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Landscape and Biodiversity Assessment of the Allah Valley Watershed Forest Reserve
Lake Sebu, South Cotabato

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A Baseline Study on Pilot Area National Pilots on the Prevention, Control and Management of Priority Forest IAS (Philippines)

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Cover Designed and Layout: *Renalyn C.Estenor. At the report cover are some photos of flowering and non flowering plants documented during field survey and data gathering. Also includes the view of the Landscape of the Lake Sebu taken from the Lamlahak Subwatershed.*

The flowering plants (angiosperms), also known as Angiospermae or Magnoliophyta, are the most diverse group of land plants. Flowering plants provide economic resources in the form of wood, paper, fiber, medicines, decorative and landscaping plants, and many other uses. The non flowering plants

Photo Credit: Mr. Danilo M. Tandang

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EXECUTIVE SUMMARY

This report presents the results of watershed assessment conducted in Lamlahak Subwatershed, of Lake Sebu, South Cotabato and the corresponding recommended management plan in the area. It also intends to provide the information needed by ERDB-PAWB DENR in its plan of preventing and controlling the spread of IAS and improving the quality of lives of the people therein, hand-in-hand with integrated watershed and environmental protection, conservation, and management.

The assessment is primarily aimed at characterizing the existing biophysical condition of Lamlahak Subwatershed, and to prescribe management plan for the conservation of natural resources. Information on the vegetation, biodiversity and land-use of the project site are essential in crafting a sustainable development framework that will work for the watershed area and its entire community. The assessment output also intends to serve as a basis for watershed rehabilitation program that is complementary to the goal of the Project. In the long run, it may also be used as baseline data for monitoring, management and other developmental activities or projects.

Lamlahak Subwatershed is part of Lake Sebu Watershed Forest Reserve and Allah Valley Watershed and Forest Reserve declared as a watershed reserve by virtue of Proclamations and under the management of the Protected Area Management Board (PAMB) composed of heads of concerned LGUs, national government agencies led by the DENR. The PAMB has been pushing for the conservation and protection through development efforts of Lake Sebu for potential eco-tourism in the province of South Cotabato.

As delineated by the ERDB DENR, the study site occupying an area of approximately 20 hectares and lying between 124° 42' 01.1" to 124° 41' 52.14" longitude and 06° 12' 19.0" to 06° 11' 54.8" latitude. It is located at Barangay Lamlahak under the Municipality of Lake Sebu, Province of South Cotabato. Specifically, it is situated in the southeastern most portions of the high mountain ranges of Allah Valley Basin.

The sampling sites for flora (2 Sites) and wildlife and arthropods (7 Sites) is characteristically a mosaic of diverse ecosystem varying from riparian, brushland, agricultural, agroforestry, plantation and secondary forest ecosystems lying with topographic gradient of flat to undulating and rolling terrain. The soil cover is of loamy to clay and reddish to yellow in color.

Specifically, the sites include: 1) riparian zone with patches of secondary forest, agricultural farms and *Piper aduncum stand* with flat to sloping terrain along the creek with loamy and reddish to yellowish soil; rocks and small sized-boulders are observed along the creek; 2) agricultural farms, agroforestry, brushland and grassland invaded with Piper aduncum stand, undulating to very steep slope with loamy and reddish to yellowish soil; 3) secondary forest, riparian vegetation, brushland, plantation, *Piper aduncum* stand and agricultural area with undulating to vey steep terrain upslope generally loamy and reddish to yellowish soil; and sandy loam in riparian zone; 4) secondary forest, riparian vegetation, brushland, plantation and agricultural area with flat to rolling terrain upslope and near the riparian area with loamy and reddish to yellowish soil color, sandy loam in riparian; 5) the area is covered with secondary forest, brushland, *Piper aduncum*

stands, agricultural farms with rugged to very steep slope with loamy, reddish to yellowish in color; 6) agricultural farm, brushland and *Piper aduncum* stand with rolling and very steep slope, generally clay loam to loamy, reddish to yellowish in color; 7) Brushland, grassland, agricultural farms, rice paddies, flat area to roling terrain, generally clay loam, reddish to yellowish in color, sandy loam along the river, soils are compacted along the road.

A total of one hundred seventy – four (174) plant species belonging to seventy - seven (77) families and one hundred forty-nine (149) genera were recorded at Lambeten/Lamlahak Subwatershed and its vicinity. Results of the combined approaches in vegetation assessment showed that of the 77 plant families recorded in the study site, the dominant families include Asteraceae with 11 species, MORACEAE and Poaceae both with 9 species, while Euphorbiaceae, Mimosaceae, Rubiaceae and Urticaceae with 7 species each. The composition of 174 species includes trees with 75 species, followed by herbs with 69 species, 18 shrubs and 12 vines. Invasion of *Piper aduncum* is documented in the 24 plots established within the proposed site for treatment and monitoring.

There are seven (7) plant species listed under DENR Administrative Order 01 series 2007. Of seven, six (6) plant species, Drynaria quercifolia, Pterocarpus indicus, Asplenium nidus, Cyathea contaminans, Shorea contorta and Shorea polysperma classified as Vulnerable (VU) while one (1) is considered endangered; Medinilla pendula.

A total of 196 species of terrestrial vertebrates were identified and recorded belonging to 149 genera and 74 families. One hundred-twenty eight (128) recorded through direct sighting during field survey, 74 species through interviews the aid of secondary materials, forty-seven (47) birds and 27 mammals identified by locals were accounted in the study site. Of the 196 species, birds accounted the largest number with 131 species (67%) followed by mammals with (36 species, 18%), reptiles (21 species, 11%) and amphibians (8 species, 4%). Ninety-nine terrestrial wildlife species representing 51% of the total species recorded as endemic to the Philippines including species endemic in Mindanao faunal region.

One hundred seven (107) arthropod species belonging to 101 genera and 61 families and 11 orders were recorded in the study sites. The highest number of species recorded for the 11 orders belong to LEPIDOPTERA with 24 species, followed by HYMENOPTERA with 16 species, COLEOPTERA with 15, ORTHOPTERA with 14 and HOMOPTERA with 12 species while THYSANOPTERA has the least number of species representation with only 1 species recorded.

On the other hand, of one hundred twenty-eight (128) fauna species recorded during the survey, 11 species are listed under DENR DAO while 9 species are under CITES list. Birds dominated the list with the most number of threatened species recorded in the area among them are restricted-range endemic species of Mindanao Faunal Region. These include: Crested Goshawk, Writhed Hornbill, Walden's Hornbill, Blue-capped Wood-Kingfisher, Silvery Kingfisher, Cattle Egret, Philippine Leafbird, McGregor's Cuckoo-shrike, Little Slaty Flycatcher, Mindanao Bleeding Heart, Bhraminy Kite, Colasisi, Dark-Eared Brown Dove, Steere's Pitta and Montane Racquet Tail.

Furthermore, the species listed in CITES are: Crested Goshawk (Accipiter trivirgatus), Writhed Hornbill (Aceros leucocephalus), Walden's Hornbill (Aceros waldeni), Cattle Egret (Bubulcus ibis), Common Rat Snake (Elaphe erythrura), Bhraminy Kite (Haliastur indus), Colasisi (Loriculus philippensis), King Cobra (Ophiophagus hannah) and Montane Racquet Tail (Prioniturus montanus).

Based on the aforesaid scenario, Integrated Prevention and Control Management of IAS at Lamlahak Subwatershed is recommended. Removal of the AIS in the site three (3) associated components which include reduction and control of AIS population, restoration of the original vegetation and monitoring, maintenance and protection from re-invasion with an ultimate desire of a sustainable watershed management which special focus on the restoration of the original forest composition of the watershed. The recommendation is anchored on the belief that watershed conservation and protection done holistically with livelihood enrichment is an effective and sustainable approach of natural resource management.

Lamlahak Subwatershed is endowed with rich natural resources coupled with affluent people vital in its protection, conservation, and management. Furthermore, it serves as a significant life support ecosystem to nearby indigenous peoples (IPs) communities by providing their everyday needs; a survival niche of the wildlife diversity; and a habitat to the different plant species. The dynamic existence and interactions of diverse life forms in Lamlahak Subwatershed is unique and biologically intricate, thus, warrants attention and protection.

1 INTRODUCTION

SECTION 1
INTRODUCTION

1.1 Rationale

Conservation of biological diversity has been an imminent concern worldwide because of its significance to agriculture, medicine and industry; aesthetics; ethical considerations; and because of the diverse ecosystem services it provide. The vegetation cover is considered as one of the most important entities that maintain the good macro and microclimate of an area renders forests as vital components of the ecosystem. Forests perform multiple functions by providing multitude of tangible and intangible services such protection and conservation of soil and water essential for the survival of man and animals. As habitat for wildlife, forest provides cover and protection to the survival of various organisms. Forests contain a pool of genetic resources, albeit largely unknown and untapped, that may someday be needed to improve some of the requirements of man, for food, clothing, shelter and medicine. Forests are also an important element in the sequestration of large amounts of carbon and in the regulation of global temperature and in combating global warming. The remaining forests in the country located within the strategic uplands and thus exercise strong influence on the agricultural, urban, coastal and marine ecosystems, principally through the quality and quantity of soil, water and minerals that emanate from them.

One of the threats to biodiversity is the introduction of the invasive alien species. According to a study IAS are among the top three drivers of environmental change globally and may soon surpass habitat loss as the main cause of ecological disintegration worldwide. Castillo 2001 cited that the introduction of exotic species might actually be one of the factors that retard natural succession process and therefore diminish biodiversity. The aggressive nature of some exotic species is responsible for the displacement of indigenous pioneer species. Gregarious prominence of exotic pioneer reflects obvious transformation of the vegetation. Thus, instead of progressive succession the use of exotic species in the reforestation on the contrary promotes retrogressive succession. In this context, the invasion of exotic species over natural ecosystems can be considered a serious threat. The integration of exotic species in natural ecosystems contradicts the principle of biodiversity conservation. This non-native species may cause severe ecological damage and they have caused harm to the existing species as well as invading the protected natural areas. The impacts of IAS on biodiversity and economy may hinder environmental conservation, sustainable development and economic growth. Forest ecosystems are vulnerable to the biological invasion.

The spread of invasive alien species (IAS) such as animals, plants, insects, bacteria, viruses, and other life forms is now considered as one of the greatest threats to the biosecurity of Philippine ecosystems and biological resources. Continuing globalization has facilitated the spread of IAS with negative impacts. Biosecurity is a more encompassing term that requires local and international cooperation among governments, economic, and public sectors. Both biosafety and biosecurity imply a guarantee against threats to the environment or biological diversity and human health from sources which are purely biological in origin and which are directed to biological processes (ERDB 2011).

Growing concern on the impact of invasive alien species (IAS) has reached international attention as IAS was identified is second next to habitat destruction on the list of greatest threats to biodiversity (CBD). International and national responses to the IAS problem have thus far been inadequate to counter their increasing toll on the environment and society. In Philippines, however, the Commission for CABI has made it a priority to provide its member countries with the information and mechanisms that they need to protect the region's forest ecosystems from the adverse effects of IAS. Ultimately, the CABI hopes to inspire and assist in the development of ASEAN strategy for preventing and managing the movement of IAS along the pathways by which they are introduced into terrestrial environment.

Substantial efforts have been focused on identifying the most significant sites for sensitive management. Biodiversity surveys have become a major preoccupation of conservation agencies. Considering the enormous importance of a watershed, it can be viewed as one of the basic life support systems of people, plants, animals, and the community as well. As a support system, its protection, conservation and management are essential. Thus, to properly manage and sustain its valuable functions, its careful assessment is important. Assessment results can be an indispensable basis in the different aspects of management such as planning, organizing, monitoring, and even policy making. Yet, since assessment generally requires large amount of resources, it is sometimes disregarded or set aside by most planners.

Seeing the importance of landscape and biodiversity assessment in planning for any conservation and developmental projects or activities in Allah Valley Watershed and Forest Reserve particularly Lake Sebu Watershed Forest Reserve, and the Department of Environment and Natural Resources (DENR) - ERDB and PAWB through the assistance and support of the UNEP and other institutions, assessed the Watershed Area. Thus, this paper hopes to guide local planners in crafting and implementing a need-based programs or plans for the management of IAS, the community of Lamlahak, Lake Sebu and its biodiversity.

