanjao, Rizal, Southern Palawan.

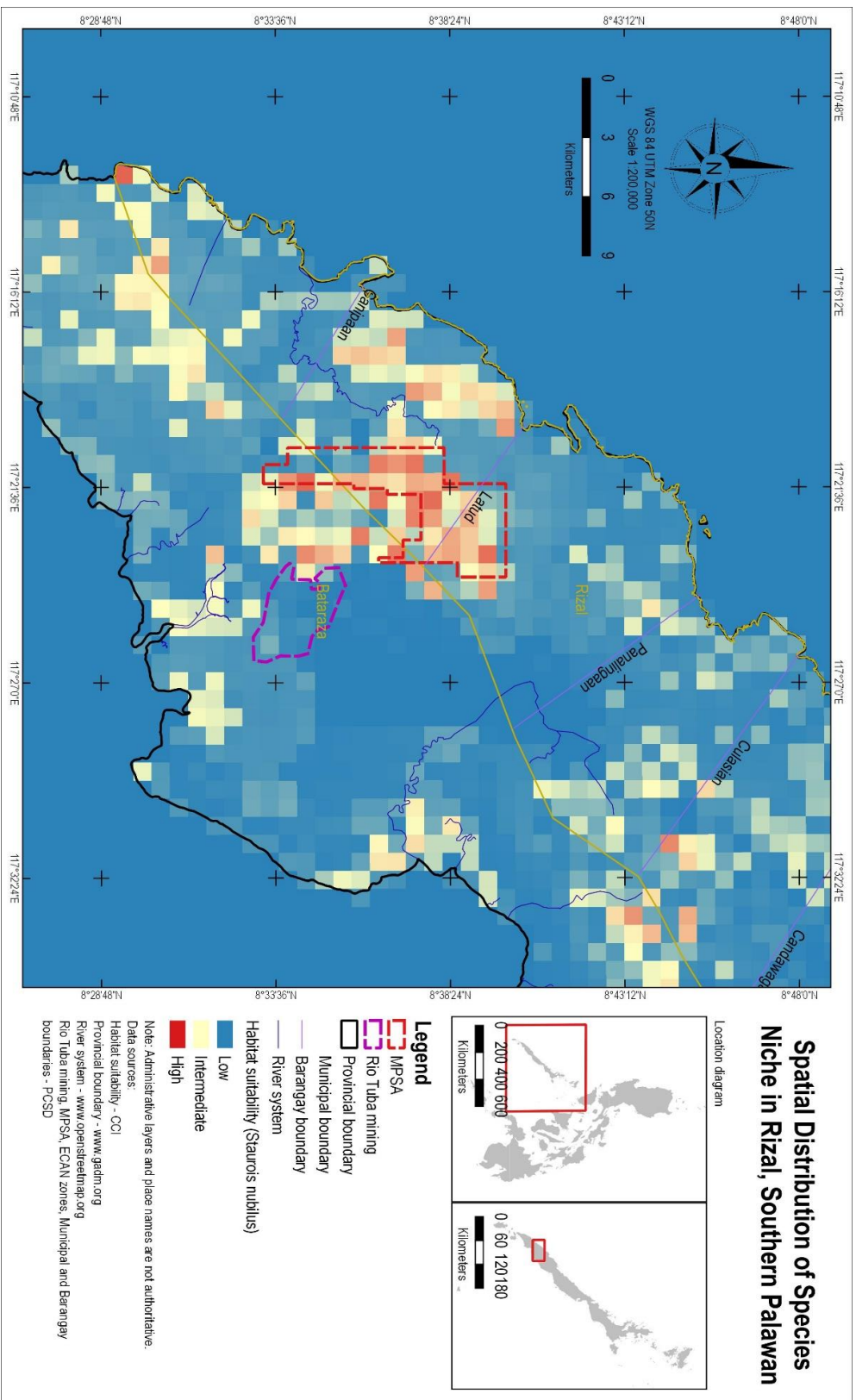


Figure 27. Species Distribution modelling of *Staurois nubilus* in West Mt. Bulanjao, Rizal, Southern Palawan.

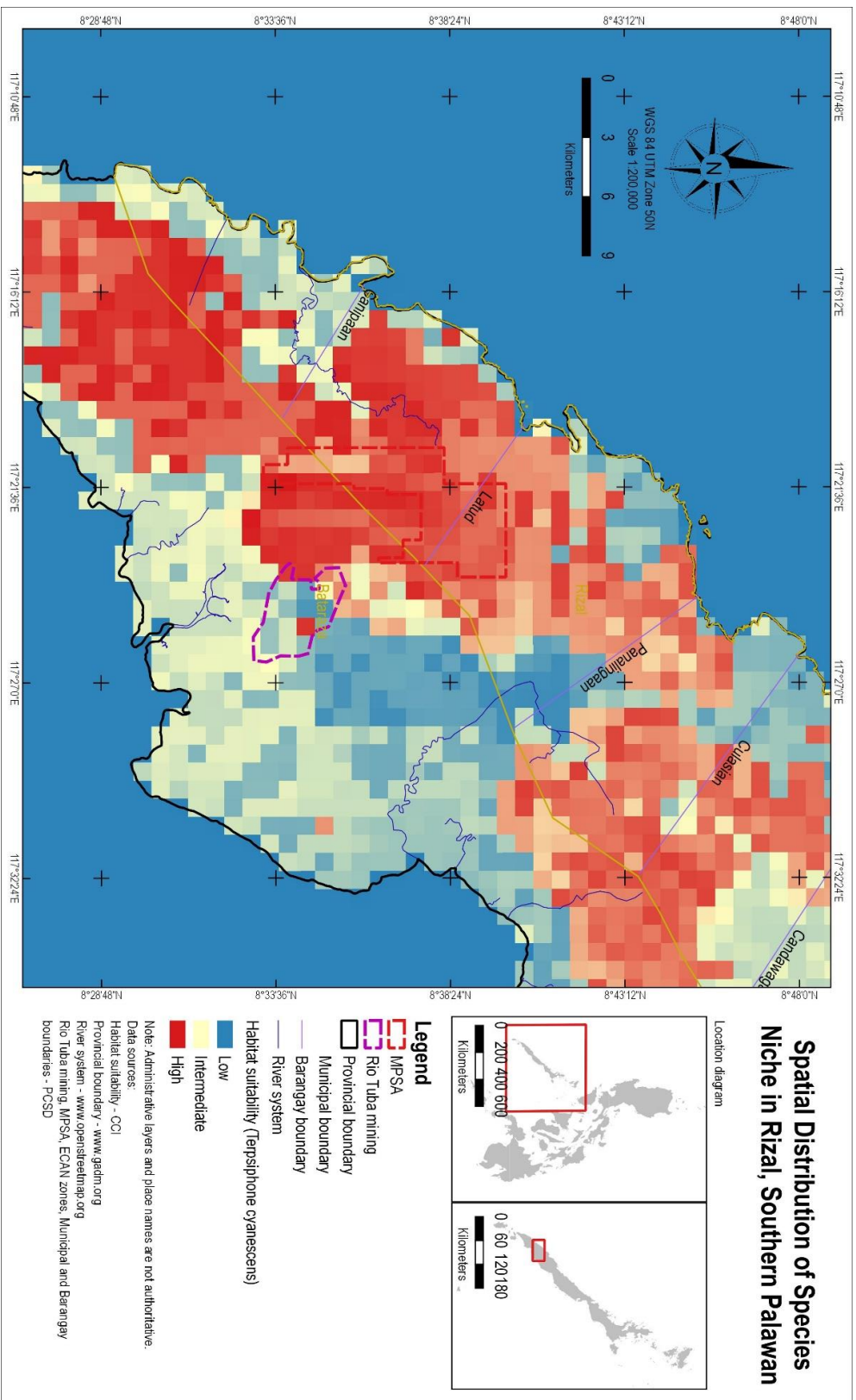


Figure 28. Species Distribution modelling of *Tersiphone cyanescens* in West Mt. Bulanjao, Rizal, Southern Palawan.

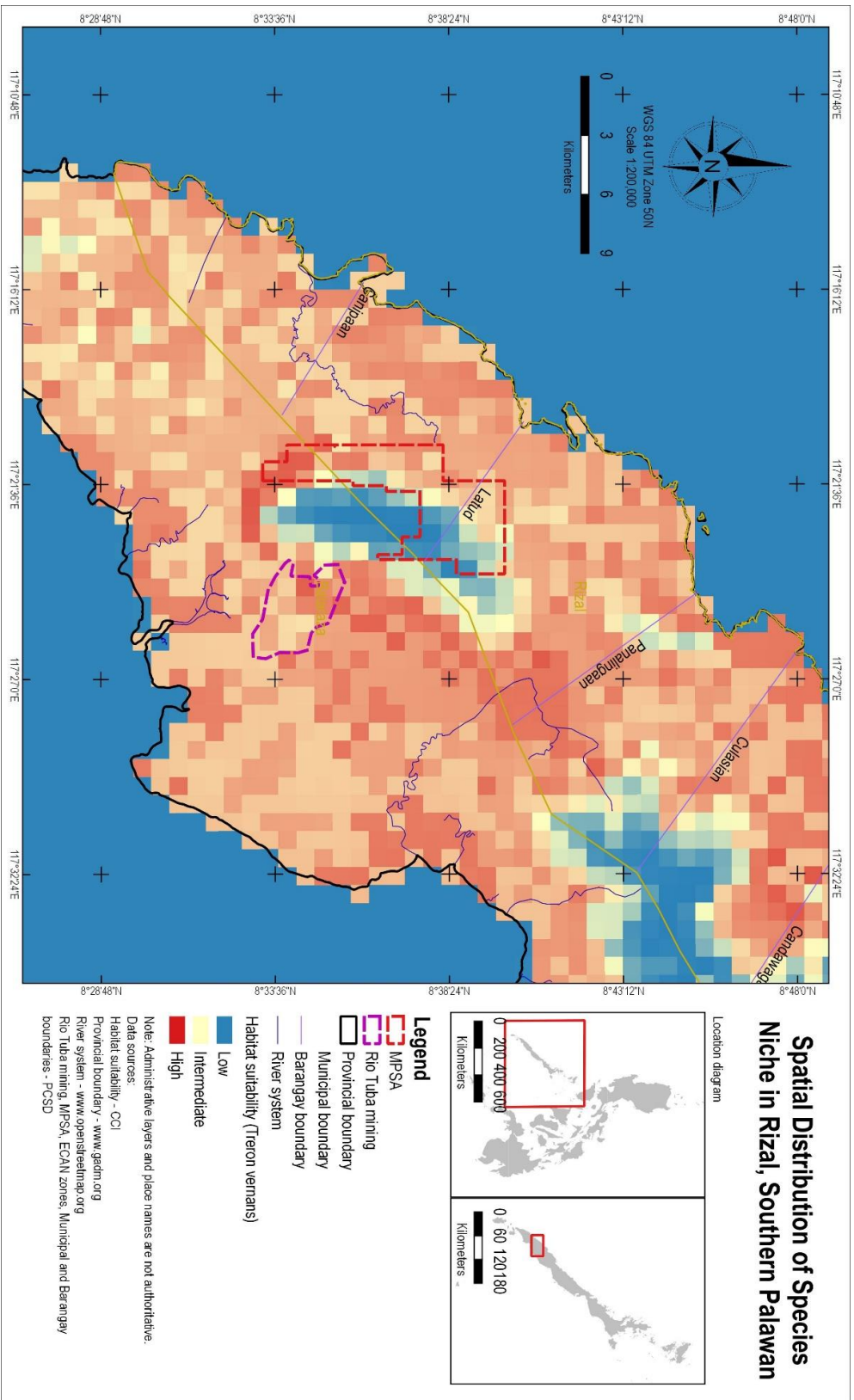


Figure 29. Species Distribution modelling of *Trepon verriani* in West Mt. Bulanjao, Rizal, Southern Palawan.

ANNEX 7.8. SPECIES ACCOUNT

FLORA

Family Anacardiaceae

***Mangifera indica* L**

Mango is one of the most culturally and economically important fruit especially in Asia. The plant is native to India but is now widely cultivated in other countries such as Bangladesh, China, Indonesia, Philippines, Sri Lanka, Thailand and Vietnam. This species was previously considered as Vulnerable (IUCN 1998) but recently considered as data deficient (IUCN 2017-3) by the IUCN Red List (World Conservation Monitoring Centre, 1998). This species thrives in both tropics and subtropics. It grows in land up to 1,200 meters elevation in well-drained soils. It grows best in soils with pH ranging from 5.5 to 7.5 (Orwa, et al, 2009).

Reference:

World Conservation Monitoring Centre. 1998. *Mangifera indica*. The IUCN Red List of Threatened Species 1998: e.T31389A9624842.

Retrieved from: <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T31389A9624842.en>.

Orwa C, A Mutua, Kindt R, Jamnadass R, S Anthony. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. Retrieved from

<http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>

***Mangifera monandra* Merr.**

Mangga paho or Malapaho is an uncommon terrestrial tree that thrives in wet evergreen lowland forest. This species is endemic in the Philippines that can be found in the Islands of Luzon, Samar, Leyte and Guimaras. It was previously considered as vulnerable (IUCN 1998) before being categorized as endangered (IUCN 2017-3) (World Conservation Monitoring Centre, 1998). However, under the DENR Administrative Order No. 2007-1, the said species is categorized as vulnerable (DENR, 2007).

References:

World Conservation Monitoring Centre. 1998. *Mangifera monandra*. The IUCN Red List of Threatened Species 1998: e.T31404A9630812. Retrieved from

<http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T31404A9630812.en>.

Department of Environment and Natural Resources (DENR). (2007). Administrative Order 2007-1. Establishing the List of Threatened Philippine Plants and their Categories, and the List of other wildlife species. Retrieved from <http://bmb.gov.ph/downloads/DAO/dao-2007-01.pdf>

***Koordersiodendron pinnatum* (Blanco) Merr.**

Amugis is a Philippine endemic terrestrial tree commonly used for building houses and ships. It is a relative of cashew tree (*Koordersiodendron pinnatum*, 2018). It is widely distributed throughout the islands of Northern Luzon, Palawan and Mindanao. It flourishes in semi-rainforest and is usually present in secondary forests as a pre-disturbance remnant. It is categorized as vulnerable under the DENR AO 2007-01 (BINHI, 2012).

References:

Koordersiodendron pinnatum. (2018, February 3). In *Wikipedia, The Free Encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Koordersiodendron_pinnatum&oldid=823752761

BINHI.2012.Tree for the Future Database. Energy Development Corporation. Retrieved from http://binhi.ph/database/future/tree_facts/result/Koordersiodendron+pinnatum#tree-facts-tabs=5

Family Annonaceae

***Cananga odorata* (Lam.) Hook.f. & Thomson**

Ilang-ilang is a tropical tree native to Indonesia but is widely distributed throughout Malaysia and Philippines (*Cananga odorata*, 2017). Today, the species is cultivated for its essential oil for the cosmetic industry. The plant can thrive in various types of soils under high temperatures and average precipitations. Despite being valued for its economic importance, this plant remains poorly known. (Benini, et al,2010).

References:

Cananga odorata. (2017, December 3). In *Wikipedia, The Free Encyclopedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Cananga_odorata&oldid=813328184

Benini, C., Danflous, J. P., Wathelet, J. P., du Jardin, P., & Fauconnier, M. L. 2010. L'ylang-ylang [*Cananga odorata* (Lam.) Hook.f. & Thomson]: Une plante à huile essentielle méconnue dans une filière en danger. *Biotechnology, Agronomy and Society and Environment*, 14(4), 693–705.

Family Apocynaceae

***Alstonia scholaris* (L.) R. Br.**

White Cheesewood or Dita Tree is often exploited because it is the most important source of pulai timber. Aside from that, the plant also provides latex used for chewing gum, and essential oil from its flowers (Orwa, et al, 2009). The plant is classified as least concern (IUCN 2017-3) in the IUCN Red List of Threatened Species. It is found to be widely distributed all throughout Southeast Asia and Australia (World Conservation Monitoring Centre, 1998).

References:

Orwa C, A Mutua, Kindt R, Jamnadass R, S Anthony. 2009 Agroforestry Database:a tree reference and selection guide version 4.0. Retrieved from <http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>

World Conservation Monitoring Centre. 1998. *Alstonia scholaris*. The IUCN Red List of Threatened Species 1998: e.T32295A9688408. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T32295A9688408.en>.

***Voacanga globosa* Blanco**

Bayag-usa is a tree reaching a height of up to 3 meters. This is an endemic plant traditionally used by Aetas of Bataan as remedy for boils and skin inflammation while its fruits were used as antidote for food poisoning (Guzman, et al, 2013). This species thrives in secondary forests and thickets at lower elevation. The plant is also cultivated ornamentally for its flowers (Stuart, 2016).

References:

Guzman, R. M. S., Canoy, R. J. C., Salvador, D. M. C., & Elena, S. 2013. Biphasic inflammatory effects of *Voacanga globosa* ethanolic leaf extract in ICR mice, 7(38), 2879–2884. <https://doi.org/10.5897/JMPR2013.5204>

Stuart, G. U., Jr. 2016. Bayag-usa. Philippine Medicinal Plants. Retrieved from <http://www.stuartxchange.org/BayagUsa.html>

Family Araliaceae

***Polyscias nodosa* (Blume) Seem**

Malapapaya is a soft wood valued for its economic use. It's one of the best sources of wood in manufacturing plywood and veneer. It is also used in reforestation of denuded forest areas (Gapido and Batoon, 2009). This species is widely distributed across Southeast Asia (Encyclopedia of Life, n.d.).

References:

Gapido, F.P. and Batoon, F.D. 2009. Growing malapapaya, *Polyscias nodosa* (Blume) Seeman, and environmentally, economically and friendly source of livelihood. Journal of the International Society for Southeast Asian Agricultural Sciences (ISSAAS) Philippines 0859-3132, v.15, no.1, pp.223. Retrieved from <http://agris.fao.org/agris-search/search.do?recordID=PH2012000417>

Encyclopedia of Life. Undated. Retrieved from <http://eol.org/pages/1152298/details#ecology>

Family Arecaceae

***Arenga pinnata* (Wurb) Merr.**

Arenga pinnata or the arenga palm/sugar palm grows up to 2- meter tall. The species is valued for its sap which is used as a drink and as raw material for sugar production. Its roots also provide medicinal products such as tea decoction used to cure bladder trouble. This plant is native to Southeast Asia and thrives in tropical rainforest and dry forest under 0 -1,400 m altitude. Typically, this plant grows close to human settlements, forest gaps and can tolerate disturbed areas (Orwa, et al, 2009).

Reference:

Orwa C, A Mutua, Kindt R, Jamnadass R, S Anthony. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. Retrieved from <http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>

***Cocos nucifera* L.**

The Coconut is a medium-sized to large palm that can reach a height of 20 to 30 meters. This plant can tolerate a wide range of site conditions, but develops best on deep, well-drained sandy loam and is widely distributed globally. It grows in the coastal areas of the tropics and sub-tropic thriving especially near the seaboard, but can also adapt to distance inland, provided by suitable soil and climatic conditions. This tree grows at altitude of 520-900 m with mean annual temperature of 20-28 degrees and mean annual rainfall of 1,000-1,500 mm (Orwa, et al, 2009).

Reference:

Orwa C, Mutua A , Kindt R , Jamnadass R, Simons A. 2009. Agroforestry Database: a tree reference and selection guide version 4.0. Retrieved from <http://www.worldagroforestry.org/af/treedb/>

Family Asclepiadaceae

***Asclepias curassavica* L.**

Tropical Milkweeds or commonly known as Ari-aritis is a shrub with a milk sap that typically grows up to 1 meter tall. This plant is considered as a weed which is cultivated and widely distributed to tropical countries. This species commonly thrives in hills above 500 meters, in marshy land, along stream banks. (Hyde, et al, 2014).

References:

Hyde, M.A., Wursten, B.T. and Ballings, P. 2014. *Asclepias curassavica* L. Flora of Zimbabwe. Retrieved from http://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=145870

Family Burseraceae

***Canarium asperum* Benth.**

Canarium asperum or commonly known as Pagsahingin is a terrestrial plant widely distributed throughout Brunei Darussalam, Indonesia, Malaysia, Papua New Guinea, Philippines and Solomon Islands. This plant usually occur in various habitats ranging from dry to wet forest, and open forest and savannas. This species is threatened due to its economic value. It is cut for kedondong timber and also utilized as fuelwood. The species is categorized as lower risk/least concern (version 2017-3) by the IUCN Red List of Threatened Species (World Conservation Monitoring Centre, 1998).

Reference:

World Conservation Monitoring Centre. 1998. *Canarium asperum*. The IUCN Red List of Threatened Species 1998: e.T33233A9770031. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33233A9770031.en>

***Canarium luzonicum* (Blume) A Gray**

Canarium luzonicum, a terrestrial plant is one of the best known and single largest source of the world's supply of elemi – a soft and fragrant oleoresin. This Species is endemic to the Philippines that typically occur in primary forests at low and medium altitudes from Northern Luzon (Cagayan) to Mindoro, Ticao and Masbate (Stuart, 2017). IUCN Red List of Threatened Species categorized this plant at vulnerable (World Conservation Monitoring Centre, 1998).

Reference:

Stuart, G. U., Jr. 2017. Sahing (*Canarium luzonicum* (Blume)). Philippine Medicinal Plants. Retrieved from <http://www.stuartxchange.org/Sahing.html>

World Conservation Monitoring Centre 1998. *Canarium luzonicum*. In: IUCN 2014 . IUCN Red List of Threatened Species. Version 2014.1 . <www.iucnredlist.org>. Retrieved from http://www.eol.org/data_objects/34355038

Family Casuarinaceae

***Gymnostoma rumphianum* (Miq.) L.A.S. Johnson**

Gymnostoma rumphianum, commonly known in the Philippines as Agoho Del Monte is a slow-growing tree that reaches a height up to 15 meters tall. The tree is occasionally used by local people as fuelwood and as an ornamental plant. This species is widely distributed in Southeast Asia particularly in Malaysia, Indonesia and Philippines. The plant thrives in terrestrial ecosystem, in humid mountain forests, typically gregarious in primary forest at 100-1,000 meters. It grows more robustly at higher elevations and requires a well-drained, acidic soil. However, this plant can also tolerate moderate drought (Fern, 2018). Under the DAO 2017-11, this species is categorized under Other Threatened Species (Pelser, et al, 2011).

References:

Fern, K. 2018. *Gymnostoma rumphianum*. Useful Tropical Plants Database 2014. Retrieved from <http://tropical.theferns.info/viewtropical.php?id=Gymnostoma+rumphianum>

Pelser, P.B., Barcelona, J.F., Nickrent, D.L. (eds). 2017. Co's Digital flora of the Philippines. www.philippineplants.org. Retrieved from <http://www.philippineplants.org/Families/Casuarinaceae.html>

***Casuarina equisetifolia* L.**

Casuarina equisetifolia (Iron wood) or commonly known as Agoho in the Philippines is a tall evergreen tree. It usually reaches up to 20 meters high with crown appearance resembling conifers. This plant is widely distributed all throughout Australia, and Southeast Asia countries. This species commonly grows to a narrow strip near to sandy seashores, extending inland to lower hills or in open sandy valleys along streams/estuaries. The plant is also salt-tolerant, growing at altitudes as high as 1,000 meters. It thrives in a well-drained sands and sandy loams soils (Orwa, et al, 2009).

Reference:

Orwa C, A Mutua, Kindt R, Jamnadass R, S Anthony. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. Retrieved from <http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>

Family Clusiaceae

***Calophyllum blancoi* Pl. & Tr.**

Calophyllum blancoi which is commonly known in the Philippines as Bitanghol/Bitangol is a tree with height reaching up to 25 meters. The sap from its bark is traditionally used in treating boils and wounds. This species thrives in primary forests under low to medium altitudes. The plant is considered Asia-endemic, with recorded occurrences from Cagayan, Sorsogon, Palawan, Leyte, Panay, and Mindanao in the Philippines as well as in Taiwan, Indonesia and Malaysia (Stuart, 2015).

Reference:

Stuart, G. U., Jr. 2015. Bitangol (*Calophyllum blancoi* Planch & Triana). Philippine Medicinal Plants. Retrieved from <http://www.stuartxchange.org/Bitaog.html>

***Garcinia lateriflora* Blume**

No data on species habitat and ecosystem requirement found

Family Combretaceae

***Terminalia catappa* L.**

Tropical Almond or commonly known as Talisay in the Philippines is a large deciduous tree reaching a height up to 35 meters tall. The plant is widely distributed and planted throughout the tropics that thrives in semi-deciduous forests areas with an elevation range of 1,000 meters. It also grows in sandy seashores, beaches with humid climate. This species is categorized as lower Risk/near threatened (2017-3) by the IUCN Red List (Encyclopedia of Life, n.d.).

Reference:

Encyclopedia of Life. Undated. Retrieved from <http://eol.org/pages/582724/details#habitat>

Family Cyatheaceae

***Cyathea* sp1**

Large tree fern typically grows in warm and moist tropical and subtropical forest. The said species is widely distributed across Southeast Asia.

Reference:

Yuan, W.H., Ya, L.H, Jan, C.C., Chaur, T.C.2016. Habitat Environment data and potential habitat interpolation of *Cyathea lepifera* at the Tajen experimental forest station in Taiwan. Tropical Conservation Science.vol.9, issue 1.pp. 153-166. Retrieved from <https://doi.org/10.1177/194008291600900108>

Family Cyperaceae

***Scleria scrobiculata* Nees & Meyen**

Scleria scrobiculata commonly known as Arat/Sarat in the Philippines is widely distributed in Asia-temperate countries (China, Taiwan), Asia-tropical (Thailand, Vietnam, Philippines, Papua New Guinea), Australia and Pacific Islands. It thrives in a tropical moist forest (Wight, 2010).

Reference:

Wight, R. 2010.*Scleria scrobiculata* Nees & Meyen. eMonocot. Retrieved from <http://e-monocot.org/taxon/urn:kew.org:wcs:taxon:265695>

Family Ebenaceae

***Diospyros blancoi* A DC.**

Mabolo is a Philippine endemic tree that grows a height of up to 18 meters tall. It is valued for its timber that is used locally for carvings. This species thrives in both primary and secondary forest at low and medium elevations (Fern, 2018). This plant is categorized as critically endangered under the DENR AO 2007-01 (DENR,2007).

References:

Fern, K. 2018. *Diospyros blancoi*. Useful Tropical Plants Database 2014. Retrieved from <http://tropical.theferns.info/viewtropical.pp?id=Diospyros+blancoi>

Department of Environment and Natural Resources (DENR). (2007). Administrative Order 2007-1.Establishing the List of Threatened Philippine Plants and their Categories, and the List of other wildlife species. Retrieved from <http://bmb.gov.ph/downloads/DAO/dao-2007-01.pdf>

Family Euphorbiaceae

***Macaranga tanarius* (L.) Muell.-Arg**

Locally known in the Philippines as Binunga, this tree may reach up to 20 meters tall. It is harvested for its range of uses (e.g. fuelwood/firewood, resin). It is widely distributed across Southeast Asia and Australia. This plant is a fast growing pioneer species that is common in secondary forests, especially in logging areas at elevations up to 1,500 meters. It can grow on clayey, loamy and sandy soils in lowland areas. This species is usually grown as a shade or shelter tree in reforestation projects to promote natural regeneration on deforested land (Orwa, et al, 2009).

Reference:

Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. Retrieved from <http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>

***Manihot esculenta* Crantz**

Cassava is a tropical root crop that requires warm weather to produce crops. However, this plant can tolerate extreme rainfall and soil pH of 4.0 to 8.0 (Hurteau, 2009). This plant is distributed and cultivated in tropical and subtropical areas worldwide for its edible starchy roots (Hyde, et al, 2014).

References:

Hurteau, M. Establishment. USDA NRCS National plant Data Center. Retrieved from http://eol.org/data_objects/1387854

Hyde, M.A., Wursten, B.T. and Ballings, P. 2014. *Manihot esculenta* Crantz Flora of Zimbabwe website. Retrieved from http://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=135500

***Macaranga hispida* (Blume) Mull.Arg.**

Macaranga hispida, locally known as Hindang is widely distributed throughout Asia, Africa, Australia and Pacific Islands (Mull, et al, 2015). This tree typically grows up to 10 meters tall. It often grows in lowlands, riparian areas at elevations up to 1,700 meters (Whitmore, 2008).