This report gives detailed procedures for landscape and biodiversity assessment of the subwatershed areas. The emphasis of landscape assessment output is the characterization of the physical (soil, water, terrain,) and biological (flora and fauna) condition of the subwatershed area. This will also determine the diversity and biological alliances of the *Piper aduncum* – invaded and *Piper aduncum un-invaded* areas. There are so many techniques of recovering the vegetation through the application of agro-silvicultural practices whereby success is anchored from considering the biophysical characteristics and land utilization. Hence, this assessment targets to deliberately lead the managers towards efficient management of the land based on its appropriate use thereby regaining the previous vegetation.

The success of restoration efforts will be attained in developing effective management strategies. At present time, we always recommended the use of indigenous species of the Philippines rather the exotic. Also, there are fast growing native species that can be alternative to the exotic species currently used. Therefore, identification of the naturally growing tree species in the target restoration sites should be the first and foremost step towards site restoration. However, in some cases that these indigenous species are slow-growing and tedious to propagate, the team will apply various silvicultural treatments to address these issues.

The Watershed Area

The Lamlahak Subwatershed, one of the identified critical watershed areas in Region 12, is part of a bigger river basin known as Allah Valley Landscape in Mindanao Region. Specifically, it is situated at Sitio Lambeten and its nearby Sitios at Barangay Lamlahak, Municipality of Lake Sebu and lies approximately at coordinates 124° 42' 01.1" to 124° 41' 52.14" longitude and 06° 12' 19.0" to 06° 11' 54.8" latitude. The Barangay is bounded by Barangay Poblacion on the north, Takunel, Tasiman and Bacudong on the northwest to southwest area, Lamdalag on the southeast to northeast.

The Allah Valley Landscape (AVL) is not officially declared as protected area. However, various NGO and Local Government of the small unit of the said landscape have different initiatives to establish protection areas and zones (i.e. Lake Sebu Watershed Forest Reserve of Proclamation No. 65 dated Aug. 4, 1966, Lake Maughan-Mt. Parker Development, Conservation and Rehabilitation, Mt. Matutum Protected Landscape of Presidential Proclamation No. 552 dated March 20, 1995, Allah Valley Protected Landscape of Proclamation No. 2455 dated Sept. 24, 1985, Allah River Watershed Development and Daguma/Roxas Mountain Ranges Preservation). The study area for IAS treatment plots covers the area of the watershed and it occupies almost 20 hectares categorized as forest and grassland based also on the Land Use and Land Cover Maps. The study team also considered the observation on its vicinities.

Lamlahak SubWatershed is endowed with fresh and potable water released through several springs. The river banks are fertile and are covered with trees. The main tributary of the watershed drains from its upstream to downstream areas of Lamlahak and other nearby barangays. Likewise, springs and streams, together with surface run-off during rainy season, flow into the Lamlahak creek, bisecting lowland farms and finally drains to river supplying water for irrigation of lowland farms. Hence, Lamlahak benefits from the watershed through irrigation.

Barangay Lamlahak is agri-producing barangay in the Municipality of Lake Sebu. Majority of the households rely on farming activities as a main source of livelihood. The agricultural products are marketed in the municipal proper and in nearby municipalities and cities. Indigenous Peoples particularly T'boli and other upland dwellers within the subwatershed area are skillful farmers and thus to maintain the continuous water supply, protection and conservation of its vegetation are needed. In addition to potable water and irrigation, the forests in the Lamlahak Subwatershed also serve as habitat to notable endangered flora and fauna. The identification of suitable area for IAS management will contribute to the research and development effort of the government and likewise provide sustainability of the area and will serve as a guide in formulating appropriate conservation strategies.

Lake Sebu Watershed

Lake Sebu, recognized as one of the most important watershed areas in the Philippines, is a natural lake located at the southwestern part of the South Cotabato Province. It is approximately 40 kilometers from the regional center, Koronadal City and capital of the Province. This area is surrounded by Allah Valley region that bounded on the north by the municipality of Surallah; on the southwest by municipalities of Kiamba and Maitum; on the east by the municipality of T'boli and on the west by the municipality of Palembang, Sultan Kudarat.

It lies between the latitudes 6°12'55"N and 124°42'5"E. Lake Sebu believes to be one of the many bodies of water giving substantial irrigation to the provinces of Sultan Kudarat and South Cotabato.

The docile lake of the said place can be found in Allah Valley near muncipality of Surallah, South Cotabato. The lake is bounded by rolling hills and mountains which covered with thick rain forest. The Lake Sebu has the land cover area of 891.38 km^2, wherein the average elevation is approximately 1000 masl.

The Allah Valley Landscape (AVL)

The Allah Valley Landscape (AVL) covers an area of 252,060 hectares located in two provinces of SOCCSKSARGEN Region XII, namely; South Cotabato and Sultan Kudarat; where the upstream and midstream portions of the landscape spring from the municipalities of Surallah, T'boli, Lake Sebu, Sto. Niño, Norala and Banga in South Cotabato and extends downstream to the municipalities of Isulan, Esperanza, Bagumbayan, Lambayong, and the City of Tacurong in Sultan Kudarat; the landscape forms a major water collection body or watershed known as the Allah Valley Watershed, wherein the collected water is mainly drained through the Allah River into the Liguasan Marsh; The Allah Valley Landscape is bounded by the municipality of Lambayong, Sultan Kudarat in the north and T'boli, South Cotabato in the south. Its geographical landmarks are the Daguma Range in the west, Mt. Busa in the south, Mt. Roxas in the east and Pitot Kalabaw in the west. The watershed lies at coordinates between 6°3' to 6°27' latitudes and between 124 °28'30" to124°55'00" longitudes.

The Allah Valley Landscape has economic potential in agriculture with major crops grown include rice, corn, coconut, mango, banana, vegetables, and other agro-forestry crops. The area has potential for aquaculture production. The forest cover is estimated at 8,356 hectares of close canopy. The area has tourism and recreational spots potential. Trade and small-scale businesses flourish in the growth areas of Lake Sebu, Tboli, Surallah, Sto.Niño, Isulan, Tacurong City and Esperanza. Physical infrastructure and support systems are in place like, drainage, communication, power and electrification, and solid waste disposal.

The project area is inhabited by a mix of ethnic groups dominated by the Tboli's, Maguindanaoans, Manobos, B'laans, and migrants from the Islands of Luzon and Visayas. Based on the municipal profiles of the component municipalities, a total of 242,411 persons are at risk to flooding when Allah River rages.

1.2 The Project

The proposed Integrated Prevention and Control Management of IAS Project of ERDB-PAWB will be implemented in proper and sustainable manner in Lamlahak Subwatershed (Lambeten and nearby Sitios), Lamlahak, Lake Sebu, South Cotabato through the support of institutions and stakeholders.

IPCM Project for IAS will adopt the concept and methods of elimination and regaining the forest concept. This method or system is designed for forest restoration through the use of native tree species, over the exotic ones, planted with agricultural crops to enhance forest sustainability and diversity. The system aims to recreate as close as possible the original state of the forest, with most of the physical structure and

productivity matching the original ecosystem and biodiversity. Hence, regaining the forest concept coined from revegetation/rainforestation farming simply means planting crops and native trees in an area.

The project goal is to revive the ecological health and protect the biodiversity of the forests of Lamlahak Subwatershed by eliminating the IAS while improving the quality of life of the people residing in its vicinity. Specifically, the project aims to: (i) establish a sustainable management plan for revegetation; (ii) rehabilitate forest and reduce erosion in the area; (iii) educate and replace the destructive forms of farming practices like "kaingin" or the slash and burn; and (iv) develop alternative sources of income to improve the quality of lives of the people.

At the end of the project, it is expected to accomplish the following: (i) properly adapted and implemented sustainable management plan for Elimination of IAS and implement the Regaining the Forest Concepts (Revegetation/Reforestation); (ii) various and combination of native trees and some fruit trees for forest cover within the protected zone and the buffer zones appropriately selected and planted; and (iii) capacitate the farmers to adapt the select elements of the proposed system and integrate it in indigenous knowledge on farming practices.

The IPCM project activities include: (i) formulation and signing of MOA ; (ii) orientation workshop and training on Elimination of IAS and community revegetation; (iii) capacity building; (iv) site identification and farm plan preparation; (v) planting and growing of trees; and; (vi) performance monitoring of trees or crops.

1.3 Objectives

The overall objective of the project is to develop a Sustainable Integrated Prevention and Control Management of IAS Framework and implement this to protect the watershed while improving the quality of life of the people. The study will focus on four specific objectives namely:

1. To characterize the existing physical and biological condition of the watershed and vegetation of Lambeten/Lamlahak Subwatershed;
2. To determine the associated flora and fauna of *Piper aduncum* as an IAS in Lambeten/Lamlahak Subwatershed;
3. To determine the nature and extent of invasion in of *Piper aduncum* within the Lambeten/Lamlahak Subwatershed;
4. To prescribe pre-management plan for the conservation of natural resources.

The output of this assessment will serve as basis for the rehabilitation component of the Project that will complement the goal and mandate of ERDB and PAWB DENR. This will

also be used as a baseline data for monitoring, management, and a model in crafting other developmental projects beneficial to the watershed as an ecosystem and as a community.

1.4 Methodology

Primarily, activities undertaken in this aspect aimed at quickly building up the knowledge-base of the team members and come up with a concrete analyses, significant recommendations, and effective project management strategies which is useful in project development and implementation.

The derived knowledge from the reconnaissance field visit and review of existing (secondary) data assisted in the formulation of initial hypothesis concerning the biophysical circumstances within the area. These hypotheses were verified, modified or rejected as part of the primary data collection and analysis activities. The key activities conducted are the following:

- Collection and review of secondary data;
- Field reconnaissance; and
- Preliminary biophysical characterization of the area.

The ultimate aim of the characterization is to provide a clear and accurate understanding of its biophysical characteristics. It is necessary for the determination of the biophysical constraints and potentials relevant to the identification, design, development, evaluation and selection of appropriate management strategies. Also, it is vital in predicting the behavioral response of the watershed to the diverse environmental and socio-economic circumstances. Preliminary watershed characterization was based upon:

- Primary data collection;
- Assessment and description of the biophysical condition of the area

Biological Characterization *Flora and Fauna Assessment*

To characterize flora and fauna field within the subwatershed, survey and assessment was conducted. Sampling activities were conducted to characterize the composition and structure of the existing site condition within the subwatershed specifically with the area invaded by *Piper aduncum.*

Physical Characterization *though GIS Mapping and Land use and Change Analysis*

Survey and mapping of the entire area were conducted with the aid of GPS instrument (Garmin 12), project maps and secondary maps from National Mapping and Resource

Inventory Authority (NAMRIA) and other sources. The team traversed the entire sub-watershed and Global Positioning System (GPS) readings were then made along the boundaries of the different vegetation and land uses. The coordinates, elevation, accuracy, and important remarks were recorded. In some cases, illustrations of the areas were made for clarity and visualization. In addition, GPS readings of important landmarks such as the location of natural features, establishments, and road intersections were documented. A base map of subwatershed came from ERDB-DENR GIS Office was used as a reference guide and working map for the mapping exercises.

Geographic Information System (GIS) was key in the vegetation assessment that integration of spatial, temporal and survey data in maps aided the planning, implementation and analyses stages of the study. From the gathered field data, GPS readings were imported to ArcGIS and Arcview softwares to generate maps. The illustrations, important remarks and other secondary maps were also used in the different maps generation. Likewise, GIS analysis was made to produce decision maps and add a spatial dimension on the recommendations.

Survey and mapping of the portion of the study area were conducted with the aid of a GPS instrument (Garmin 12), project maps and secondary maps from NAMRIA, and other relevant sources. The team traversed the entire subwatershed of Allah Valley Watershed Forest Reserve and Global Positioning System (GPS) readings were taken along the boundaries of the different vegetation and land uses. The coordinates, elevation, accuracy, and important remarks were recorded. In some cases, illustrations of some areas were made for clarity and visualization. In addition, GPS readings of important landmarks such as the location of natural features such as rivers, settlements, establishments, trails and road intersections were documented. A base map from ERDB GIS Section served as a reference guide and working map for the team members.

GPS readings were plotted in GIS software to create maps and models. These were used for spatial analysis and identification of significant areas such as cultivated area, invaded area of *Piper aduncum,* forested areas, and plantations.

Tools for Analysis

- Biodiversity and ecological community analyses. It refers to the methods and analysis of abundance, diversity, variety and variability of a species, its composition, structure and relationships within the study area.
- Spatial analysis refers to the analytical procedures applied to spatially-referenced or geographic data such as slope, vegetation, drainage system, settlement areas and land uses. This is also useful in determining how a variable changes over space, such as land use and vegetation cover.

- Watershed approach – a coordinated approach focuses on biophysical, socio economic and institutional factors to address the environmental problems within hydrologically defined geographic area considering water flow and cycle.
- Landscape approach – an approach that is holistic and spatially explicit concept that considers geographic and socio economec factors of the environment and cultural construction to manage the natural resources

2

PHYSICAL ENVIRONMENT

SECTION 2
PHYSICAL ENVIRONMENT

2.1 Methodology

The physical environment of Allah Valley Landscape (AVL) or Allah Valley Forest Reserve Watershed (AVFRW) particularly the subwatershed of Sitio Lambeten and nearby Sitios, Lamlahak, Lake Sebu, South Cotabato was assessed using secondary data and actual field validation. The physical conditions of the study area was established using secondary sources such AVFRW and Lake Sebu information (technical and project reports), and maps of country, provincial and barangay shape files, Lamlahak and Lake Sebu Spot Map and Google Earth 2013.

The compendium of data from field observation, secondary (NAMRIA) and project maps from other relevant sources were processed and analyzed through GIS software. This enabled the creation of maps and models and spatial analysis for identification of significant areas such as cultivated area, forested areas, plantations and invaded area of *Piper aduncum.*

2.1 Geographical Location and Land Area

The Lambeten, Lamlahak Subwatershed is located at Lake Sebu Watershed as part of the Allah Valley Forest Reserve Watershed. The forest reserve is approximately 9,900 ha. of Lake Sebu Land Cover Area. The tributaries of the subwatershed drain to the Lake Sebu as the basin.

The Subwatershed supplies river that traversing the Barangay Lamlahak under the Municipality of Lake Sebu Province of South Cotabato. The study area was designated with an area of approximately 20 hectares and occupying the entire area of Sitio Lambeten and its vicinities. It is also lying between between 124° 42' 01.1" to 124° 41' 52.14" longitude and 06° 12' 19.0" to 06° 11' 54.8" latitude. Specifically, it is situated in the southwestern portion of the high mountain ranges of Lake Sebu River Basin. The forest area is categorized as timberland and watershed reserve. **Figures 1** and **2** shows the location map and administrative boundaries of Lamlahak Subwatershed.

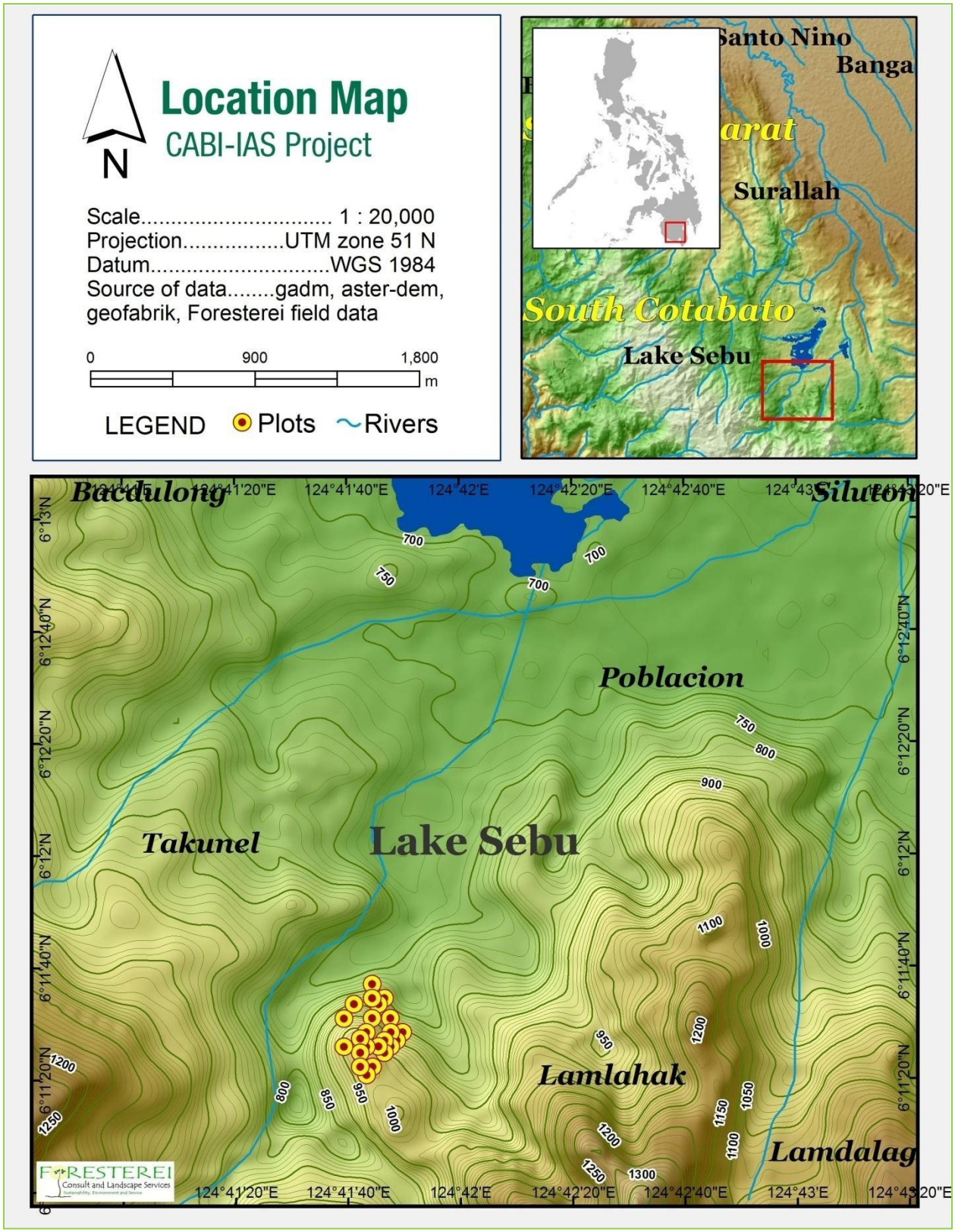


Figure 1. Location of Lamlahak Subwatershed, Lake Sebu, South Cotabato.

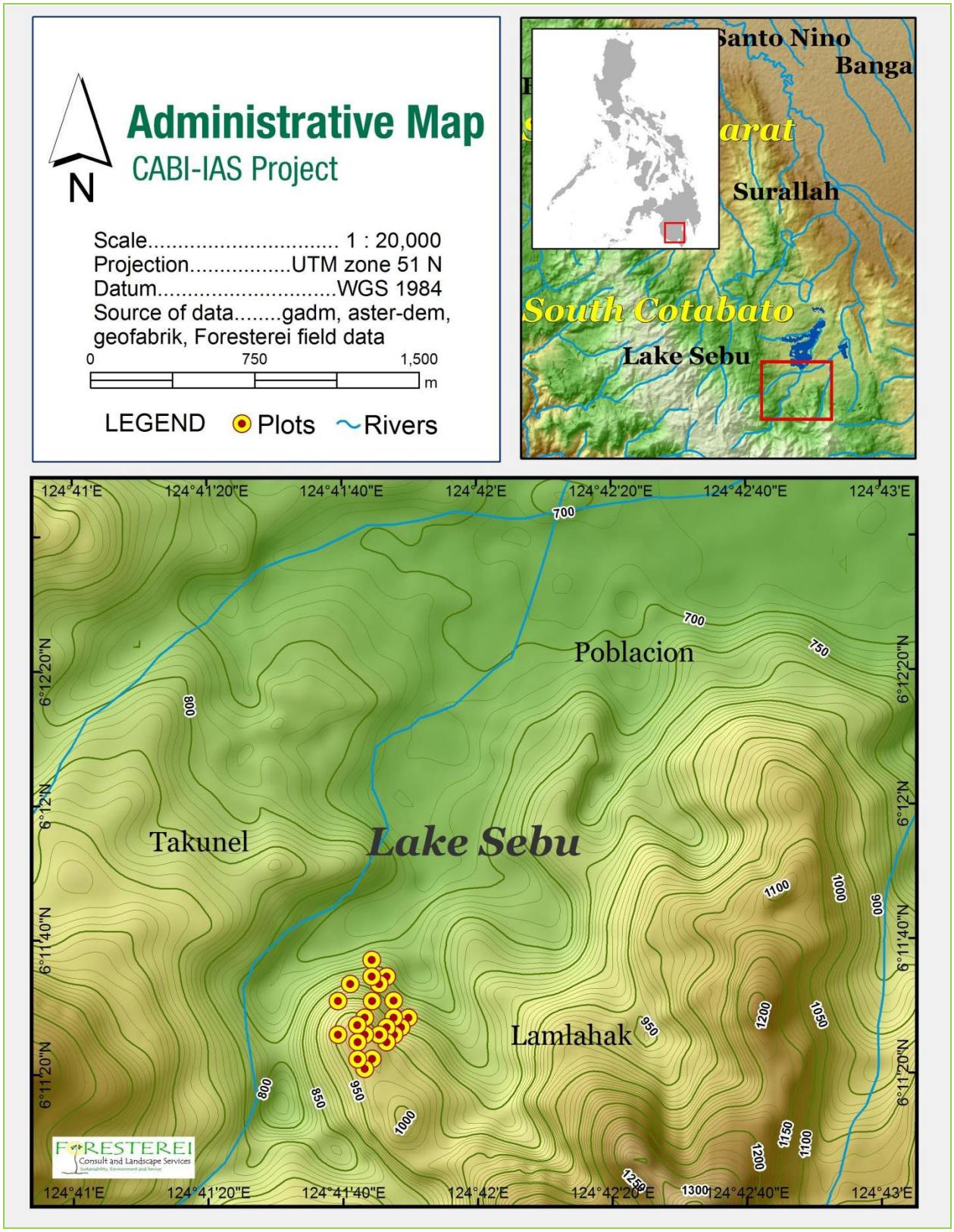


Figure 2. Boundaries of Lamlahak Subwatershed Lake Sebu, South Cotabato.

2.2 Topography, Slope, Elevation and Aspect

The topographic relief of the land surface, the direction of the trend of the mountain ranges, and the nearness to the bodies of water largely determine the direction of the prevailing wind, atmospheric humidity and the amount of rainfall. The terrain of Lake Sebu is predominantly rugged as evidenced by the presence of the Daguma and Talahik mountain ranges along the eastern portion of the municipality; Mt. Busa on the southeastern portion with an elevation of 2,064 meters; Pitot Kalabao Peak along the central portion with an elevation of 1,600 meters and Mt. Talili on the eastern portion with an elevation of 1,410 meters.

As shown in **Figure 3**, the study site lies within contour ranging from 700 to 1400 masl. The highest contour (1,416masl, based on GPS Reading) is concentrated in the southeastern section of the watershed and the terrain is sloping towards its eastern side. **Table 1 and Figure 4** shows the elevation class of the Lamlahak Subwatershed. Growth of trees diminished regularly and noticeably with increase in elevation. Winds are stronger at higher than lower elevation and the whole area is classified as high elevation.