References:

Mull, B., Saepudin, E., Hanafi, M., Darmawan, A., & Lotulung, P. D. N. 2015. Identification and Bioactivity Studies of Flavonoid Compounds from, 19(3), 96–100. Retrieved from <https://doi.org/10.7454/mss.v19i3.4848>

Whitmore, T.C. 2008. Malesian Euphorbiaceae Descriptions *Macaranga*. Flora Malesiana. Retrieved from <http://www.nationaalherbarium.nl/Euphorbs/specM/Macaranga.htm>

***Jatropha curcas* L.**

Jatropha curcas or locally known in the Philippines as Tuba-tuba is a multipurpose perennial plant that thrives on marginal or poor soils and grows on almost any terrain. This plant is widely distributed in tropical and subtropical regions worldwide and has been used as a traditional medicine in many countries. The oil extracted from its seeds is used as biofuel. The use of its oil as biodiesel is a promising and commercially viable alternative to diesel oil (Debnath and Bisen, 2008).

Reference:

Debnath, M., and Bisen, P.S. 2008. *Jatropha Curcas* L., A Multipurpose stress resistant plant with a potential for Ethnomedicine and Renewable Energy. *Current Phatmaceutical Biotechnology*. Vol.9, issue 4. Retrieved from <https://doi.org/10.2174/138920108785161541>

***Euphoria didyma* Blanco**

Euphoria didyma or locally known as Alapag is a terrestrial tree commercially valued for its edible fruit. This species is endemic to the Philippines, growing in both wet and dry regions (Menzel, 2002).

Reference:

Menzel, C. 2002. *The Lychee Crop in Asia and the Pacific, Botany and Taxonomy*. RAP PUBLICATION: 2002/16. Food and Agriculture Organization (FAO). United Nations, Regional Office for Asia and the Pacific. Retrieved from <http://www.fao.org/docrep/005/ac681e/ac681e04.htm>

***Euphorbia hirta* L.**

Asthma weed or commonly known as Tawa-tawa is an important medicinal herb widely distributed across tropical regions worldwide. This species can thrive on waste places, cultivated fields in lowland areas, and open area at elevations ranging from 1,800 to 2,000 meters (Fern, 2018)

Reference:

Fern, K. 2018. *Euphorbia hirta*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Euphorbia+hirta>

Family Fabaceae

***Intsia bijuga* (Colebr.) Kuntze**

Borneo Teak, locally known in the Philippines as Ipil is a terrestrial plant widely distributed across Southeast Asia, and Pacific Islands. The trees can thrive in lowland rainforests area and are exploited for the economic value of its timber. This plant is categorized as vulnerable by the IUCN Red List 2017-3 (World Conservation monitoring Centre, 1998).

Reference:

World Conservation Monitoring Centre. 1998. *Intsia bijuga*. The IUCN Red List of Threatened Species 1998: e.T32310A9694485. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T32310A9694485.en>.

***Koompassia excelsa* (Becc.) Taub.**

Koompassia excelsa, commonly known as Manggis is a terrestrial tree known to be one of the tallest rainforest trees recorded that is widely distributed in Southeast Asia. This plant thrives in both primary and secondary forests along rivers and valley. This species is categorized as Lower risk/conservation dependent (ver. 2017-3) by the IUCN Red list despite the threat due to the increasing use of its timber as substitute for heavy hardwood timber commonly used in furniture making (Asian Regional Workshop, 1998).

Reference:

Asian Regional Workshop (Conservation & Sustainable Management of Trees, Viet Nam, August 1996). 1998. *Koompassia excelsa*. The IUCN Red List of Threatened Species 1998:

e.T33208A97 65707. Retrieved
<http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33208A9765707.en>.

from

***Afzelia rhomboidea* (Blanco) Vidal**

Commonly known as Tindalo, this terrestrial plant is widely distributed throughout Indonesia, Malaysia and Philippines. It is a slow-growing species that thrives on low hills and ridges and temporarily flooded areas (Asian Regional Workshop, 1998). This plant is considered endangered under DENR AO No. 2007-01 while IUCN Red List (2017-3) categorized this species as vulnerable due to exploitation for timber use (DENR, 2007), (Asian Regional Workshop, 1998).

References:

Department of Environment and Natural Resources (DENR). (2007). Administrative Order 2007-1. Establishing the List of Threatened Philippine Plants and their Categories, and the List of other wildlife species. Retrieved from <http://bmb.gov.ph/downloads/DAO/dao-2007-01.pdf>

Asian Regional Workshop (Conservation & Sustainable Management of Trees, Viet Nam, August 1996). 1998. *Afzelia rhomboidea*. The IUCN Red List of Threatened Species 1998: e.T33192A9759772. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33192A9759772.en>.

Family Verbenaceae

***Vitex parviflora* A.Juss.**

Molave is a terrestrial dominant timber species widely distributed throughout Indonesia, Malaysia and Philippines. It thrives on well-drained limestone soils in monsoon forest. This species is considered as endangered under the DENR AO No. 2007-01 while IUCN Red List (2017-3) categorized this species as vulnerable due to exploitation of its highly prized timber (World Conservation Monitoring Centre, 1998), (DENR, 2007).

References:

Department of Environment and Natural Resources (DENR). (2007). Administrative Order 2007-1. Establishing the List of Threatened Philippine Plants and their Categories, and the List of other wildlife species. Retrieved from <http://bmb.gov.ph/downloads/DAO/dao-2007-01.pdf>

World Conservation Monitoring Centre. 1998. *Vitex parviflora*. The IUCN Red List of Threatened Species 1998: e.T33339A9777894. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33339A9777894.en>

Family Lauraceae

***Neolitsea vidalii* Merr.**

Commonly Known as Puso-puso, this terrestrial plant is endemic to the Philippines. It is considered as vulnerable (IUCN 2017-3) because of declined in its population primarily due to habitat loss through logging and shifting cultivation (World Conservation Monitoring Centre, 1998).

References:

World Conservation Monitoring Centre. 1998. *Neolitsea vidalii*. The IUCN Red List of Threatened Species 1998: e.T33353A9779179. <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33353A9779179.en>

***Litsea philippinensis* Merr.**

Litsea philippinensis, commonly known as Bakan is a tree reaching up to 15 meters tall. The tree is harvested for its wood/timber, which is used locally for carving. This plant is endemic in the Philippines which occurs in thickets and forest hills at low to high altitude (Dayan and Bandian, 2007).

References:

Dayan, M., Reaviles, R. S., & Bandian, D. B. 2007. Indigenous Tree Species in Laguna Province (Compiled). Ecosystem Research and Development Bureau. Department of Environment and Natural Resources (DENR). Retrieved from http://www.rainforestation.ph/resources/pdf/publications/Dayan_et_al_2007_Indigenous_Forest_Tree_Species_in_Laguna_Province.pdf

Family Malvaceae

***Durio graveolens* Becc.**

Durio graveolens or commonly known as Dugyan is a tree that can reach a height of up to 40 meters tall. It is valued and cultivated for its edible fruits. This plant is distributed across Southeast Asia. It thrives to lowland forest, usually on clay-rich soils and on shale ridges at elevations of up to 1,300 meters (Fern, 2018).

Reference:

Fern, K. 2018. *Durio graveolens*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Durio+graveolens>

***Durio testudinarum* Becc.**

Durio testudinarum is a terrestrial plant that can be found within Brunei Darussalam, Indonesia and Malaysia. This plant is limited to the lowland mixed dipterocarp forest (World Conservation Monitoring Centre, 1998). It can also thrive in clay-rich, well-drained soils at elevation up to 700 meters (Fern, 2018). This species is categorized as vulnerable by the IUCN Red List (2017-3).

References:

World Conservation Monitoring Centre. 1998. *Durio testudinarum*. The IUCN Red List of Threatened Species 1998: e.T34570A9876131. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T34570A9876131.en>

Fern, K. 2018. *Durio testudinarum*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Durio+testudinarum>

Family Meliaceae

***Toona calantas* Merr. & Rolfe**

Kalantas or Philippine Cedar is widely distributed throughout Asia specifically in Thailand, Indonesia (Asian Regional Workshop, 1998) and the Philippines especially in the Balabac group of islands (Dayan and Bandian, 2007). This species prefers deep, well-drained soils and is commonly scattered in the forest hills and in primary forests at low and medium altitudes (Dayan and Bandian, 2007). Its population is in threat due to logging and shifting cultivation. It is categorized as data deficient by the IUCN Red List (2017-3).

References:

Asian Regional Workshop (Conservation & Sustainable Management of Trees, Viet Nam, August 1996). 1998. *Toona calantas*. The IUCN Red List of Threatened Species 1998:

e.T32122A9681676. Retrieved from
<http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T32122A9681676.en>.

Dayan, M., Reaviles, R. S., & Bandian, D. B. 2007. Indigenous Tree Species in Laguna Province (Compiled). Ecosystem Research and Development Bureau. Department of Environment and Natural Resources (DENR). Retrieved from
http://www.rainforestation.ph/resources/pdf/publications/Dayan_et_al_2007_Indigenous_Forest_Tree_Species_in_Laguna_Province.pdf

Family Moraceae

***Artocarpus blancoi* (Elmer) Merr.**

Antipolo is an evergreen tree endemic to the Philippines that flourishes in a terrestrial environment. This species thrives in lowland seasonal forest and thicket where the mean annual rainfall is at least 2,000 mm with a distinct dry season. The tree is often harvested locally for food and medicine (Fern, 2018). The plant is categorized as vulnerable by the IUCN Red List of Threatened Species (World Conservation Monitoring Centre, 1998).

References:

Fern, K. 2018. *Artocarpus blancoi*. Useful Tropical Plants Database 2014. Retrieved
<http://tropical.theferns.info/viewtropical.php?id=Artocarpus+blancoi>

World Conservation Monitoring Centre. 1998. *Artocarpus blancoi*. The IUCN Red List of Threatened Species 1998: e.T33195A9760233. Retrieved from
<http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33195A9760233.en>

***Ficus nota* (Blco.) Merr.**

Ficus nota, commonly known as Tibig can grow up to 13 meters tall. The plant is widely distributed throughout Southeast Asia and is locally harvested for food, water and sometimes used as ornamental in gardens. Negritos of Pinatubo used this plant as their source of drinking water. This species flourishes in forests and thickets at low to medium elevation near water bodies.

Reference:

Fern, K. 2018. *Ficus nota*. Useful Tropical Plants Database 2014. Retrieved
<http://tropical.theferns.info/viewtropical.php?id=Ficus+nota>

***Ficus septica* Blume.f**

Fig tree or locally known as Malahawili is widely distributed across Japan, Taiwan, Malaysia, Indonesia, New Guinea, Northern Australia, Solomon Islands and Vanuatu. This tree is commonly harvested for medicinal use. This species flourishes on secondary rainforest and thrive on a various types of soil at elevations up to 1,800 meters. This plant also preferred disturbance, thus it is frequently used as a pioneer species in reforestation efforts (Fern, 2018).

Reference:

Fern, K. 2018. *Ficus septica*. Useful Tropical Plants Database 2014. Retrieved
<http://tropical.theferns.info/viewtropical.php?id=Ficus+septica>

***Ficus baletae* Merr.**

Baletae is a strangling, smooth plant endemic to the Philippines. This plant is traditionally used as medicine to cure wounds, bruises and relief of fatigue. It is widely distributed throughout

Northern Luzon to Mindanao. This species flourishes in primary forests at low and medium altitudes (Stuart, 2017).

Reference:

Stuart, G. U., Jr. 2017. Balete. Philippine Medicinal Plants. Retrieved from <http://www.stuartxchange.org/Balete.html>

***Parartocarpus woodii* Merr.**

Parartocarpus woodii, locally known as Malanangka/Pangi is considered as unutilized terrestrial fruit trees because its economic potential have not yet been fully utilized. Its fruits can be a source of food while its wood/timber can be used as fuel and construction materials. This species is considered as endemic to the Philippines that grows in the wild of in semi-cultivated areas (PCAARRD Regional Consortia, 2018).

Reference:

PCARRD Regional Consortia.2018. Morphology, Ecology, Hoeticultural Attributes and Utilization of Pangi *Parartocarpus woodii* Merr. Retrieved from http://www.pcaarrd.dost.gov.ph/home/regional_consortia

Family Musaceae

***Musa textilis* Née**

Musa textilis, commonly known as Abaca is native to Philippines but is now grown worldwide as a fiber crop. This tropical plant grows in regions below 500 meters in elevation but can tolerate altitudes between sea level and 1,100 meters. It prefers heavy fertile, clay soils (Ecocrop, 2007).

Reference:

Ecocrop.2007. *Musa textilis*. Food and Agricultural Organization (FAO) of the UN. Retrieved from <http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=1506>

Family Myristicaceae

***Myristica simiarum* A.DC.**

Myristica simiarum is a terrestrial tree that can reach a height of up to 5 to 40 meters tall. This plant is Endemic to Asian countries specifically to Philippines, Malaysia and Indonesia. Commonly harvested for wood and medicinal properties. This species commonly flourishes in undisturbed mixed dipterocarp forest. It can also thrive on slopes, hills and low mountains usually on limestone or sandstone at elevations up to 600 meters (Fern, 2018). The IUCN Red List of Threatened species classified this plant as vulnerable (World Conservation Monitoring Centre, 1998).

References:

Fern, K. 2018. *Myristica simiarum*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Myristica+simiarum>

World Conservation Monitoring Centre. 1998. *Myristica simiarum* ssp. *calcareae*. The IUCN Red List of Threatened Species 1998: e.T37324A10044391. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T37324A10044391.en>.

***Ardisia squamulosa* Presl.**

Ardisia squamulosa, locally known as Tagpo is endemic species to the Philippines. It is categorized as Vulnerable (IUCN 2017-3) due to significant decline of its population caused by habitat loss through logging and shifting cultivation (World Conservation monitoring Centre, 1998). This species is thrive in primary forest at low and medium altitudes, at elevation up to 1,000 meters throughout the Philippines (Stuart, 2017).