Table 1. Area by Elevation Class of Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Elevation Class (masl)	Description	Study Area (ha)	Percent Distribution (%)
700 - 750	High Elevation	0.01	0.05
750 - 800	High Elevation	2.23	10.77
800 - 850	High Elevation	4.49	21.69
850 - 900	High Elevation	3.82	18.48
900 - 950	High Elevation	4.07	19.70
950 - 1000	High Elevation	6.06	29.30
TOTAL		20.68	100

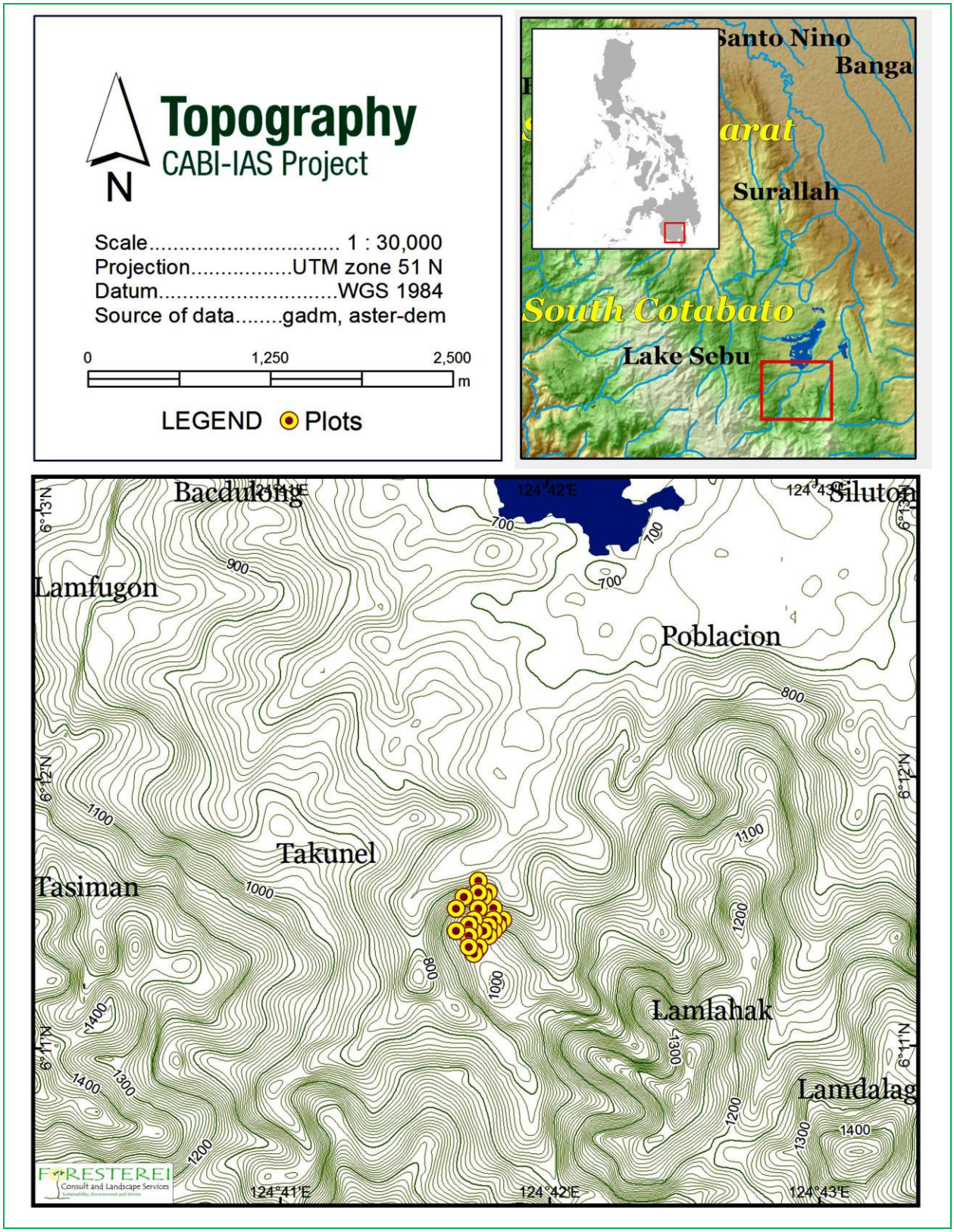


Figure 3. Topography of Lamlahak Subwatershed Lake Sebu, South Cotabato.

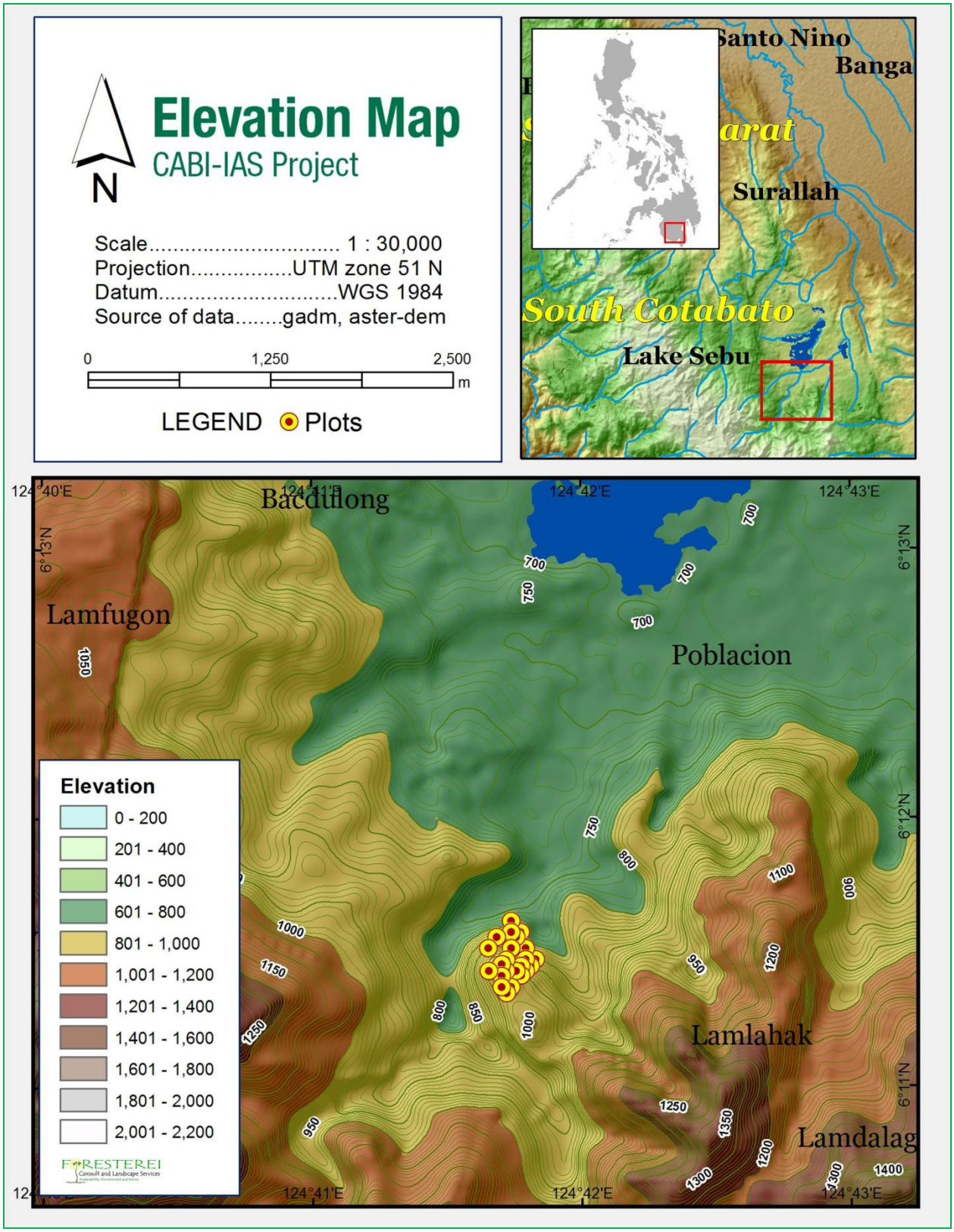


Figure 4. Elevation of Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Slope is important in relation to its effect on soil on run-off, drainage and upon the water content of the soil. Lamlahak Subwatershed is characterized by undulating to very steep rolling uplands, rugged hills and mountainous terrain. Most of the highly elevated portion of the area is situated on the southwestern side towards Barangays Takunel and Tasiman of Lake Sebu on the north and Municipality of Surallah on the east. As adopted on Allah Valley Watershed and Forest Reserve characterization, there are five categories of slope used in describing a watershed. These are 3-8% or level to gently sloping lands, 8-18% or undulating to rolling areas, 18-30% or rolling to steep slopes, 30-50% or steep to very steep slopes and greater than 50% or very steep slopes. In the case of Lamlahak Subwatershed, slope ranges from 15-25% which falls to the second to fifth categories (greater than 50%). **Table 2** presents the summary of slope categorization of study Lamlahak Subwatershed.

Table 2. Slope Category of Lamlahak Subwatershed, Lake Sebu, South Cotabato.

SlopeCategory/ Ranges	Description	Study Area(ha)	Percent Distribution (%)
3 - 8	Gently sloping lands to undulating	0.40	1.95
8 - 18	Undulating to rolling areas	0.97	4.67
18 - 30	Rolling to steep slopes	1.51	7.29
30 - 50	Steep to very steep slopes	4.50	21.75
50% and Above	Very steep slopes	13.30	64.34
TOTAL		20.68	100

Out of the 20.38-hectare of study area of Lamlahak Subwatershed, only 6.62% has a slope below 18% while the remaining 7.29% has slope higher than 18%. This implies that only 30% of the total land area can be a potential site for upland agricultural activities or farming as well as livestock raising and agroforestry farming. Based on **Figures 5**, this is located in the southeastern part of the watershed. The remaining 64% located in the greater eastern portion of the watershed is restricted because it is already classified as a forest, based on PD 705, otherwise known as Revised Forestry Code of the Philippines.

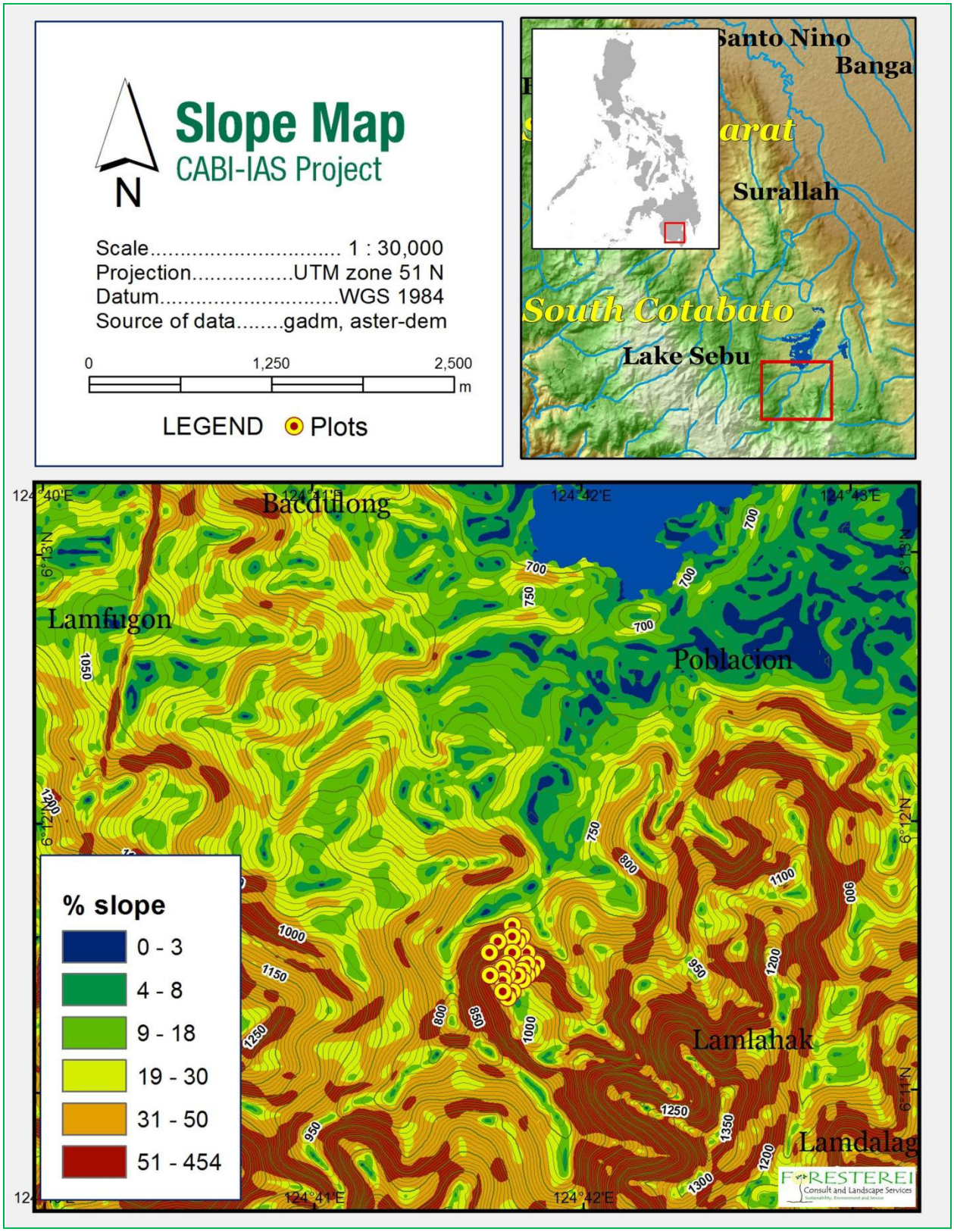


Figure 5. Slope of Lamlahak Subwatershed, Lake Sebu, South Cotabato.

The aspect or exposure of the slope determines the amount of sunlight received by a certain site. This turn, modifies the moisture content and the air and soil temperature, **Figure 6** and **Table 3** shows the aspect of the study site.

Table 3. Slope Aspect of the Lamlahak Subwatershed, Lake Sebu, South Cotabato

Aspect (Direction)	Study Area (ha)	Percent Distribution (%)
North	5.78	27.95
North-East	7.52	36.35
East	0.78	3.77
South-East	0.09	0.45
South	0.09	0.45
South-West	1.14	5.53
West	2.43	11.73
North-West	2.85	13.77
TOTAL	20.68	100

2.3 Climate

Generally, the Municipality of Lake Sebu falls under the 3rd and 4th Climatic type of the Corona Climate Classification as shown in **Figures 7 and 8**. The 3rd type is when there is a short dry season, usually from February to April and the 4th type is when the rainfall is almost evenly distributed during the whole year. This type is intermediate between the preceding two, although it resembles the first type more closely because it has a very short dry season. This is because the Municipality is shielded from the northeast monsoon but is exposed to the southwest monsoon and is also benefited by the rainfall caused by tropical cyclones. The average rainy days is recorded between 142 and 156 days with the months of June, July and September having most of the number of occurrence.

Average rainfall ranges from 1,500 to 2,500 millimeter per year. Air humidity generally follows closely the rainfall pattern. Humidity is highest during the period of June to October with 93% and the months of February and March have the lowest humidity recorded at about 68% to 75% only.

Maximum daytime temperature throughout the municipality is in the range between 36 and 38 degrees centigrade falling to 20 and 21 degrees centigrade during the night depending on the elevation. The hottest period usually occur in the months of April and May while the coldest mornings occur in the months of December and January.

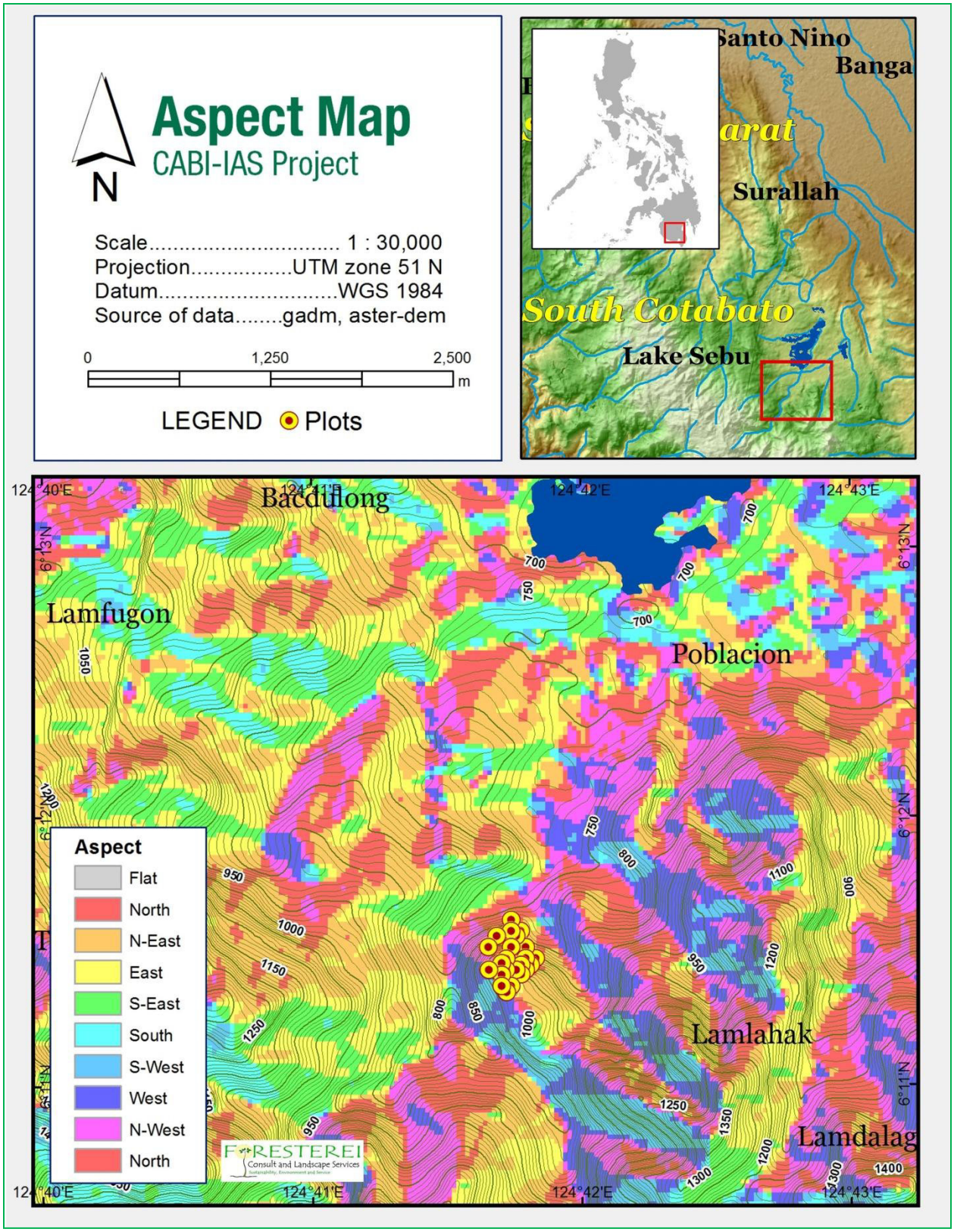


Figure 6. Slope Aspect of Lamlahak Subwatershed, Lake Sebu, South Cotabato.

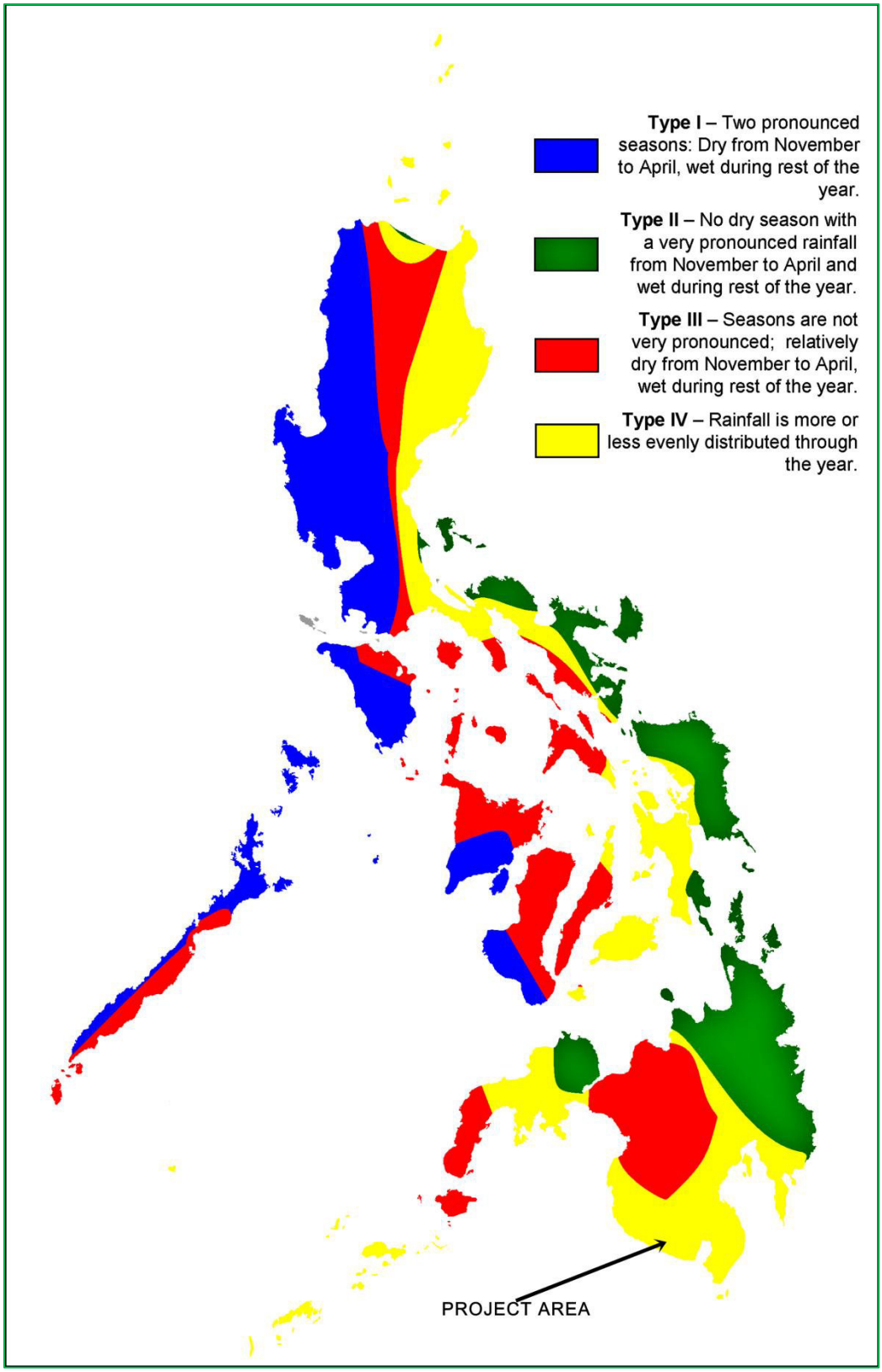


Figure 7. Climate Map of the Philippines.