Reference:

World Conservation Monitoring Centre. 1998. *Ardisia squamulosa*. The IUCN Red List of Threatened Species 1998: e.T33355A9779320. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33355A9779320.en>.

Stuart, G. U., Jr. 2017. Tagpo. Philippine Medicinal Plants. Retrieved from <http://www.stuartxchange.com/Tagpo>

Family Myrtaceae

***Syzygium hutchinsonii* (C. B. Rob.) Merr.**

Syzygium hutchinsonii, locally known as malatambis is a plant endemic to the Philippines. It grows on lowland forest (Pesler, et al, 2017).

Reference:

Pelser, P.B., Barcelona, J.F., Nickrent, D.L. (eds). 2017. Co's Digital flora of the Philippines. www.philippineplants.org. Retrieved from <http://www.philippineplants.org/Families/Myrtaceae>.html

***Xanthostemon speciosus* Merr.**

Xanthostemon speciosus locally known as Palawan mangkono is endemic to Palawan group of Island, specifically to Busuanga, Culion and Manamoc (Hassler, 2018). This plant is valued for its hard timber. It thrives on dry, open, grassy valleys (Fern, 2018). Under the DENR DAO No. 2007-1 and IUCN Red List, this species is classified as endangered (Amora, 2004).

References:

Hassler, M. 2018. Worlds Plants: Synonymic checklist of the vascular plants of the world (version Dec.2017). In: Roskov Y., Abucay L., Orrel T., Nicolson D., Baily N., Kirk P.M., Bourgoin T., DeWalt R.E., Decock W., De Wever A., Nieukerken E. van, Zarucchi J., Penev L., 30th January 2018. Catalogue of Life.Org.Species 2000: Naturalis, Leiden, the Netherlands. Retrieved from <http://www.catalogueoflife.org/col/details/species/id/87d2230911e62eb3ca2f10b1670b419d>

Fern, K. 2018. *Xanthostemon speciosus*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Xanthostemon+speciosus>

Amora, P. R. M. Z. 2004. Threatened plants of the Philippines : a preliminary assessment.

Family Nepenthaceae

Nepenthes sp1

Picher plant is carnivorous plant that is widely distributed throughout Asia and Australia. It can grows with or without soils (as an epiphytes). Majority of its species are tropical mountain plants. This plant is often classified as either lowland or highland species, depending on their altitude above sea level. Species of pitcher plant that thrives on lowland requires warm

climates during the day and night while highland species requires warm days and cooler nights to grow. Some species favors dense forests while some thrives in disturbed areas. Pitcher plants grows in acidic, nutrient-deficient soils (*Nepenthes*, 2018).

Reference:

Nepenthes. 2018. In *Wikipedia, The Free Encyclopedia*. Retrieved from <https://en.wikipedia.org/w/index.php?title=Nepenthes&oldid=822020099>

Family Phyllantaceae

***Bischofia javanica* Blume**

Java Cedar or locally known as Tuai is widely distributed throughout Asia, Australia and south Pacific. This species is commonly found in primary and secondary forest, swamp and teak forest at elevations of up to 1,800 meters. It also favors areas with distinct dry season. It can also thrive on riverbanks, limestone areas, and favors deep loose soils with sufficient water such as sandy or loamy soils (Orwa, 2009).

Reference:

Orwa C, Mutua A, Kindt R, Jamnadass R, Simons A. 2009. Agroforestry Database: a tree reference and selection guide version 4.0. Retrieved from <http://www.worldagroforestry.org/af/treedb/>

Family Pittosporaceae

***Pittosporum pentandrum* (Blanco) Merr.**

Pittosporum pentandrum, locally known as Mamalis is commonly harvested as for its essential oil, medicinal value and as fuelwood. This plant is widely and commonly distributed throughout Asia particularly in Southern China, Vietnam, Indonesia and Philippines. It is commonly found on the thickets and secondary growth forest at elevations up to 1,400 meters and can also thrive along slopes and seashores at elevations up to 300 meters (Fern, 2018).

Reference:

Fern, K. 2018. *Pittosporum pentandrum*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Pittosporum+pentandrum>

Family Poaceae

Bambusa sp

Bamboo is a perennial grass common in tropical and temperate Asia, Australia and America. It grows in humid tropical climates, along riparian areas and in mixed moist habitats up to 1,000 meters elevation. This species grows best on fertile soils but is tolerant on dry, poor soils found in deciduous hill forests. Bamboos are consumed by humans as food and often planted for erosion control or dune stabilization (CABI, 2018).

Reference:

CABI, 2018. Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.

Family Rhizophoraceae

***Carallia brachiata* (Lour.) Merr.**

Carallia brachiata, locally known as Bakawang-gubat is widely distributed throughout Africa, Asia, Australia and Solomon Islands. This tree is valued for its timber and sometimes used as ornamental plant. This species is common on lowland wet evergreen forest at elevations up to 1,500 meters. Plant species growing in China have been found to thrive in heavily polluted environment, thus making this plant suitable for reforestation use on heavily degraded and polluted lands (Fern, 2018).

Reference:

Fern, K. 2018. *Carallia brachiata*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Carallia+brachiata>

Family Sapindaceae

***Nephelium lappaceum* Linnaeus**

Rambutan is a terrestrial plant that is widely distributed throughout Asia. Primarily cultivated and valued for its fruits and timber that is used for construction. It can grow up to 20 meters in height. It thrives in tropical primary and secondary forests and can tolerate prolonged dry season. This species favors rich, well drained sandy loams or clay soils. This plant is assessed as least concern (IUCN 2017-3), however, it is anticipated that this species is threatened by habitat loss due to deforestation caused by rapid urban and agricultural expansion (Barstow, 2017).

Reference:

Barstow, M. 2017. *Nephelium lappaceum*. The IUCN Red List of Threatened Species 2017: e.T33266A67808476. Retrieved from <http://www.iucnredlist.org/details/33266/0>

***Cubilia cubili* (Blanco) Merr.**

Cubili is an endemic terrestrial plant in Asia that can be found particularly in Indonesia, Malaysia and Philippines. The seeds and leaves of this plant are harvested and consumed locally and is sometimes cultivated as a food crop (Fern, 2018). It thrives in lowland primary and secondary forest. It is globally assessed as least concern by the IUCN Red List of Threatened Species (World Conservation Monitoring Centre, 1998).

References:

Fern, K. 2018. *Cubilia cubili*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Cubilia+cubili>

World Conservation Monitoring Centre. 1998. *Cubilia cubili*. The IUCN Red List of Threatened Species 1998: e.T33350A9779016. Retrieved from <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33350A9779016.en>.

***Guioa acuminata* Radlk.**

Guioa acuminata, locally known as Pasi is endemic to the Philippines. It is particularly found in Luzon and Polillo Island. This terrestrial plant thrives in secondary forest. It is globally assessed as endangered by the IUCN Red List of Threatened Species (van Welzen, 1998).

Reference:

van Welzen, P.C. 1998. *Guioa acuminata*. The IUCN Red List of Threatened Species 1998: e.T37350A10046012. <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T37350A10046012.en>.

Nephelium sp

No data on species habitat and ecosystem requirement found

Family Sapotaceae

***Palaquium luzoniense* (Fern.-Vill.) Vidal**

Red Nato is a terrestrial tree endemic to the Philippines. It is primarily harvested from the wild for its wood for local use and trade. This primary forest tree thrives at lowland primary forest at elevations below 200 meters (Fern, 2018), (World Conservation Monitoring Centre, 1998). It is assessed as Vulnerable by IUCN Red List of Threatened Species and DENR (World Conservation Monitoring Center, 1998), (DENR, 2007).

References:

Fern, K. 2018. *Palaquium luzoniense*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Palaquium+luzoniense>

World Conservation Monitoring Centre. 1998. *Palaquium luzoniense*. The IUCN Red List of Threatened Species 1998: e.T33267A9772003. Retrieved from http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33267A977_2003.en

Department of Environment and Natural Resources (DENR). (2007). Administrative Order 2007-1. Establishing the List of Threatened Philippine Plants and their Categories, and the List of other wildlife species. Retrieved from <http://bmb.gov.ph/downloads/DAO/dao-2007-01.pdf>

***Pouteria villamilli* (Merr.) Baehni**

Villamil Nato or locally known as Dolitan is a terrestrial tree that reach a height of up to 30 meters tall. It is endemic in the Philippines that is widely distributed throughout Cagayan, Bataan, Laguna and Siargao. This particular species thrives in primary forests at medium altitude. This plant is assessed as vulnerable under the DENR AO 2007-01 and IUCN Red List of Threatened Species 2012 (BINHI, 2012).

References:

BINHI.2012.Tree for the Future Database. Energy Development Corporation. Retrieved from http://binhi.ph/database/future/tree_facts/result/Pouteria+villamilli#tree-facts-tabs=2

Family Simaroubaceae

***Ailanthus triphysa* (Dennst.) Alston**

White Palle or locally known as Tala-tala/Malakamias is widely distributed throughout Asia particularly in India, Myanmar and Nepal. This plant is primarily harvested in the wild for its timber which is locally used for making boats and matches. It thrives in wet evergreen forest at elevations up to 1,500 meters. This species prefers a well-drained light/sandy soils (Orwa, et al, 2009).

Reference:

Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. Retrieved from <http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>

***Eurycoma longifolia* Jack**

Tongkat-ali can grow up to 10 meters tall, popular for its antibacterial and aphrodisiac properties. This plant is widely distributed throughout Southeast Asia. This plant grows at low elevations in beach forests, understory in primary and secondary forests, mixed dipterocarp rainforest. It prefers sandy soils (Fern, 2018).

Reference:

Fern, K. 2018. *Eurycoma longifolia*. Useful Tropical Plants Database 2014. Retrieved <http://tropical.theferns.info/viewtropical.php?id=Eurycoma+longifolia>

Family Urticaceae

***Leucosyke capitellata* (Poir.) Wedd.**

Tooth Scrubber or commonly known as Alagasi is a plant that reach a height of 4 meters tall. It is widely distributed throughout Asia (Hassler, 2018), (Stuart, 2016). This species thrives in the thickets and secondary forests at low and medium altitudes (Stuart, 2016).

References:

Hassler, M. 2018. Worlds Plants: Synonymic checklist of the vascular plants of the world (version Dec.2017). In: Roskov Y., Abucay L., Orrel T., Nicolson D., Baily N., Kirk P.M., Bourgoin T., DeWalt R.E., Decock W., De Wever A., Nieukerken E. van, Zarucchi J., Penev L., 30th January 2018. Catalogue of Life.Org. Species 2000: Naturalis, Leiden, the Netherlands. Retrieved from <http://www.catalogueoflife.org/col/details/species/id/87d2230911e62eb3ca2f10b1670b419d>

Stuart, G. U., Jr. 2016. Alagasi. Philippine Medicinal Plants. Retrieved from <http://www.stuartxchange.com/Alagasi.html>

AMPHIBIANS

Family Rhacophoridae

***Philautus longicrus* (Boulenger, 1894)**

Philautus longicrus is recorded in Borneo and in Palawan islands, Philippines. It inhabits submontane and montane forests, where it usually seen in the low shrub layer, and has not been found outside the forests. This is listed as Near Threatened since as it depends in undisturbed forest habitat, it is threatened by deforestation and habitat conversion.

References:

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- IUCN. 2004. 2004 IUCN Red List of Threatened Species. Available at: www.iucnredlist.org. (Accessed: 23 November 2004).

***Philautus everetti*, (Boulenger, 1894)**

Everett's Flying Frog occurs in Borneo and in Palawan islands, Philippines only. It dwells in arboreal microhabitats, usually beside water, in lower montane and lowland forests. It usually seen perched on moss-covered logs. The species is threatened by habitat loss due to deforestation. It is listed as Near Threatened.

References:

- Alcala, A.C. and Brown, W.C. 1985. *Philippine Amphibians: An Illustrated Field Guide*. Bookmark Press, Makati City, Philippines.
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- Inger, R.F. and Stuebing, R.B. 1997. *A Field Guide to the Frogs of Borneo*. Borneo Natural History Publishers, Kota Kinabalu, Malaysia.
- IUCN. 2004. 2004 IUCN Red List of Threatened Species. Available at: www.iucnredlist.org. (Accessed: 23 November 2004).

Family Megophryidae

Megophrys ligayae (Taylor, 1920)

Palawan Horned Frog is listed as Endangered and is a Palawan endemic, recorded only in Balabac and Palawan islands, Philippines. It inhabits the forest floor litter of montane and lowland rainforests and appears to be dependent on mountain streams where it breeds. Its major threat is habitat loss due to shifting agriculture and pollution. The species is also identified as key conservation species of Palawan.

References:

- Alcala, A.C. and Brown, W.C. 1985. *Philippine Amphibians: An Illustrated Field Guide*. Bookmark Press, Makati City, Philippines.
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- Taylor, E.H. 1920. Philippine Amphibia. *Philippine Journal of Science*: 213-359.

Family Megophryidae

Leptobrachium tagbanorum

Leptobrachium tagbanorum is a Palawan endemic and observed in areas with presence of some forest covers and appears to be common in swampy areas adjacent to rivers or along secondary stream banks when water levels are low and ambient noise is minimal.

References:

- Brown, R. M., Siler, C. D., Diesmos, A. C., & Alcala, A. C. (2009). Philippine Frogs of the Genus *Leptobrachium* (Anura; Megophryidae): Phylogeny-based Species Delimitation, Taxonomic Review, and Descriptions of Three New Species. *Herpetological Monographs*, 23(1), 1-44. doi:10.1655/09-037.1

Family Dicroglossidae

Occidozyga laevis (Günther, 1858)

Common Puddle Frog is known to occur in Thailand, Malaysia, Singapore, Borneo, and Philippines, and inhabits shallow muddy puddles and pools near small forest streams and is found occasionally in gentle stream sections. In the Philippines, it is also found in lowlands and occasionally in undisturbed lower montane and lower forests.

References:

IUCN SSC Amphibian Specialist Group. 2014. *Occidozyga laevis*. The IUCN Red List of Threatened Species 2014: e.T58410A62673576. <http://dx.doi.org/10.2305/IUCN.UK.2014-3.RLTS.T58410A62673576.en>. Downloaded on 06 February 2018.

***Limnonectes acanthi* (Taylor, 1923)**

Busuanga Wart Frog is endemic to the Philippines with records from the Palawan group of Islands and Mindoro, but it probably occurs more widely than current records suggest. As it inhabits streams, rivers, and pools in lower montane and lowland forests, the main threat of this species is habitat loss. *Limnonectes acanthi* is indicated as Vulnerable due to its distribution is severely fragmented, and continuing decline in the extent and quality of its forest habitat. It has also been identified as key conservation species of Palawan.

References:

Alcala, A.C. and Brown, W.C. 1985. *Philippine Amphibians: An Illustrated Field Guide*. Bookmark Press, Makati City, Philippines.

Brown, W.C. and Alcala, A.C. 1955. Observations on amphibians of the Mount Halcon and Mount Canlaon areas, Philippine Islands. *Silliman Journal*: 93-105.

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IUCN. 2004. 2004 IUCN Red List of Threatened Species. Available at: www.iucnredlist.org. (Accessed: 23 November 2004).

***Limnonectes palavanensis* (Boulenger, 1894)**

Limnonectes palavanensis occurs in Borneo and Philippines. Smooth Guardian Frog dwells in undisturbed and disturbed streams and rivers in lower montane and lowland forests. It wanders through the forests and is confined to the floor stratum. Its habitat is mostly well protected, although it can be potentially be impacted with habitat loss.

References:

Alcala, A.C. and Brown, W.C. 1985. *Philippine Amphibians: An Illustrated Field Guide*. Bookmark Press, Makati City, Philippines.

Dubois, A. 1992. Notes sur la classification des Ranidae (Amphibiens Anoures). *Bulletin Mensuel de la Societe Linneenne de Lyon* 61(10): 305-352.

Emerson, S.E., Inger, R.F. and Iskandar, D. 2000. Molecular systematics and biogeography of the fanged frogs of southeast Asia. *Molecular Phylogenetics and Evolution*: 131-142.

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IUCN. 2004. 2004 IUCN Red List of Threatened Species. Available at: www.iucnredlist.org. (Accessed: 23 November 2004).

Family Ranidae

***Sanguirana sanguinea* (Boettger, 1893)**

Calamianes Frog is known to occur in Palawan, Philippines. A population from Sulawesi, Indonesia has also been attributed to this species. This species utilizes lowland and lower montane rainforests and also in secondary growth vegetation and anthropogenic habitats.

References:

Alcala, A.C. and Brown, W.C. 1985. *Philippine Amphibians: An Illustrated Field Guide*. Bookmark Press, Makati City, Philippines.
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IUCN. 2004. 2004 IUCN Red List of Threatened Species. Available at: www.iucnredlist.org. (Accessed: 23 November 2004).

Family Bufonidae

***Ingerophrynus philippinicus* (Boulenger, 1887)**

The Philippine Toad is endemic in the Philippines and occurs on Palawan islands. This adaptable species be found occasionally in pristine lowland and montane rainforests and thrives mainly in degraded habitats and man-made environments.

References:

Alcala, A.C. and Brown, W.C. 1985. *Philippine Amphibians: An Illustrated Field Guide*. Bookmark Press, Makati City, Philippines.
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Family Ceratobatrachidae

***Alcalus mariae* (Inger, 1954)**

Mary's Frog is endemic to the Philippines and currently recorded in Palawan island. It inhabits on the forest floor leaf-litter in lower montane forest. Its habitat is threatened by deforestation and habitat conversion to agriculture.

References:

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- IUCN. 2004. 2004 IUCN Red List of Threatened Species. Available at: www.iucnredlist.org. (Accessed: 23 November 2004).

NON-VOLANT MAMMALS

Family Muridae

***Mus musculus* (Linnaeus, 1758)**

The widespread and abundant species of House Mice is found in a very wide range of environment but may be uncommon in some extreme areas like high-altitude places (Macholán, 1999). This species is commonly regarded as pest due to its high rate of success to colonize artificial environments. It is prevalent over all continents, except Antarctica. In fact, the current list of countries where it occurs is yet to be completed. It ranges widely to man-made habitats such as houses, farm buildings, other types of building, and even coal mines and frozen meat stores (IUCN, 2017). Its close association with humans is a prime indication why the species has been widely introduced across the world (Musser and Carleton, 2005), although it tends not to be found in locations like forests and deserts (Macholán, 1999). There are no known conservation measures currently in place for this species because of the absence of major threats to its population. Therefore, the species is evaluated as Least Concern in 2016 (IUCN 2017-3).

References:

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< <http://www.iucnredlist.org/details/full/13972/0#habitat>>. Accessed on 09 February 2018.

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Musser, G.G. and Carleton, M.D. 2005. Superfamily Muroidea. In: D.E. Wilson and D.A. Reeder (eds), *Mammal Species of the World: a geographic and taxonomic reference*, pp. 894-1531. The John Hopkins University Press, Baltimore, USA.

***Maxomys panglima* (Robinson, 1921)**

The widely distributed Palawan Maxomys or Palawan Spiny Rat is species endemic to the Philippines, particularly in Balabac, Palawan, Busuanga, Calauit, and Culion islands from sea level to 1,550 m (Esselstyn *et al.* 2004, Heaney *et al.* 1998). It normally inhabits forested lowland and lower montane areas, i.e., including primary and secondary environments, agricultural areas, and tree plantations as well (Esselstyn *et al.* 2004; Barbehenn *et al.* 1972, 1973). Presumably, it has large population which then qualifies it to be listed as Least Concern (IUCN 2017-3) since 2008 in understanding of its wide distribution. There are no known conservation measures currently in place for this species due to absence of major threats.

References:

Barbehenn, K.R., Sumangil, J.P. and Libay, J.L. 1972-1973. Rodents of the Philippine croplands. *Philippine Agriculture* 56: 217-242.

Esselstyn, J.A., Widmann, P. and Heaney, L.R. 2004. The mammals of Palawan Island, Philippines. *Proceedings of the Biological Society of Washington* 117(3): 271-302.

Heaney, L.R., Balete, D.S., Dollar, M.L., Alcalá, A.C., Dans, A.T.L., Gonzales, P.C., Ingle, N.R., Lepiten, M.V.,

Oliver, W.L.R., Ong, P.S., Rickart, E.A., Tabaranza Jr., B.R. and Uzzurum, R.C.B. 1998. A synopsis of the mammalian fauna of the Philippine Islands. *Fieldiana: Zoology (New Series)* 88: 1–61.

IUCN 2017. *The IUCN Red List of Threatened Species. Version 2017-3*. <<http://www.iucnredlist.org/details/full/12903/0>>. Accessed on 09 February 2018.

Family Sciuridae

***Hylopetes nigripes* (Thomas, 1893)**

The Palawan Tree Flying Squirrel is a nocturnal and arboreal species that normally nests in cavities of large trees. They are found both in primary and secondary lowland forest (Taylor 1934; Esselstyn *et al.* 2004). The species is endemic to the Philippines, and can only be found in Palawan and Bancalan islands (Heaney *et al.* 1998; Esselstyn *et al.* 2004). Although Heaney *et al.* (1998) described this species as widespread and moderately common in mature forest, the reliance of this species on tree cavities primarily for shelter makes deforestation a potentially very serious threat to its population. Occasionally, this squirrel is also hunted for food and as caged pet for trade. Little is known about the abundance, ecology, and tolerance to disturbance of this species. Hence, it is listed as Near Threatened since 1996 (IUCN 2017-3) mainly because of declining habitat concerns. Halt or reduction of illegal logging and clearing for agriculture are some posited efforts to improve forest conservation and protection measures for this species.

References:

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Family Suidae

***Sus ahoenobarbus* (Huet, 1888)**

The Palawan Bearded Pig is extensively associated to grassland areas that is reflected in its local name 'baboy damo', which means grass pig. This species is endemic to the Philippines, with records showing occurrence from all major types of forest in Palawan. It inhabits evergreen and semi-evergreen montane, hill and lowland, ultramafic, limestone and mangrove forests. Esselstyn *et al.* (2004) has recorded the species from contiguous and fragmented forests, as well as cultivated areas. Thus, the species remains to be relatively widely, if patchily, distributed. The species may still appear as locally common in some areas, but it is declining due to slow destruction of habitat and substantial hunting pressure (locally hunted for food) in many areas of its range (Esselstyn *et al.* 2004). Most recently, the species has

been evaluated as Near Threatened (IUCN 2017-3) and is legally protected by Philippine wildlife protection legislation.

References:

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Family Manidae

***Manis culionensis* (de Elera, 1915)**

Little is known about the population of Philippine Pangolin because of its increasing rarity and elusive, solitary, and nocturnal habits accompanied by a lack of research on population densities or abundance (Esselstyn *et al.* 2004). The species is endemic to the Philippines, where it is found in lowland primary and secondary forests, grassland or secondary growth mosaics, mixed mosaics of agricultural lands and scrubland adjacent to secondary forests (Esselstyn *et al.* 2004). There are suspicions that it is more common in northern and central Palawan and relatively rare in the south (Schoppe and Cruz 2009). However, its population is said to be declining due to hunting activities-both for subsistence use and trade, aggravated by habitat loss (Lagrada, 2012). Due to this suspected population decline, this species is listed as Endangered (IUCN 2017-3) since 2014. Nevertheless, further research is needed to determine its populations and the measure and types of threats it faces.

References:

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Family Viverridae

***Paradoxurus hermaphroditus* (Pallas, 1777)**

The Common Palm Civet or Mentawai Palm Civet is considered to be one of the most commonly documented species of small carnivore across its range. Evergreen and deciduous

forest (both primary and secondary), seasonally flooded peat swamp forest, mangroves, monoculture plantations (such as oil palm and teak), village and urban environments are included in the wide range of habitats it uses (Duckworth 1997). This species can tolerate environments near people despite being well adapted to forest living (Spaan *et al.* 2014). Its global population is likely to be declining due to hunting pressure as food and pet, particularly in northern South-east Asia, but this is believed to be a very shallow decline. In Indonesia, it is being kept captive for the production of civet coffee (Nijman *et al.* 2014). Considering its wide distribution, large populations and tolerance to broad range of habitats, this species is listed as Least Concern (IUCN 2017-3) since 1996.

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Family Mephitidae

***Mydaus marchei* (Huet, 1887)**

The Palawan Stink Badger is endemic to the Philippines where it is found in Palawan Island, Busuanga and Calauit, but is found neither on the smaller outlying coral islands such as Rasa and Malinau, nor on the larger land-bridge island of Dumaran (Widmann and Widmann 2004). There are records to show that this species occurs up to at least 300 m asl, but its occurrence at higher level altitudes has not been evaluated (Widmann and Widmann 2004). This species is being hunted by the ethnic group Pala'wan for domestic consumption by removing the anal glands, although there is a very limited pet trade, catering to mostly private collections within the Philippines. Aside from this, little is known about its use, likely given the pungent stench. While it might be in shallow decline, it is believed to be not substantial. The species also reflects high tolerance to deforestation and human disturbance. Therefore, it is listed as Least Concern (IUCN 2017-3) since 2008.

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Family Cercopithecidae

***Macaca fascicularis* (Raffles, 1821)**

The Nicobar Crab-eating Macaque is native to the Philippines among other Asian nations. The species is described to occur in habitats ranging from mangrove to swamp forests, even in agricultural areas near secondary growth forest secondary forest, and primary forest (Danielsen *et al.* 1994). The species is said to be extremely tolerant of these range ((Danielsen *et al.* 1994). Due to its wide distribution, presumed large population, ability to tolerate broad range of habitats and occurrence in some of protected areas, it is unlikely to be declining rapidly to approach a threatened state. Some concerns like hunting pressure for meat, sport and trophies are essentially not considered as major threats to the species overall. For these reasons, this species is listed as Least Concern since 2008 (IUCN 2017-3).

References:

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Family Tupaiidae

***Tupaia palawanensis* (Thomas, 1894)**

The Palawan Tree Shrew occurs in primary and secondary lowland forest; also, it has been found in agricultural areas and in cashew and coconut plantations, brushy areas, and logged-over areas according to Esselstyn *et al.* (2004). Being endemic to the Philippines, the species is reported to be widespread on Palawan Island (Esselstyn *et al.* 2004) but ay also be observed in some islands with low elevations such as islands of Busuanga and Culion (part of Calamian Islands), Balabac, and Cuyo (Sargis *et al.* 2014). There are no reported major threats that faces this species. However, its habitat range outside of considered protected areas is in decline due to deforestation and habitat conversion into agroforestry (Dimalibot 2010). As of now, the species is listed as Least Concern (IUCN 2017-3) due to its ability to tolerate broad range of habitats and insufficient evidence that shows rapid population decline.

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VOLANT MAMMALS

Family Pteropodidae

***Cynopterus brachyotis* (Müller, 1838)**

The Lesser Dog-faced Fruit Bat is described to be a wide ranging from South Asia, through parts of southern China to parts of Southeast Asia. The species is believed to be more restricted to higher elevations, which makes it precisely a hill forest species in South Asia. Its habitats mainly include orchards, gardens to forested tracts. They are reported to roost in palms, either solitary or in small groups among few individuals in rural and urban landscapes and in forested areas. According to Bates and Harrison (1997), the species bears single young after a gestation period of 105-120 days. The species is not commonly recorded, but believed to be widespread and tolerant of broad range habitats, presuming a large population without any substantial population decline. Generally, there are no major threats that face this species. For these reasons, it is listed as Least Concern (IUCN 2017-3) since 1996.

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***Macroglossus minimus* (É. Geoffroy Saint-Hilaire, 1810)**

The Dagger-toothed Long-nosed Fruit Bat or Lesser Long-tongued Fruit Bat is a widespread species that occurs in both primary and secondary tropical moist forest, it has also been reported from paperbark woodlands, mangroves, swamp forest, plantations, rural gardens and urban areas. In the Philippines, Heaney *et al.* (1998) stated that the species prefers disturbed habitats from sea level up to at least 2,250 m asl, henceforth observed to be rare in old growth forest. It is described to roost as single animals, or in small groups, under large leaves, beneath the branches and loose bark, in bamboo or in abandoned buildings. The species abundance in disturbed areas show its tolerance to broad range of habitats. As the population is presumed to be large and without known significant threats, it is evaluated as Least Concern (IUCN 2017-3) since 1996.