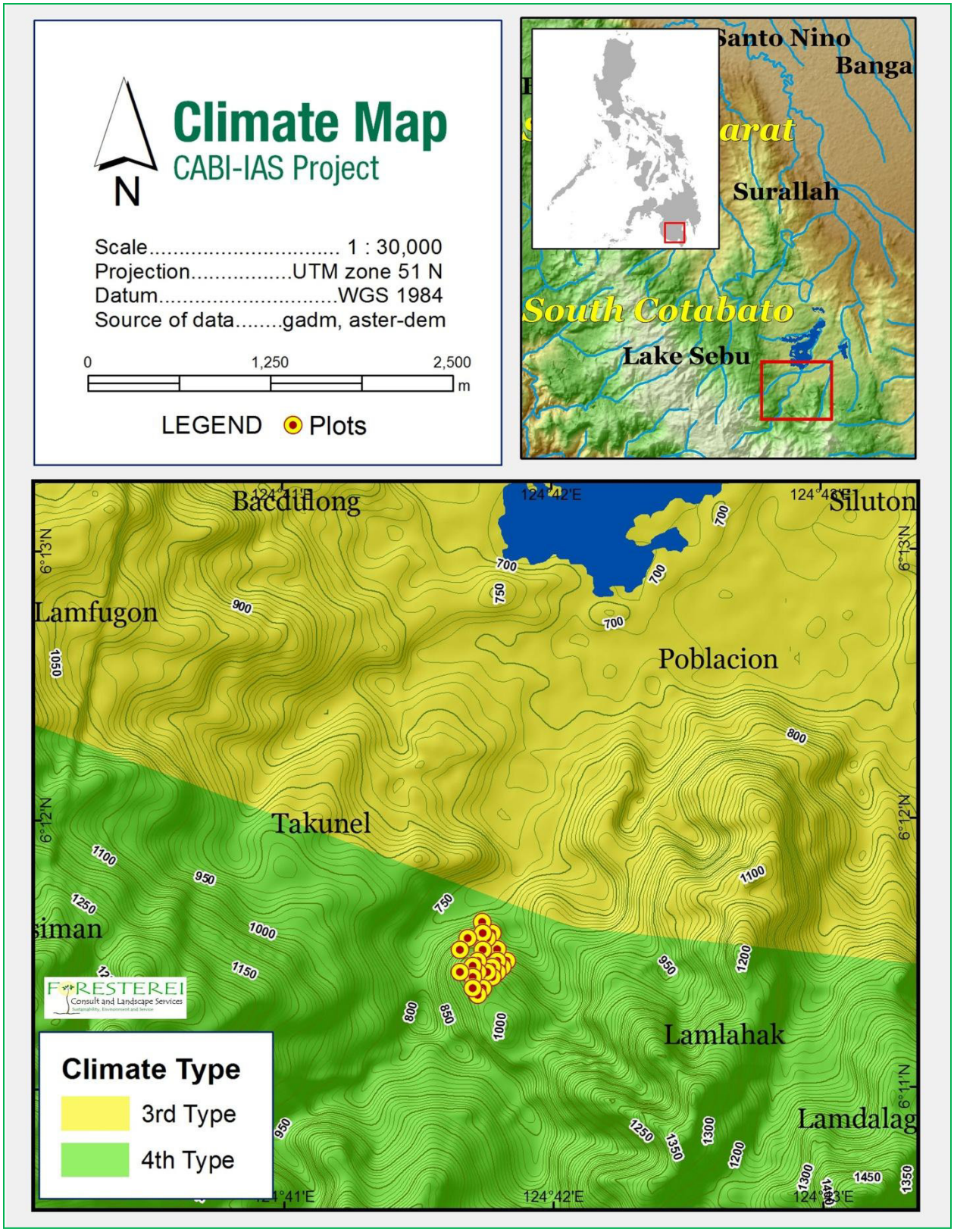


Figure 8. Climate of Lamlahak Subwatershed Lake Sebu, South Cotabato.

The area enjoys a mild, pleasant climate with no pronounced dry or wet season, and is practically typhoon-free. No typhoon or other climatic disturbances of considerable impact was experienced as the area is located outside the typhoon belt and protected by hills and small mountains surrounding it. Occasional flooding however, do occur during the onset of heavy rains. The prevailing wind in the area comes from southeast and the relatively weak wind that sweeps the region makes the condition possible for the formation of thunderstorms which usually occur any time during the year, even during the dry season. The prevailing type of climate in the area favors the cultivation of rice, vegetables, root crops and legume.

High amount of rainfall in the country is brought by tropical cyclones and an average of 1 cyclone per 12 year pass the province of South Cotabato as illustrated in **Figure 9**. Moreover, the subwatershed falls within Type 4 climate which basically receives evenly distributed amount of rainfall throughout the year.

2.4 Hydrology

Allah River crisscrosses almost half of the Empire Cotabato and serves as the natural boundaries of the many municipalities, discharging into the Rio Grande de Mindanao. Its length is almost 100 kilometers from its source.

The River gushes out from a crack of big rock, just a few meters in width, and flows in a soothing cold crystal clear spring at Sitio Demamis, Barangay Laconon, T'boli in the East, and Sitio Demamis, Barangay Klubi, Lake Sebu on the West, at the boundary of Maitum Municipality, Province of Sarangani. It flows downstream and combines with another river named Ga-ao River at Barangay New Dumangas where the origin is Lake Maughan.

The Ga-ao River is the most dreaded tributary so far, as any disturbance on the lake, would cause its waters to overflow causing tremendous damage downstream especially at Sitio Dalia, Barangay Edwards, T'boli and portion of Barangay Seloton, Lake Sebu. The Allah River and Ga-ao River meet at Barangay New Dumangas from the junction to Lake Maughan and run to an estimate distance of 15 kilometers. From the junction to Sitio Demamis, Barangay Laconon where Allah River originates, it runs to an estimated distance of 22 kilometers.

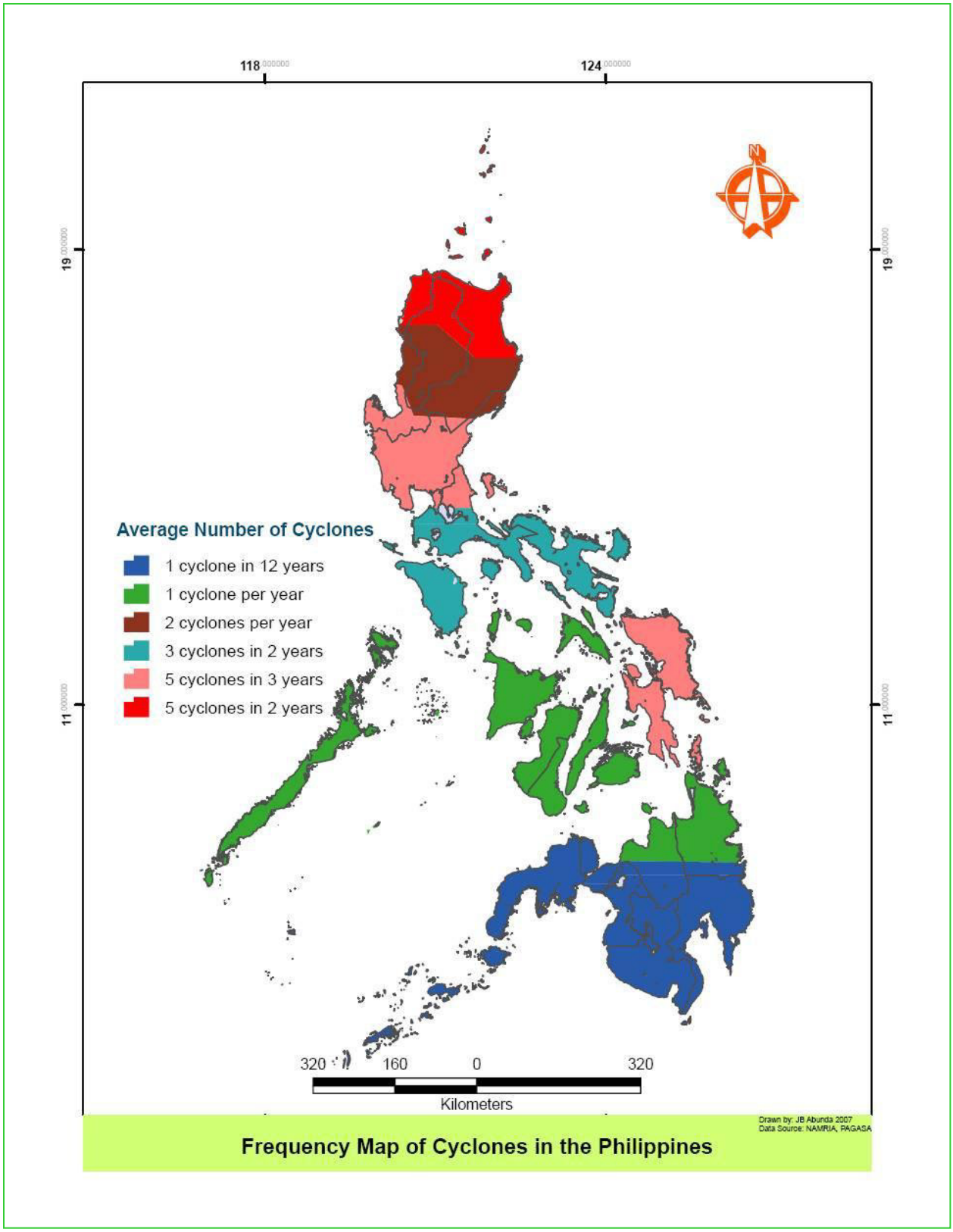


Figure 9. Frequency of Cyclones in the Philippines

At the Lake Sebu side, the Lowo-El River coming from Lake Sebu and the tributary river of Lake Seloton serve as the main source of seven falls located at Barangay Lahit. The seven falls are considered natural wonders of in the municipality of Lake Sebu. There are also 17 creeks and rivers that converge to form Lowo-El River which joins the Allah River at Barangay Colongolo Surallah, which is considered as a major tributary of Allah River Dam I. In the Municipality of Bagumbayan in the Province of Sultan Kudarat, there are 16 rivers and creeks. The Allah River Dam II utilizes the Sepaka River in Lake Sebu. It is situated between Barangay M. Roxas, Sto. Niño, and Bai Saripinang, Bagumbayan. Data obtained from the National Irrigation Administration (NIA) show that there are two dams constructed: one in Barangay Colongolo, Surallah in South Cotabato and the other one in Bo. M. Roxas, Sto. Niño and Bai Saripinang, Bagumbayan in Sultan Kudarat. There are three dams in Banga and Kapingkong Rivers; one in Barangay El Nonok, Banga, South Cotabato; one in Barangay Dumaguil, Norala, South Cotabato and the other one in Barangay Kapingkong, Lambayong, Sultan Kudarat.

The Allah River played a very important role in the early settlement and development of Cotabato. It serves as a major landmark of Central and Southern Cotabato. It carries with it economic opportunities and prosperity and, at the same time, political unity between provinces and the municipalities that it traverses. the Allah River, which is the most prominent structure in the watershed, has caused so much damage to environment, people and other resources in the landscape and to the adjacent areas due to recurrent overflow and resultant flooding that has been attributed to the heavy station of the powerful river and the breaches in the waterway. Allah River practically runs along the entire length of the watershed. Flooding has been a serious threat to lives, properties, and other resources in the landscape and neighboring areas. It will remain as such if no interventions will be introduced to manage it. The areas most likely affected are those that the River traverses.

Allah River plays an important role in the socio-economic development of Sultan Kudarat and South Cotabato as an abundant source of water. Due to the massive cutting of trees and clearing in the upland and along the bank for agricultural purposes, the bank has started caving in. with less vegetation holding the soil, erosion, siltation and meandering of the river has occurred. The National Government through the Department of Public Works and Highways (DPWH) tried to establish protection dikes to prevent massive floods but the solution is merely palliative in nature. Due to the meandering of the river, municipalities especially at the downstream experienced massive destruction to lives and properties.

The worst experience was in 1995, when a portion of the wall of Lake Maughan collapsed. Then in March 2002, a catastrophic earthquake struck. These two calamities recorded damage to properties estimated at almost 200 Million Pesos and loss of 100

lives. The operation of the dams stopped, bringing great hardship to a significant number of farmers. These grim realities and possibilities of worst scenarios are alarming to the environment and its people. If left unattended, this will cause unimaginable destruction to the environment and to the people.

There are three major lake formations in the municipality of Lake Sebu namely Lake Sebu, Lake Lahit and Lake Seloton. Lake Sebu has 354 hectares, Seloton has 75 hectares and Lake Lahit has 24 hectares. There are 40 major rivers and 103 springs located in different parts of the municipality. There are 13 of these springs which were developed into levels 1 & 2 water systems. The rest of the springs remained untapped for potable water systems of majority of the residents.

Lake Sebu is composed of 34 hectares and 7 islands. It has 3 lakes, 7 waterfalls which cover no less than 890 square kilometers. The municipality is a major producer of tilapia in the region. Tilapia production in fish cages is the main preoccupation of fish cage operators in Lake Sebu and Lake Seloton. In Lake Lahit, fish cages are not allowed to be set up after the local government unit cleaned up the lake from water lilies. Based on the 2000 Fishery Profile of the the Province of South Cotabato, 124 hectares of Lake Sebu was utilized for fish cages run by 280 operators. Lake Siloton has 26 hectares of its 75 hectares utilized for fish cages while Lake Lahit has 4 hectares of its 24 hectares.