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***Eonycteris spelaea* (Dobson, 1871)**

The Common Dawn Bat is a cave roosting bat forming compact clusters and cohabits with other bats. It is reported to roost in large groups that consist thousands of individuals in caves in forested areas, although more often observed in disturbed and agricultural areas. In the Philippines, it is often found in colonies of thousands in caves and in agricultural areas. In fact, there are two recorded populations of this species on Palawan Island. The species mainly feeds on nectar and has adapted to the flowers of many important agricultural orchard crops as reported by Smith and Xie (2008). Since it occurs in various protected areas, has a degree of tolerance towards habitat modification, and absence of major threat to its population, the species is evaluated as Least Concern (IUCN 2017-3) since 1996.

References:

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***Rousettus amplexicaudatus* (É. Geoffroy Saint-Hilaire, 1810)**

The Geoffroy's Rousette or Common Rousette is a locally abundant species in Southeast Asia and the Philippines (Utzurum 1992). This species is colonial, forming cave roosts of several thousand animals. According to Heideman and Heaney (1989), it is found in wide variety of habitats such as secondary forest, agricultural areas, and other disturbed habitats like rural gardens, fruit orchards and at the forest edge. In primary tropical moist forest, the species is observed to be present, but less common, travelling long distances at night in search for suitable fruit to feed. Although regarded as a pest in some parts of its range, there are no major threats to this species. With presumed large population and wide distribution, the species is listed as Least Concern (IUCN 2017-3) since 1996.

References:

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Family Rhinolophidae

***Rhinolophus virgo* (Andersen, 1905)**

The Yellow-faced Horseshoe Bat is endemic to the Philippines, where it occurs widely. Esselstyn *et al.* (2004) stated that it was widespread and found moderately common on Palawan Island. There are records showing this species from primary lowland forest up to the lower limits of montane forest. There are some reports as well that it occurs in caves and from tree buttress (Taylor, 1934) and in heavily disturbed agricultural areas if there is second-growth vegetation adjacent to the caves where it roosts. This species is believed to be adaptable and may probably not seriously impacted by deforestation. Since the species is presumed to have large population, it is evaluated as Least Concern (IUCN 2017-3) in 2008.

References:

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***Rhinolophus acuminatus* (Peters, 1871)**

Little is known about the Acuminate Horseshoe Bat, however, there are record to show that this species is widespread and locally common, with tolerant of urban areas. With its ecology and habitat being unknown, there is only a known area where it roosts in the Philippines, i.e. in caves, being found from 60-250 m asl (Esselstyn *et al.* 2004). According to Heaney *et al.* (1998), this species occurs from Thailand east to Lombok (Indonesia), Borneo (Sabah, Malaysia) and the Philippines, where it is known only due to records from Balabac, Busuanga and Palawan. Likewise, the population trend status for this species is still not identified; although apparently it occurs in small colonies and forages in primary and secondary forest, as well as bamboo thickets (Esselstyn *et al.* 2004). Although disturbance of caves is a localized threat, there are no major threats to this species. Thus, qualifying it as Least Concern (IUCN 2017-3) since 1996.

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Family Megadermatidae

***Megaderma spasma* (Linnaeus, 1758)**

The Lesser False Vampire or Common Asian Ghost Bat is a common species in South and Southeast Asia. In the Philippines, it is described to be prevalent throughout the country, and locally common to uncommon in both primary and secondary forest (Heaney *et al.* 1998) and often encountered in small groups, though sometimes cumulative numbers are in the hundreds. Its was reported to feed on insects but not on vertebrates. The species is normally found in humid areas and dense tropical moist forest, roosts in small colonies in caves, old and disused buildings, temples etc. (Molur *et al.* 2002). On Palawan, Esselstyn *et al.* (2004) stated that “the species occurs in bamboo thickets, secondary forest, and primary forest”. As it is believed to be widely distributed without any threats that may indicate rapid decline in population, and its ability to tolerate secondary forest, the species is evaluated as Least Concern (IUCN 2017-3) since 1996.

References:

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Family Hipposideridae

***Hipposideros diadema* (Geoffroy, 1813)**

The Diadem Lead-nosed Bat is a wide-spread colonial species recorded to roost in small to large colonies, hanging singly from high chambers in cave roofs; a low flier bat species that feeds on beetles, normally seen in gallery forests, over water pools and also found in disturbed forests (Aul and Vijaykumar 2003). Heaney *et al.* (1998) stated that this species occurs in primary forest and disturbed lowland forest areas, including riparian areas in Southeast Asia, and roosts in hollow trees, caves and man-made tunnels. In the Philippines, specimens have been recorded across the country from Luzon, Visayas and Mindanao areas. There appear to be no major threats overall to this widespread species, while it is present in a number of protected areas in Southeast Asia. Moreover, it has some tolerance when it comes to some degree of habitat modification. This species is listed as Least Concern (IUCN 2017-3) since 1996.

References:

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Family Miniopteridae

***Miniopterus austral* (Tommes, 1858)**

The Little Long-fingered Bat or Little Bent-winged Bat is described to be a generally a common species. It is native to the Philippines, with recorded occurrence throughout the country except the Babuyan/Batanes group of Islands. Heaney *et al.* (1998) said that the species is common in appropriate habitat with caves in the Philippines, often dependent on caves where it feeds over the canopy in both secondary and primary lowland areas, including agricultural areas. In addition, the species may migrate seasonally. Currently, there are no major threats to this species. Although the disturbance of maternity caves due to limestone quarrying and mining are considered to be local threats, destroying roosting habitat, the species reoccupy the caves once the disturbance ceases. Considering its tolerance of a broad range of habitats (including agricultural and disturbed areas), and its presumed large population in the absence of major threats, it is listed as Least Concern (IUCN 2017-3) since 1996.

References:

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Family Vespertilionidae

***Murina cyclotis* (Dobson, 1872)**

The Round-eared Tube-nosed Bat is a forest dweller species that roosts among leaves of cardamom plantations in forested tracts and in caves, roosting in small colonies of two to five individuals, although its population size and trends for this species are not known (Molur *et al.* 2002). According to Heaney *et al.* (1991), this species is found in primary lowland forest, lightly disturbed lowland and lower montane forest in the Philippines, though there has been records as well from secondary forest in another place. Little is known about the threats to this species. However, it is unlikely to be threatened substantially. It has been recorded from some

modified habitats and so appears to be adaptable somehow in parts of its range. With a presumed large population and tolerance of a degree of habitat modification, the species is listed as Least Concern (IUCN 2017-3) since 1996.

References:

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BIRDS

Family Caprimulgidae

***Caprimulgus macrurus* (Horsfield, 1821)**

Fairly common in open country and early second growth forest, the Large-tailed Nightjar roosts in shaded area on the ground and forages at night from ground or exposed perches, often in and along roads (Kennedy et al., 2000, plate 36). As reported, the species appears to be common to locally abundant throughout much of its range (del Hoyo *et al.* 1999, Cleere 2010). In 2014, the species was ever since classified as Least Concern since the population trend is suspected to be stable due to absence of indication for any declines or substantial threats (IUCN 2017-3).

References:

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Family Cuculidae

***Surniculus lugubris* (Horsfield, 1821)**

The Square-tailed Drongo-cuckoo is fairly common in lowland forest, in the canopy, or understory where it may be seen singly or in pairs (Kennedy et al., 2000, plate 32). According to IUCN (2017), this species has an extremely large range which does not approach the thresholds for Vulnerable under the range size criterion. Accordingly, the species is evaluated as Least Concern since 2014. Due to recent taxonomic splits, the population size of this species has not been quantified, although it is suspected to be in decline because of the ongoing habitat destruction. Despite the fact that the population trend is seemingly decreasing, the decline is not believed to be sufficiently rapid in order to approach the thresholds for Vulnerable category.

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Family Pittidae

***Pitta sordida* (Müller, 1776)**

The Hooded Pita is usually found in drier habitats from scrub to second growth forest. It is the only Philippine pitta known with an all-black head (Kennedy et al., 2000, plate 43). The IUCN (2017) evaluated this species as Least Concern in 2016, stating the species having an extremely large range, and hence does not approach the thresholds for Vulnerable under the range size criterion. Lambert and Woodcock (1996) reported that the species appear to be relatively common in parts of its range but may be rare or localized in some other areas. However, habitat destruction and collection of the species for cage-bird trade caused the population to rapidly decline (del Hoyo *et al.* 2003). Even though the population trend seems to be decreasing, the decline is not believed to be sufficiently rapid to approach the thresholds for Vulnerable under the population trend.

References:

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Family Timaliidae

***Mixornis gularis* (Horsfield, 1822)**

The Pin-striped Tit-Babbler is described to be common, shy, showing in active flocks in the undergrowth of forests, second growth, scrub, and forest edge below 1500 m (Kennedy et al., 2000, plate 53). This species has not been recognized in the previous assessment publications of IUCN until 2008. Nevertheless, the species is said to have an extremely large range which does not approach the thresholds for Vulnerable size criterion. Reported to be generally common, its population trend appears to be stable in the absence of evidence for any current declines or substantial threats. For these reasons, the species is evaluated as Least Concern (IUCN 2017-3).

References:

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Family Cisticolidae

***Orthotomus sericeus* (Temminck, 1836)**

The Rufous-tailed Tailorbird is described as common in more open habitats of scrubs and mangroves but not in deep forest. It is normally found singly or in pairs, noisy and not as secretive like other tailorbirds (Kennedy et al., 2000, plate 58). Although the global population size has not been quantified, Baker (1997) noted the species to be rather scarce and local. Since 2004, the species is evaluated as Least Concern (IUCN 2017-13) as the population is assumed to be stable in the absence of evidence for any declines or substantial threats. Having an extremely large range, the population does not approach the thresholds for Vulnerable range size criterion.

References:

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Family Nectariniidae

***Arachnothera longirostra* (Latham, 1790)**

The Pale Spiderhunter, also known as Little Spiderhunter, is mainly common in Palawan, less so elsewhere in understory of forest edge, second growth forest, and cultivation areas-the species is described to have preference to bananas (Kennedy et al., 2000, plate 58). Reported to have an extremely large range, the population trend appears to be stable, hence does not approach the thresholds for Vulnerable range size criterion. The species is evaluated as Least Concern in 2016 (IUCN 2017-3) because of the absence of evidence for any declines or substantial threats towards the global population size of the species.

References:

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Family Pycnonotidae

***Alophoxius frater* (Sharpe, 1877)**

The Palawan Bulbul is native to the Philippines, particularly in West Philippines (Calamians, Palawan, and Balabac). The species is found in forest, forest edges and second growth, rarely visiting open country areas below 1000 m. Its diet is apparently undescribed, but the species

is said to be observed alone or in pair (*HBW Alive, 2017*). Although this species has a restricted range, it is not believed to approach the thresholds for Vulnerable range size criterion since the population trend appears to be stable. In 2016, the species is evaluated as Least Concern (IUCN 2017-3) due to the absence of indication for any declines or considerable threats.

References:

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<<https://www.hbw.com/species/palawan-bulbul-alophoixus-frater>>. Accessed on 02 February 2018.

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***Pycnonotus cinereifrons* (Tweeddale, 1878)**

The Ashy-fronted bulbul is native to the Philippines, particularly in West Philippines (Busuanga, Culion, and Palawan). The habitat of this species includes open country areas and forest edge, as well as second growth forest (*HBW Alive, 2017*). Although this species has a considerably restricted range, it is not believed to approach the thresholds for Vulnerable range size criterion as the population trend appears to be stable. Although the global population size has not been quantified, there are no indications for any declines or extensive threats to the species. Thus, the species is evaluated as Least Concern in 2016 (IUCN 2017-3).

References:

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Family Pellorneidae

***Trichastoma cinereiceps* (Tweeddale, 1878)**

The Ashy-headed Babbler is fairly common species, described as short-tailed, long-legged and long-billed babbler. They appear to be solitary but not of any kind shy. They are normally observed hopping on or near the ground in forest and second growth forest to 1300 m (Kennedy et al., 2000, plate 51). del Hoyo et al. (2007) reported that although the global population size has not been quantified, the species is described as fairly common. With its restricted range and population trend that appears to be decreasing, the decline is not believed to be sufficiently rapid. In Palawan, rates of forest loss have been hasty; yet their ability to adapt to secondary growth environment explains the reason of this species to have experienced only moderately rapid declines. The species is evaluated as Least Concern (IUCN 2017-3) in 2004.

References:

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Chickadees. Lynx Edicions, Barcelona, Spain.

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Family Monarchidae

***Hypothymis azurea* (Boddaert, 1783)**

The Black-naped Monarch is resident throughout much of southeast Asia. Its habitation includes broadleaf evergreen forest, semi-evergreen forest, deciduous forest and peatswamp-forest. The species is noted to feed on insects, including small butterflies, moths and grasshoppers, and also small beetles and bugs (*HBW Alive, 2017*). *It has an extremely large range and* does not approach the thresholds for Vulnerable range size criterion. del Hoyo *et al.* (2006) described that the species is generally widespread and common throughout its range. Due to the absence of sufficient threats to its population, reasons the species is evaluated as Least Concern (IUCN 2017-3) in 2016.

References:

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<<http://www.iucnredlist.org/details/full/103715755/0>>. Accessed on 02 February 2018.

Family Dicruridae

***Dicrurus hottentottus* (Linnaeus, 1766)**

The Hair-crested Drongo is essentially a forest-dweller and normally feeds on insects and nectar in variable proportions (*HBW Alive, 2017*). The IUCN (2017) described that the species appeared to be locally common in India and Bangladesh, although uncommon in the western Ghats and fairly common in Bhutan (as cited in Grimmett *et al.*, 1998). With its extremely large range, the species does not approach the thresholds for Vulnerable range size criterion. Since the population is not believed to be decreasing rapidly due to absence of significant threats, the species is evaluated as Least Concern (IUCN 2017-3) in 2016.

References:

HBW Alive 2017. *Handbook of the Birds of the World Alive*.
<<https://www.hbw.com/species/hair-crested-drongo-dicrurus-hottentottus>>. Accessed on 02 February 2018.