Lamlahak Subwatershed is part of a larger river basin known as Allah Valley Watershed and Forest Reserve (AVWFR). As presented in **Figure 10**, there is only one river which flows within the watershed area; this river is considered as one of the tributaries of Lake Sebu. Groundwater availability map is shown in **Figure 11**. As shown, the area has fairly extensive and protective aquifers. The aquifers are protected by the forest itself.

2.5 Soils

Broadly, there are three (3) soil types present in the area. The most dominant soil type found in South Cotabato which makes up 80% of the total land area is the Faraon clay type. These are moderately good lands suitable for limited cultivation and less appropriate for urban development due to soil characteristics. Urban development would require very careful and complex soil utilization practices. This type is found in the innermost portion of the area, the Tamontaka clay type found in the areas along Rio Grande de Mindanao on the north and south directions. This type of soil has high fertility level, good lands which can be cultivated and suited for urban development but requires carefully, planned erosion control measures. The third type of soil is where settlements and other urban uses are highly concentrated. These are very good lands which can be cultivated safely and require very simple soil management practices and with high density for urban development.

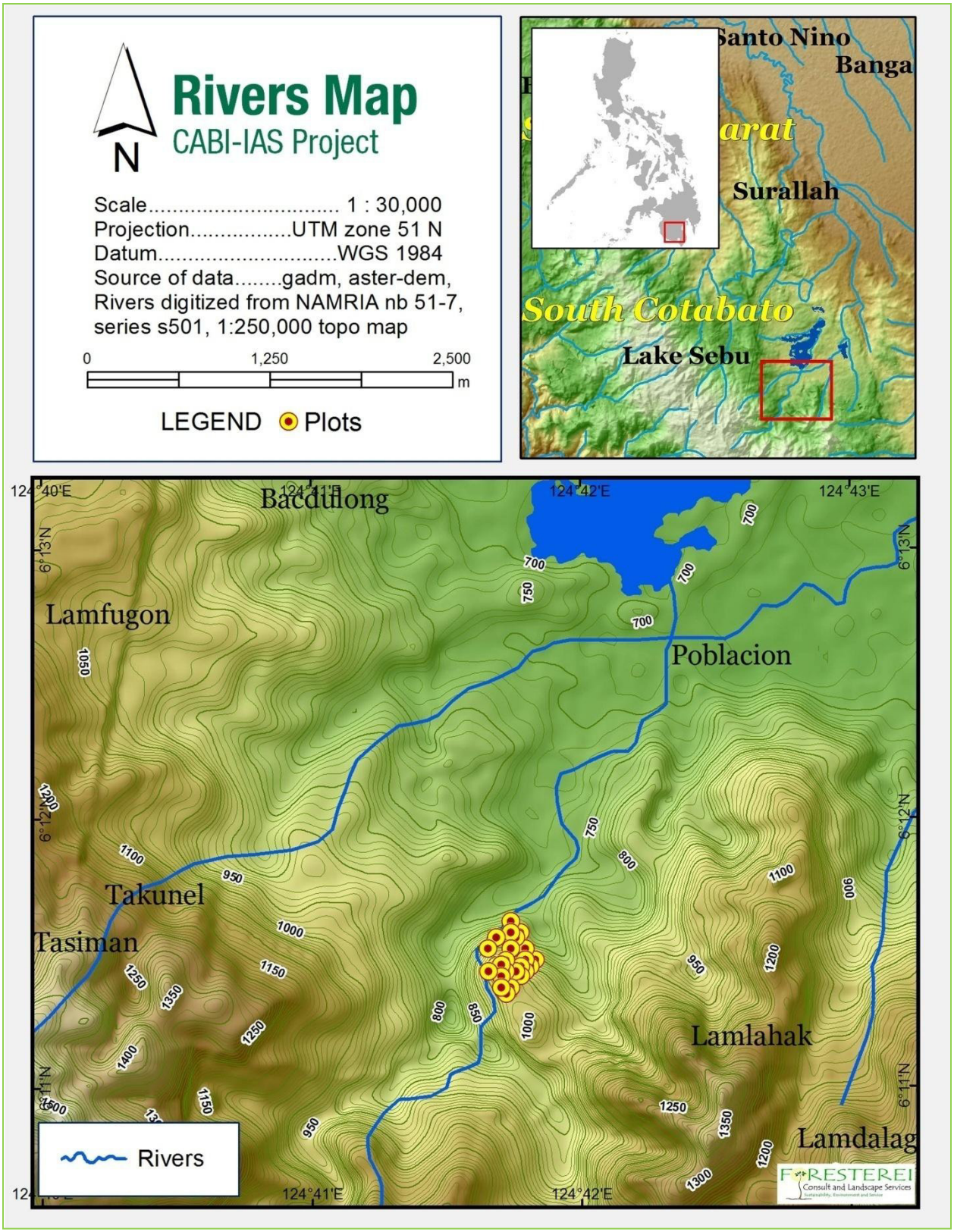


Figure 10. Hydrology of Lamlahak Subwatershed Lake Sebu, South Cotabato.

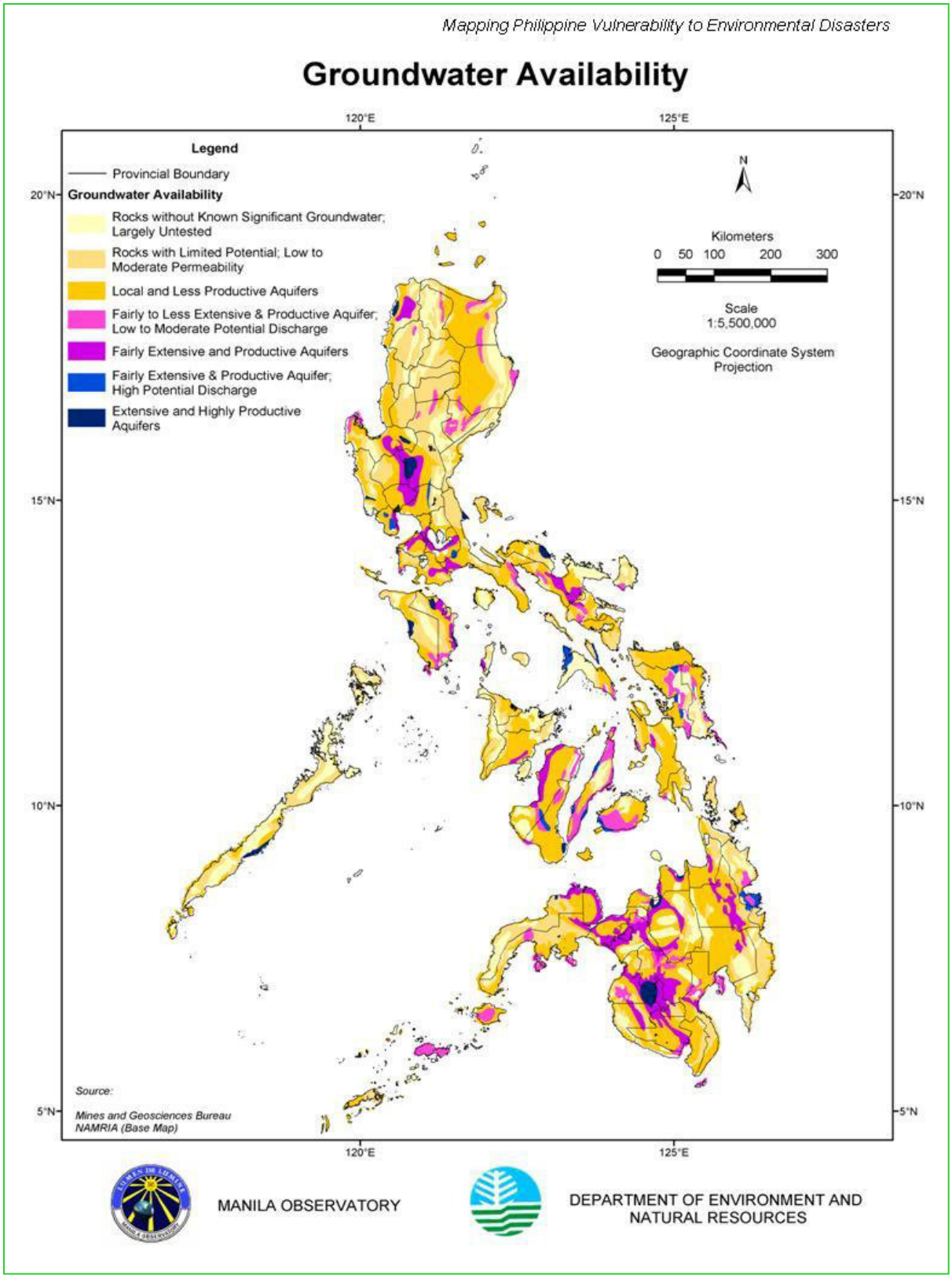


Figure 11. Groundwater Availability of the Philippines.

In South Cotabato, the susceptibility of the soils in the area to be eroded were those that are Erosion Potentials located along the river banks. Barangays located along low-lying areas occasionally experience flash floods brought about by heavy rains. Potential flooding areas are those found in almost all four directions in the north, south, east and west. The meandering and occasional braided courses of rivers could aggravate the flooding hazards of the area where these rivers are found especially during rainy season. Approximately, 85% of the soils in the area have good external and internal drainage while the other 15% have poor external and internal drainage.

2.6 Geology

Lamlahak Subwatershed generally consists of mountain ranges situated in the southeastern portion of Allah Valley Watershed and Forest Reserve (AVWFR). It is composed of Upper Miocene-Pliocene (Sedimentary and Rocks) characterized by the presence of modern plants and animals (mammals and birds) to modern marine mollusk fauna. This formation is largely marine clastics (molasse) overlain by extensive, locally transgressive pyroclastics (chiefly tuff, tuffites) and tuffaceous sedimentary rocks. **Figure 12** shows the geologic characteristics of the Lamlahak Subwatershed.

Regionally, the area lies within the Daguma Range and associated Daguma Fault, a major northwest-trending mountain range of Mindanao Island that lies at the southwestern coastal flank of the island. The Daguma Range constitutes the backbone of a Neogene magmatic arc that lies parallel to its associated northeast-verging subduction zone physiographically manifested as the Cotabato Trench, located about 100 km southwest offshore in the Celebes Sea. Tectonically the project is associated with splays of the Daguma Fault, locally named the Desawu ("Desawo") Fault and Kematu ("Kematau") Fault. The immediate area is underlain by dacitic to andesitic, locally basaltic agglomerates, flows and tuffs, intruded by high level dacite porphyry of the Daguma Diorite. Current exploration is focused on a structural corridor defined by the north-westerly trending Kematu and Desawu Faults with several east-west vein systems with an overall dip of 65 degrees south and associated with fault structures near the southern margin of the intrusive. Local rocks consist of andesites, agglomerates, ash flows and basalt related to eruptions from Mt. Parker. The tuffaceous suite has been intruded by dacite porphyry. Petrographic work conducted by the Philippine Mines and Geosciences Bureau in 2012 on samples defined the tuff as a dacite, lapili tuff and confirmed the composition of the dacite with approximately 5% quartz. The Project area topography is dominated by paleo-volcanic piles and intrusions that have been rapidly eroded by the tropical climate that has created a geomorphology of steep volcanic slopes, ridgelines, incised rivers systems and local broad fertile plains.