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<<http://www.iucnredlist.org/details/full/103711043/0>>. Accessed on 02 February 2018.

Family Dicaeidae

Dicaeum pygmaeum (Kittlitz, 1833)

The Pygmy Flowerpecker is native to the Philippines. It is commonly observed, noisy and show to be active in the canopy or high understory of forest, forest edge, and second growth forest usually below 1000 m. although there are records on higher (Kennedy et al., 2000, plate 69). This species has a very large range, and hence does not approach the thresholds for Vulnerable range size criterion. Cheke et al. (2001) described that the species is common, although the population is suspected to be in decline because of ongoing habitat destruction. Despite the fact that the population trend appears to be decreasing, the decline is not supposed to be sufficiently rapid. Therefore, the species is evaluated as Least Concern (IUCN 2017-3) since 2004.

References:

Cheke, R. A.; Mann, C. F.; Allen, R. 2001. *Sunbirds: a guide to the sunbirds, flowerpeckers, spiderhunters and sugarbirds of the world.* Christopher Helm, London.

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Family Irenidae

Irena tweeddalii (Sharpe, 1877)

The Palawan Fairy-bluebird is found on Palawan, the Calamians and Balabac in the western Philippines. This newly split species is listed as Near Threatened (IUCN 2017-3), as it is suspected to have experienced a discreetly rapid decline of population (over the past three generations) contingent from habitat destruction and degradation. The hunting and trapping activities have a significant effect as well on this decline. The species has been reported to show in lowland broadleaf evergreen to semi-evergreen forest up to 700 m. It is found mainly on primary forest but there are records from secondary forests as well (Wells 2016, P. Widmann *in litt.* 2017). Wells (2016) described the species as locally uncommon or rare with experienced decline in population due to present habitat destruction and fragmentation accompanied by hunting pressure. The food and feeding of the species is not well documented but likely to be very similar in overall diet and habits to *I. puella* (HBW Alive, 2017).

References:

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<<https://www.hbw.com/species/palawan-fairy-bluebird-irena-tweeddalii>>. Accessed on 02 February 2018.

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Wells, D. 2016. Asian Fairy-bluebird (*Irena puella*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). *Handbook of the Birds of the World Alive*. Lynx Edicions, Barcelona. Available at: <http://www.hbw.com/node/60466>. Accessed on 02 February 2018.

Family Monarchidae

Terpsiphone cyanescens (Sharpe, 1877)

The Blue Paradise-Flycatcher is endemic to the Palawan group (Palawan, Busuanga, Culion and Bantac), **Philippines**, and appears to be uncommon to common throughout Palawan (Collar *et al.* 1999, del Hoyo *et al.* 2006, R. Hutchinson *in litt.* 2013). Most of the species is found in lower-lying areas, occupying primary forest and modified habitats, although Mallari *et al.* (2011) have recorded the species in early and advanced secondary growth and habitats within agricultural areas. The species is described as uncommon to common throughout Palawan (Collar *et al.* 1999, del Hoyo *et al.* 2006, R. Hutchinson *in litt.* 2013). As suspected, the species is experiencing population decline due to habitat loss and degradation. Mallari *et al.* (2011) noted the rate of decline could be more rapid than slow to moderate because of the species use secondary habitat that are also under treat. As it turns out, the species is more tolerant of habitat modification than formerly thought. Therefore, from being classified as Near Threatened since 2004, it was then evaluated as Least Concern in 2013 ever since (IUCN 2017-3).

References:

Collar, N. J.; Mallari, N. A. D.; Tabaranza, B. R. J. 1999. *Threatened birds of the Philippines: the Haribon Foundation/BirdLife International Red Data Book*. Bookmark, Makati City.

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Family Columbidae

Chalcophaps indica (Linnaeus, 1758)

The Grey-capped Emerald Dove, also known as Common Emerald Dove, is found in forests from early second growth to virgin forest up to about 1000 m. the species is usually seen flying low through forest, down trails and logging roads or over clearings (Kennedy *et al.*, 2000, plate 27). With an extremely large range, the species does not approach the thresholds for Vulnerable range size criterion. Gibbs *et al.* (2001) described the species as usually common, although scarce on Java and Bali and uncommon on the Ryukyu islands. The population is suspected to be in decline owing to predation by feral cats and rats (del Hoyo *et al.* 1997). The species is evaluated as Least Concern (IUCN 2017-3) in 2014n due to the absence of substantial threats.

References:

Gibbs, D.; Barnes, E.; Cox, J. 2001. *Pigeons and doves: a guide to the pigeons and doves of the world*. Pica Press, Robertsbridge, U.K.

IUCN 2017. *The IUCN Red List of Threatened Species. Version 2017-3*. <<http://www.iucnredlist.org/details/full/22725538/0>>. Accessed on 02 February 2018.

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Family Muscicapidae

***Muscicapa dauurica* (Pallas, 1811)**

The Asian Brown flycatcher is rare flycatchers commonly observed from exposed perch in forest and forest edge. It is well-known with its light greyish brown breast band and flanks (Kennedy et al., 2000, plate 60). According to del Hoyo *et al.* (2006), the population size is unknown, but the species is defined as common to locally common in much of its range. With the species having an extremely large range and absence of substantial threats to its population, it is suspected that the population is stable. For these reasons, the species is evaluated as Least Concern (IUCN 2017-3) since 2004.

References:

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Family Corvidae

***Corvus enca* (Horsfield, 1822)**

The Slender billed crow is native to Brunei Darussalam, Indonesia, Malaysia and Philippines. It inhabits lowland broadleaf evergreen forest, both primary and well-grown secondary forest. Surprisingly, its food and feeding are poorly studied. Although omnivorous, fruiting trees provide a major part of its diet; also takes variety of invertebrates (HBW Alive, 2017). This species has an extremely large range which does not approach the thresholds for Vulnerable range size criterion. With the population trend appears to be stable, Madge and Burn (1993) described the species to be common to rare. Overall, the population is suspected to be stable in the absence of evidence for any declines or significant threats. The species is therefore evaluated as Least Concern (IUCN 2017-3) in 2016.

References:

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Madge, S.; Burn, H. 1993. *Crows and jays: a guide to the crows, jays and magpies of the world*. Helm Information, Robertsbridge, U.K.

Family Pycnonotidae

***Brachypodius atriceps* (Temminck, 1822)**

The Black-headed Bulbul is common in open country in trees and forest edge, they are usually observed in active and noisy groups, Kennedy et al. (2000, plate 47) described it as a colorful bulbul. del Hoyo et al. (2005) noted that the species is locally common throughout much of its range, even though very rare in southern China and rare in India. Generally, this species has an extremely large range which does not approach the thresholds for Vulnerable range size criterion. As the population trend seems to be stable without any significant evidence of rapid decline or threats, the species is evaluated as Least Concern (IUCN 2017-3) in 2016.

References:

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Family Sturnidae

***Aplonis panayensis* (Scopoli, 1783)**

The Asian Glossy Starling is described as common and gregarious in the lowlands from second growth habitats to down-town cities. Reportedly, the species does not range into true forests. It flies to and from roost in small noisy flocks (Kennedy et al., 2000, plate 65). Feare and Craig (1998) stated that the species are common, although the global population size has not been really quantified. Nevertheless, this species has an extremely large range, and hence does not approach the thresholds for Vulnerable range size criterion. Currently, the population trend for this species is unknown because of the difficulties in determining caused by uncertainty over the impacts of habitat modification on population sizes. Yet, it is believed to have a stable population, agreeing it to be evaluated as Least Concern (IUCN 2017-3) since 2004.

References:

Feare, C.; Craig, A. 1998. *Starlings and Mynas*. Christopher Helm, London.

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Family Sturnidae

***Gracula religiosa* (Linnaeus, 1758)**

The Common Hill Myna or Hill Myna is found in lowlands of moist or semi-evergreen forest, hills and mountains. Recognized for its ability to mimic noises including human speech, this species occurs in an extremely large range. Feare and Craig (1998) described the species as common to abundant. There are records that shows the species' occurrence from east and north-east India east to southern China, and south through south-east Asia to Palawan (Philippines), Borneo and the Greater Sundas, including Enggano Island (Indonesia). The current population is suspected to be in decline for reasons that concerns trading and widespread forest destruction, however, this species is tolerant of secondary and degraded habitats. Since the rate of decline are unlikely to be higher than moderate, the species is evaluated as Least Concern (IUCN 2017-3) in 2016.

References:

Feare, C.; Craig, A. 1998. *Starlings and Mynas*. Christopher Helm, London.

IUCN 2017. *The IUCN Red List of Threatened Species. Version 2017-3*.
< <http://www.iucnredlist.org/details/full/22710550/0>>. Accessed on 02 February 2018.

Family Columbidae

***Ducula aenea* (Linnaeus, 1766)**

The Green Imperial-pigeon is native to the Philippines among many other Asian countries. It inhabits forests, including both primary and secondary evergreen and monsoon forests. The species is frugivorous, feeding on large variety of fruits and berries for its diet (HBW Alive, 2017). Although its total population size has not been quantified, del Hoyo *et al.* (1997) reported the species to be widespread and common. Having an extremely large range, its population is believed to be stable despite the fact that the population trend appears to be decreasing due to present destruction and fragmentation of its habitat (del Hoyo *et al.* 2007). Since the population decline is not believed to be sufficiently rapid, the species is evaluated as Least Concern in 2014 (IUCN 2017-3).

References:

del Hoyo, J., Elliott, A., Sargatal, J. 1997. *Handbook of the Birds of the World, vol. 4: Sandgrouse to Cuckoos*. Lynx Edicions, Barcelona, Spain.

HBW Alive 2017. *Handbook of the Birds of the World Alive*.
< <https://www.hbw.com/species/green-imperial-pigeon-ducula-aenea>>. Accessed on 02 February 2018.

IUCN 2017. *The IUCN Red List of Threatened Species. Version 2017-3*.
<<http://www.iucnredlist.org/details/full/22725586/0>>. Accessed on 02 February 2018.

Family Psittacidae

***Prioniturus platenae* (Blasius, 1888)**

The Blue Headed Racquet-tail is generally uncommon but may be found in lowland forest, scrub, and forest edge. It may be seen alone, in pairs or small groups (Kennedy et al., 2000, plate 30). This species is endemic to Palawan and its satellite islands in the **Philippines** (Collar et al. 1999), where it is widespread in every mainland municipalities (P. Widmann *in litt.* 2012). There have been records from seven satellite islands (Calauit, Busuanga, Culion, Dumarán, Rasa, Pandanan and Bugsuk) as well since 1980. In the previous, it was reported to be abundant until recent records show a decline in population and become generally uncommon, although it still occurs regularly in small numbers at several sites (P. Widmann *in litt.* 2012). The species is locally persecuted as an agricultural pest in banana plantations (P. Widmann *in litt.* 2012), and due to extensive lowland deforestation, severe fragmentation and present decline in the extent and quality of suitable habitat in this species' small range, which, combined with limited exploitation for the cage-bird trade, rapid population reduction qualifies this species as Vulnerable (IUCN 2017-3) since 1994.

References:

Collar, N. J.; Mallari, N. A. D.; Tabaranza, B. R. J. 1999. *Threatened birds of the Philippines: the Haribon Foundation/BirdLife International Red Data Book*. Bookmark, Makati City.

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Family Nectariniidae

***Leptocoma calcostetha* (Jardine, 1843)**

The Copper-throated Sunbird is described to be common, particularly in mangroves, but may also occur in gardens and cultivated areas near the coastline (Kennedy et al., 2000, plate 67). Identified to have a very large range, the population trend appears to be stable, and hence does not approach the thresholds for Vulnerable range size criterion. Although its global population size has not been quantified, Cheke et al. (2001) reported the species to be not uncommon. Due to absence of any significant declines and threats, the species is evaluated as Least Concern (IUCN 2017-3) since 2004.

References:

Cheke, R. A.; Mann, C. F.; Allen, R. 2001. *Sunbirds: a guide to the sunbirds, flowerpeckers, spiderhunters and sugarbirds of the world*. Christopher Helm, London.

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***Leptocoma sperrata* (Linnaeus, 1766)**

The Purple-throated sunbird is commonly observed in lowland areas, particularly in mangroves, coconut groves, second growth forest, and even in cultivated areas (Kennedy et al., 2000, plate 67). Cheke et al. (2001) reported the species to be locally common to uncommon. In the Philippines, there are records that this species occurs in Calayan, Babuyan Claro, Fuga, Camiguin Norte, Luzon, Polillo, Cantanduanes, Lubang, Mindoro, Busuanga, Culion, Tablas, Romblon, Sibuyan, Masbate, Ticao, Palawan, Dadagican, Ursula, Balabac, Panay, Guimaras, Biliran, Leyte, Samar, Basiao, Calicoan, Negros, Cebu, Bohol, Siquijor, Camiguin Sur, Dinagat, Nipa, Siargao, Bucas Grande, eastern Mindanao, Talicud, Pujada and Balut. This confirms that the species has a large range, hence it does not approach the thresholds for Vulnerable range size criterion. With the population trend appears to be stable without any substantial threats or decline, the species is evaluated as Least Concern since 2004.

References:

Cheke, R. A.; Mann, C. F.; Allen, R. 2001. *Sunbirds: a guide to the sunbirds, flowerpeckers, spiderhunters and sugarbirds of the world*. Christopher Helm, London.

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Family Dicaeidae

***Prionochilus plateni* (Blasius, 1888)**

The Palawan Flowerpecker is native to the Philippines and is commonly observed singly or in mixed flocks in all levels of the forest, even in scrubs and gardens (Kennedy et al., 2000, plate 68). Although this species may have a restricted range, it is not believed to approach the thresholds for Vulnerable range size criterion. Cheke et al. (2001) described the species as common, although its global population size has not been quantified. Further, present habitat destruction is causing the downward trend to its population size. The most recent assessment by the IUCN in 2012 has evaluated this species as Least Concern (IUCN 2017-3).

References:

Cheke, R. A.; Mann, C. F.; Allen, R. 2001. *Sunbirds: a guide to the sunbirds, flowerpeckers, spiderhunters and sugarbirds of the world*. Christopher Helm, London.

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Family Pycnonotidae

***Lole palawanensis* (Tweeddale, 1878)**

The Sulphur-bellied Bulbul is described to be uncommon in forest and forest edge in the canopy and understory, and may be seen in these areas singly or in flocks (Kennedy et al., 2000, plate 47). Further, del Hoyo et al. (2005) also noted that the species is uncommon. Although this species may have a restricted range, it is not believed to approach the thresholds for Vulnerable range size criterion. Because of the present habitat destruction, the population is suspected to be in decline-although it is not believed to be rapid. Most previously, the species was evaluated as Least Concern (IUCN 2017-3) in 2012.

References:

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Family Pittidae

***Erythropitta erythrogaster* (Temminck, 1823)**

The Philippine Pitta is fairly common but may appear inconspicuous when present, yet equitably tame. It forages on the ground in a variety of habitats from scrub to virgin forest that is usually below 1000 m. (Kennedy et al., 2000, plate 43). This species is native to the Philippines and has an extremely large range which does not approach the thresholds for Vulnerable range size criterion. Lambert and Woodcock (1996) mentioned that although the species is reported to be common locally in some parts of Luzon, it is seemingly rare or overlooked on. In addition, del Hoyo *et al.* (2003) noted that the present destruction of lowland evergreen forests within the species' restricted range have caused a decline to its population. However, the decline is not believed to be sufficiently rapid that is why the species is evaluated as Least Concern (IUCN 2017-3) in 2016.

References:

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Lambert, F.; Woodcock, M. 1996. *Pittas, broadbills and asities*. Pica Press, Robertsbridge, U.K.

Family Columbidae

***Treeron vernans* (Linnaeus, 1771)**

The Pink-necked Green Pigeon may be typically observed in groups in lowlands areas, particularly in mangroves, cultivated areas, and forest. Male is distinctive with its pinkish and orange breast, and dark rufous undertail coverts. Female can be identified by its yellow belly and one yellow wing bar and by pale golden green uppertail coverts (Kennedy et al., 2000, plate 24). Gibbs et al. (2001) described the species as generally common to abundant. Having an extremely large range, absence of declining population evidence and threats, its population trend appears to be stable. In 2016, the species was evaluated as Least Concern (IUCN 2017-3).

References:

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Family Paridae

***Pardaliparus amabilis* (Sharpe, 1877)**

The Palawan Tit is described to be uncommon to common in forest and second growth forest but rarely seen in scrub, in the canopy and middle story. Usually, they may be observed in pairs, in groups, or as a core species in mixed flocks (Kennedy et al., 2000, plate 50). Although this species occurs in primary evergreen forest in the lowlands, its occurrence at higher elevations remains to be confirmed. Levels of tolerance of secondary or logged forest are also not well understood. This forest-dwelling species is considered Near Threatened (IUCN 2017-3) because it has a small range, in which the majority of suitable habitat is intact, and is likely to have a moderately small population, which is inferred to be in decline as a result of present habitat loss, probably at a moderately rapid rate. Collar *et al.* (1999) stated that the species occurs on Palawan, Balabac and Calaut, **Philippines**, where it is generally considered

uncommon. Data on its population trend are lacking but a moderately rapid decline is suspected to be occurring in general as a result of localized habitat loss.

References:

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Family Cuculidae

***Centropus bengalensis* (Gmelin, 1788)**

The Lesser Coucal is a common resident of open country, if somewhat local in some areas. It also inhabits tall grass, reedbeds, swamps and marshlands, bamboo thickets, second-growth forest etc. (HBW Alive, 2017). del Hoyo *et al.* (1997) further affirm that the species appears to be abundant in open country. Having an extremely large range, it does not approach the thresholds for Vulnerable range size criterion. Present habitat degradation is creating new areas of suitable habitat for this species; thus, the current population trend appears to be increasing. As of 2016, the species is evaluated as Least Concern (IUCN 2017-3).

References:

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IUCN 2017. *The IUCN Red List of Threatened Species. Version 2017-3*. <<http://www.iucnredlist.org/details/full/22684254/0>>. Accessed on 02 February 2018.

Family Picidae

***Dinopium everetti* (Tweeddale, 1878)**

The Spot-throated Flameback is found in the western **Philippines**, predominantly on Balabac, Basuanga, Culion and Palawan, where it occurs in forests and open woodlands, including coconut plantations (Kennedy *et al.* 2000), which indicates its some tolerance for human-altered habitat, but the species is considered uncommon and typically inhabits the lowlands (del Hoyo *et al.* 2002). This newly-split species is classified as Near Threatened (IUCN 2017-3) as it is thought to have a small population which is inferred to be in decline because of continuous habitat loss and degradation. Even though it tolerates some human-altered habitat, the population is nevertheless suspected to be decreasing (del Hoyo *et al.* 2002).

References:

del Hoyo, J.; Elliott, A.; Sargatal, J. 2002. *Handbook of the Birds of the World, vol. 7: Jacamars to Woodpeckers*.

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Family Muscicapidae

***Larvivora cyane* (Pallas, 1776)**

The Siberian Blue Robin is described as cautious and difficult to see. It stays on the ground in forest and second growth forest. It has an observed behavior of hopping to a perch when disturbed by intruders (Kennedy et al., 2000, plate 53). Having an extremely large range, del Hoyo *et al.* (2005) further noted the species as common throughout its range, except for northern Vietnam, where it is rare. Nevertheless, the population is suspected to be declining due to habitat destruction and fragmentation, but it is not believed to be sufficiently rapid. For these reasons, the species is recently evaluated as Least Concern (IUCN 2017-3) in 2012.

References:

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Family Pellorneidae

***Ptilocichla falcata* (Sharpe, 1877)**

The Falcated Wren-babbler or Falcated Ground-Babbler is uncommon and secretive in forest and second growth forest, normally stays on or near the ground in dense foliage. The species is recognizable by its all dark brown coloration with white stripes and clear white throat with dark moustache (Kennedy et al., 2000, plate 51). Collar *et al.* (1999) reported that this species is endemic to Palawan in the Philippines, where it is known from eleven (11) localities across the island and was formerly locally common. There are some recent observations that suggest that it may be very sensitive to habitat modification. This species appears to be reliant upon primary lowland forest, thus it is likely to have declined substantially due to modified habitats and high rates of deforestation occurring within its range. This species is considered Vulnerable (IUCN 2017-3) since year 2000.

References:

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Family Nectariniidae

***Aethopyga shelleyi* (Sharpe, 1876)**

The Lovely Sunbird is endemic to the Philippine Islands, particularly in Palawan. This species is common locally and can be seen in cultivated areas, thickets, forest and forest edge below 2000 m (Kennedy et al., 2000, plate 68). Having a very large range, it is not believed to approach the thresholds for Vulnerable range size criterion. Cheke *et al.* (2001) described the species as fairly common. Since the current population trend for this species appears to be stable, and there is no evidence for any declines or considerable threats, the species is evaluated as Least Concern (IUCN 2017-3) since its recognition in 2006.

References:

Cheke, R. A.; Mann, C. F.; Allen, R. 2001. *Sunbirds: a guide to the sunbirds, flowerpeckers, spiderhunters and sugarbirds of the world*. Christopher Helm, London.

IUCN 2017. *The IUCN Red List of Threatened Species. Version 2017-3*. <<http://www.iucnredlist.org/details/full/22734230/0>>. Accessed on 02 February 2018

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Family Columbidae

***Ramphiculus leclancheri* (Bonaparte, 1855)**

The Black-chinned Fruit-dove is described to be uncommon in forest patches up to 1500 m but may be common on small islands like the Batan Island of Batanes in the Philippines (Kennedy et al., 2000, plate 25). del Hoyo *et al.* (1997) reported the species to be generally uncommon. According to IUCN (2017), this species has a very large range, which does not approach the thresholds for Vulnerable range size criterion. As the population trend appears to be stable in the absence of any significant decline and threat to this species, it is then evaluated as Least Concern since 2004.

References:

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Family Muscicapidae

***Cyornis lemprieri* (Sharpe, 1884)**

The Palawan Blue Flycatcher may be seen singly or in pairs as described by Kennedy et al. (2000). The species reportedly occurs in lowland submontane dry primary forest and second growth, to 1,000 m, where it forages in the understorey. According to Mallari *et al.* (2011), surveys in Puerto Princesa Subterranean River National Park found the species in early and advanced secondary growth, as well as habitats within agricultural land, indicating a considerable tolerance concerning habitat modification. This species is endemic to Palawan, Balabac, Culion and Calauit, **Philippines**, where it is uncommon to locally common in suitable habitat. Further, del Hoyo *et al.* (2006) described as uncommon or scarce. This species is listed as Near Threatened (IUCN 2017-3) because it is suspected to be in moderately rapid population decline because of continuous forest clearance, especially in lowland areas. It is not considered more threatened because of its ability to use secondary habitats and lower montane forest.

References:

del Hoyo, J.; Elliott, A.; Christie, D. 2006. *Handbook of the Birds of the World, vol. 11: Old World Flycatchers to Old World Warblers*. Lynx Edicions, Barcelona, Spain.

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Mallari, N. A. D.; Collar, N. J.; Lee, D. C.; McGowan, P. J. K.; Wilkinson, R.; Marsden, S. J. 2011. Population densities of understorey birds across a habitat gradient in Palawan, Philippines: implications for conservation. *Oryx* 45(2): 234-242.

Family Columbidae

***Macropygia tenuirostris* (Bonaparte, 1854)**

The Philippine Cuckoo-Dove is native to the Philippines, Taiwan and Province of China. In the Philippines, its habitat includes forest, second growth and clearings (HBW Alive, 2017). This species has a very large range which does not approach the thresholds for Vulnerable range size criterion. According to del Hoyo *et al.* (1997), the species is reported to be widespread. As the population is suspected to be stable without any evidence for any declines or considerable threats, the species is evaluated as Least Concern (IUCN 2017-3) since 2004.

References:

HBW Alive 2017. *Handbook of the Birds of the World Alive*. <<https://www.hbw.com/species/philippine-cuckoo-dove-macropygia-tenuirostris>>. Accessed on 02 February 2018.

IUCN 2017. *The IUCN Red List of Threatened Species. Version 2017-3*. <<http://www.iucnredlist.org/details/full/22690553/0>>. Accessed on 02 February 2018.

Family Phasianidae

***Polyplectron napoleonis* (Lesson, 1831)**

The Palawan Peacock-pheasant is endemic to the **Philippines**, where it occurs on Palawan (BirdLife International 2001). This species is secretive and difficult to see, with the males described to be solitary and distinctive while the females occurs to travel in groups or with young (Kennedy et al., 2000). It mainly inhabits primary and secondary forest on flat and rolling terrain. Occasionally, this species occurs almost up to mossy forest and in *Casuarina*-dominated dwarf forest on serpentine rock. Survey evidences were found evidence that the species shows a strong preference for old growth forest over advanced secondary growth, with none recorded in cultivation (Mallari et al. 2011). In addition, Mallari et al. (2011) specified that the species' population density is positively correlated with the density of large trees. With extensive logging and clearance of lowland forest on Palawan, mining designations, capture for trade and severe hunting pressure in places, the species is suspected to be declining rapidly. For these reasons, this species still qualifies as Vulnerable (IUCN 2017-3) as of 2016.

References:

BirdLife International. 2001. *Threatened birds of Asia: the BirdLife International Red Data Book*. BirdLife International, Cambridge, U.K.

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Family Dicruridae

***Dicrurus leucophaeus* (Vieillot, 1817)**

The Ashy Drongo is essentially a forest bird, mainly in occur mountain areas, preferring more open forest (HBW Alive, 2017). This species has an extremely large range which does not approach the thresholds for Vulnerable range size criterion. Grimmett et al. (1998) described the species as generally common throughout the Indian Subcontinent, although uncommon in Bangladesh. Although the current population trend is unknown, it is not believed to be decreasing sufficiently rapidly. Therefore, the species is evaluated as Least Concern (IUCN 2017-3) most previously in 2016.

References:

Grimmett, R.; Inskipp, C.; Inskipp, T. 1998. *Birds of the Indian Subcontinent*. Christopher Helm, London.

HBW Alive 2017. *Handbook of the Birds of the World Alive*.
<<https://www.hbw.com/species/ashy-drongo-dicrurus-leucophaeus>>. Accessed on 02 February 2018.

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Family Accipitridae

Spilornis cheela (Latham, 1790)

The Crested Serpent-eagle is common species that soars over forest from lowlands to over 2000 m. It holds wings slightly forward and with slight dihedral. Its underwing has diagnostic broad white band near trailing edge (Kennedy et al., 2000). The species was not recognized until 2002. del Hoyo et al. (1992) described the species as widespread and common, although locally uncommon. This species has an extremely large range which does not approach the thresholds for Vulnerable range size criterion. Since the current population trend appears to be stable due to absence of rapid decline and substantial threat, the species is evaluated as Least Concern (IUCN 2017-3) most recently in 2016.

References:

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Family Oriolidae

Oriolus chinensis (Linnaeus, 1766)

The Black-naped Oriole inhabits the open primary and secondary evergreen forest, mixed broadleaf forest and deciduous forest. This species has been described to feed on berries and fruits (*Handbook of the Birds of the World Alive*, 2017). The species has an extremely large range which does not approach the thresholds for Vulnerable range size criterion. Although the global population size has not been quantified, the species is described by Kennedy *et al.* (2000) as common. Its population trend is currently not known, but it is not believed to be decreasing sufficiently rapid. For these reasons, the species is evaluated as Least Concern (IUCN 2017-3) as of 2014.

References:

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Family Laniidae

***Lanius cristatus* (Linnaeus, 1758)**

The Brown Shrike is native to the Philippines among many other countries. It is described to be common in all habitats at all elevations, and perches in open on telephone wires or exposed limbs (Kennedy et al., 2000). Its Diet are mainly insects, and other arthropods and small vertebrates as well (HBW Alive, 2017). Having an extremely large range, it does not approach the thresholds for Vulnerable range size criterion. Despite the fact that the population trend appears to be decreasing, the decline is not believed to be sufficiently rapid. The species is evaluated as Least Concern (IUCN 2017-3) most recently in 2016.

References:

HBW Alive 2017. *Handbook of the Birds of the World Alive*.
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