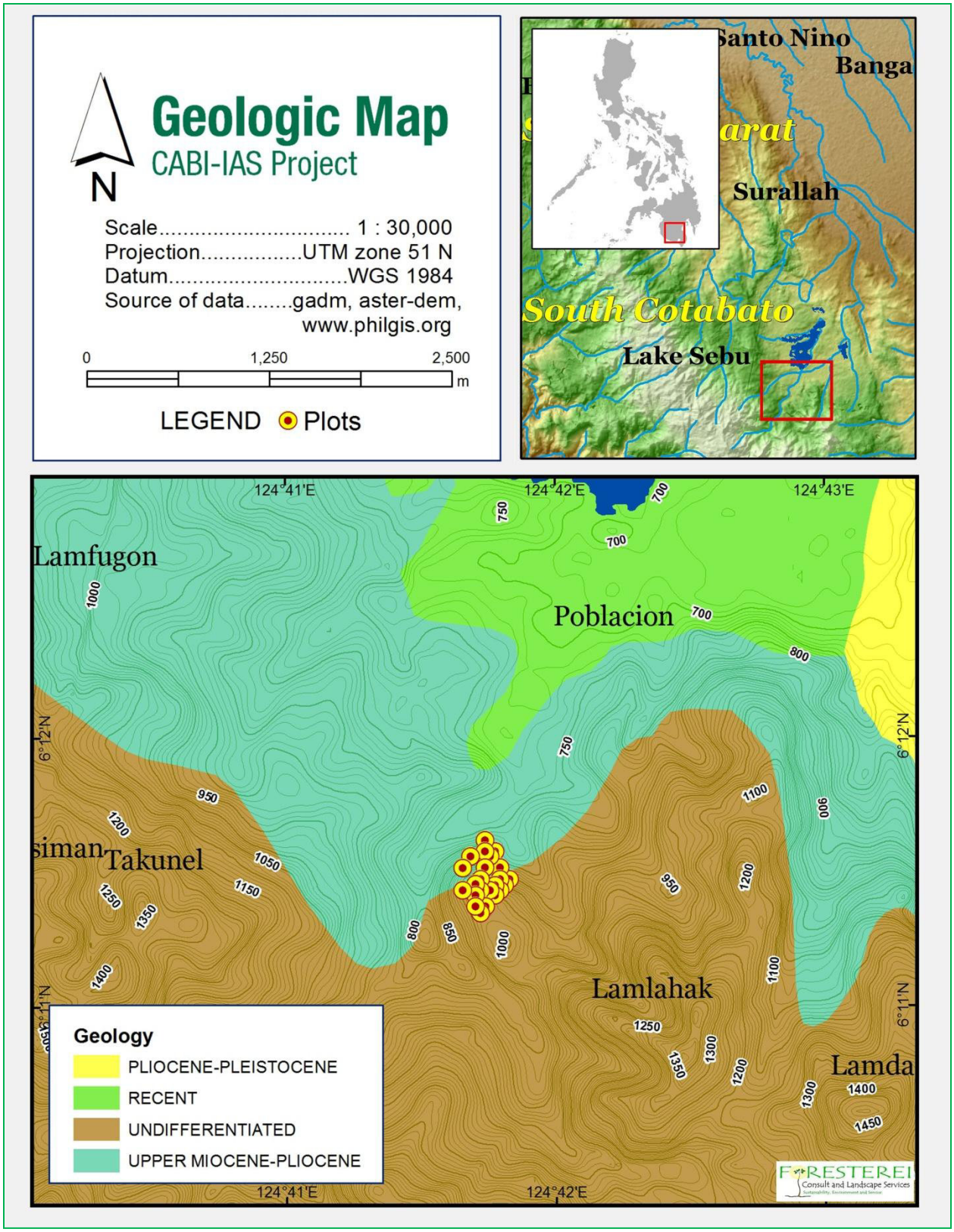


Figure 12. Geology of Lamlahak Subwatershed Lake Sebu, South Cotabato.

2.7 Land Classification, Cover and Use

Lands of the public domain are classified into agricultural, forest or timber, mineral lands, and national parks under the 1987 Philippine Constitution. The two major land classifications and considered as lands of the public domain are the Alienable and Disposable (A & D) and the Forest lands. A & D lands pertain to those which have been declared but not needed for forest purposes. It is limited to lands identified as agricultural lands and may be further classified according to the uses to which they are devoted. Forest lands are areas in the public domain that have been classified for forest use such as public forest, permanent forest or forest reserves, timberlands, grazing lands, game refuge, bird sanctuaries, and areas which are not yet declared as A & D.

Under Philippine Law, the implementation of a project within a specific area is covered by an official declaration of land classification. It is thus important to determine and understand the existing land use within the study area and compare this to what was legally classified by the local and national government.

The total land area of the Lake Sebu municipality is 89,138 hectares. It is composed of 19 barangays with Ned considered the biggest barangay with 46.3% of the town's area (**Table 4**).

Table 4. Land Capability of Lake Sebu, South Cotabato

Land Use	Area (hectares)	Percentage (%)
Cultivated Land	22,492	25.3
Pasture Land	9,130	10.2
Forest Land	54,902	61.6
Built-up Area	466	0.5
Lakes/Miscellaneous	2,148	2.4
TOTAL	**89,138**	**100.00**

Source: Profile from the websource, undated

Lake Sebu's remaining forest area is approximately 54,902 hectares or 61.6% of the total land area of the municipality. This includes an area of 20,122 hectares of the Tasaday-Manubo, Blit special forest under Proclamation No. 995; 2,635 hectares of Datu Mafalen Civil Reservation under Proclamation No. 115.

Of the recorded 22,492 hectares devoted to agriculture, 2,237 hectares are irrigation lands, 14,194 hectares are available for upland agricultural production especially corn

production and the remaining areas are for orchards, mixed plantations and other crops.

Among the agricultural crops, corn is the major crop grown in the study site. Rice is also grown both at the lowlands and uplands. In addition, abaca, which is the raw material for tinalak processing and weaving, also abounds in the area. Durian, rambutan and lanzones are among the fruit trees that are being grown by the local populace. Bananas and root crops mainly for local consumption while vegetables especially tomatoes are grown in certain areas in the municipality.

The land classification of Lamlahak Subwatershed is identified as forest reserve. As a forest reserve area, the authority to regulate the cutting, collection, and removal of timber and other forest products is in accordance with the Forest Laws and regulations of watershed protection and timber production. The Department of Environment and Natural Resources has the full administration and control on this area. Hence, proper coordination and well-documented agreements and processes of project implementation are needed. **Figure 13** shows the land use and land cover of Lamlahak Subwatershed categorized as forestlands mixed with brushlands and grasslands.

The existing land use of Lamlahak Subwatershed and study area based from the general observation are forest which is secondary in nature, plantation, brushland, agriculture, and agroforestry. Piper aduncum stands are dominant from lowland to upland occupying forest and gap areas.

The area comprising 12 hectares of forest stands enfold the uppermost portion of the area down to the lowland and rolling areas. Agricultural areas are mostly found in the lowland to upland from 700 masl to 1000 masl. Brushland and grassland are intensely identified on the southwestern side of the watershed up to 900 masl while the agroforestry farms occupy the lower elevation of the watershed. Sighted plantation areas are mostly on the northern, eastern and western portion of the watershed area. The agricultural and brush land comprise the 9 hectares of grassland (NAMRIA Landcover, 2003). The land use map is just a projection map of the area based on limited gps readings from the biological survey. Ground truthing is still recommended to validate the boundaries of each land use type.

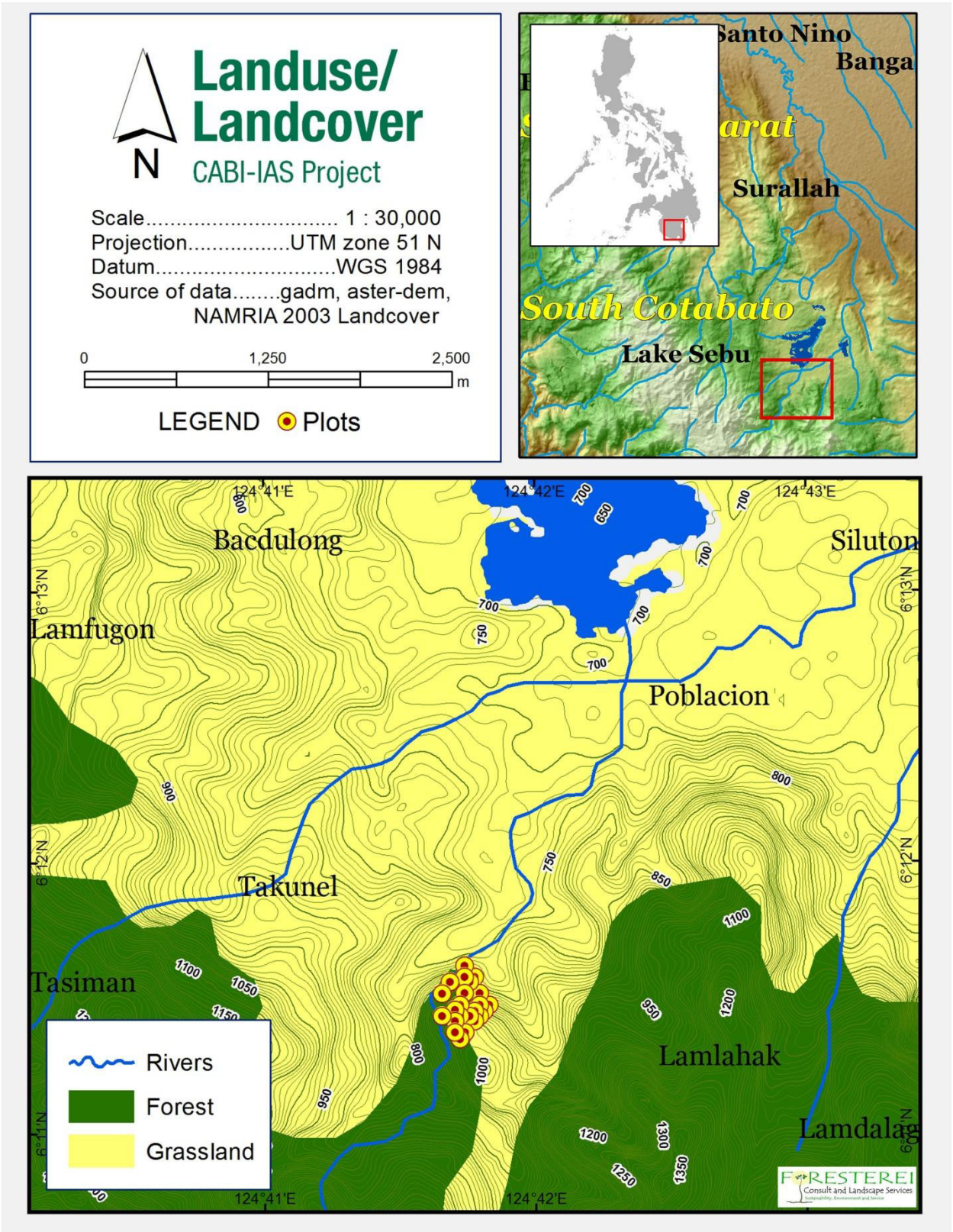


Figure 13. Land Use/Land Cover of Lamlahak Subwatershed Lake Sebu, South Cotabato.

2.8 Geologic Hazards

Geologic hazards are conditions or phenomena that present risks or potential dangers to life and property, either naturally occurring or man-made. There are four major types of geologic hazards listed by the Mines and Geosciences Bureau (MGB): mass movements; earthquake-related hazards; volcanic hazards and; hydrologic hazards. The risk of the study area to the geologic hazards mentioned above will be discussed in this section.

2.8.1 Earthquake-related Hazards

Earthquake related hazards discussed in this section are ground shaking, liquefaction, landslides and tsunami.

Ground vibration or shaking results from the passage of seismic waves produced during an earthquake. Intense ground shaking is the main hazard associated with earthquakes, ground rupture/fissuring, liquefaction, and landslides as collateral hazards. The intensity of ground shaking is dependent on the magnitude of the earthquake, proximity to the source, and ground condition. The potential earthquake generators that may affect the study area is shown in **Figure 14.**

Earthquake hazard and risk map is shown in **Figure 15.** The risk to earthquake of the study area is high that Lake Sebu is within an area that is seismically active. In the same manner, risk to earthquake-related hazards such as earthquake-induced landslides and tsunami is high as shown in **Figure 16**.

2.3.2 Volcanic Hazards

There is no known volcanic hazard in the study area as there is no active volcano proximal to the project site as shown in **Figure 17.**

2.3.3 Hydrologic Hazards

The relatively high annual rainfall received in the area, as well as the area's topography suggest that the area is vulnerable to hydrologic hazards such as flooding and severe erosion (caused by extreme hydrologic events).

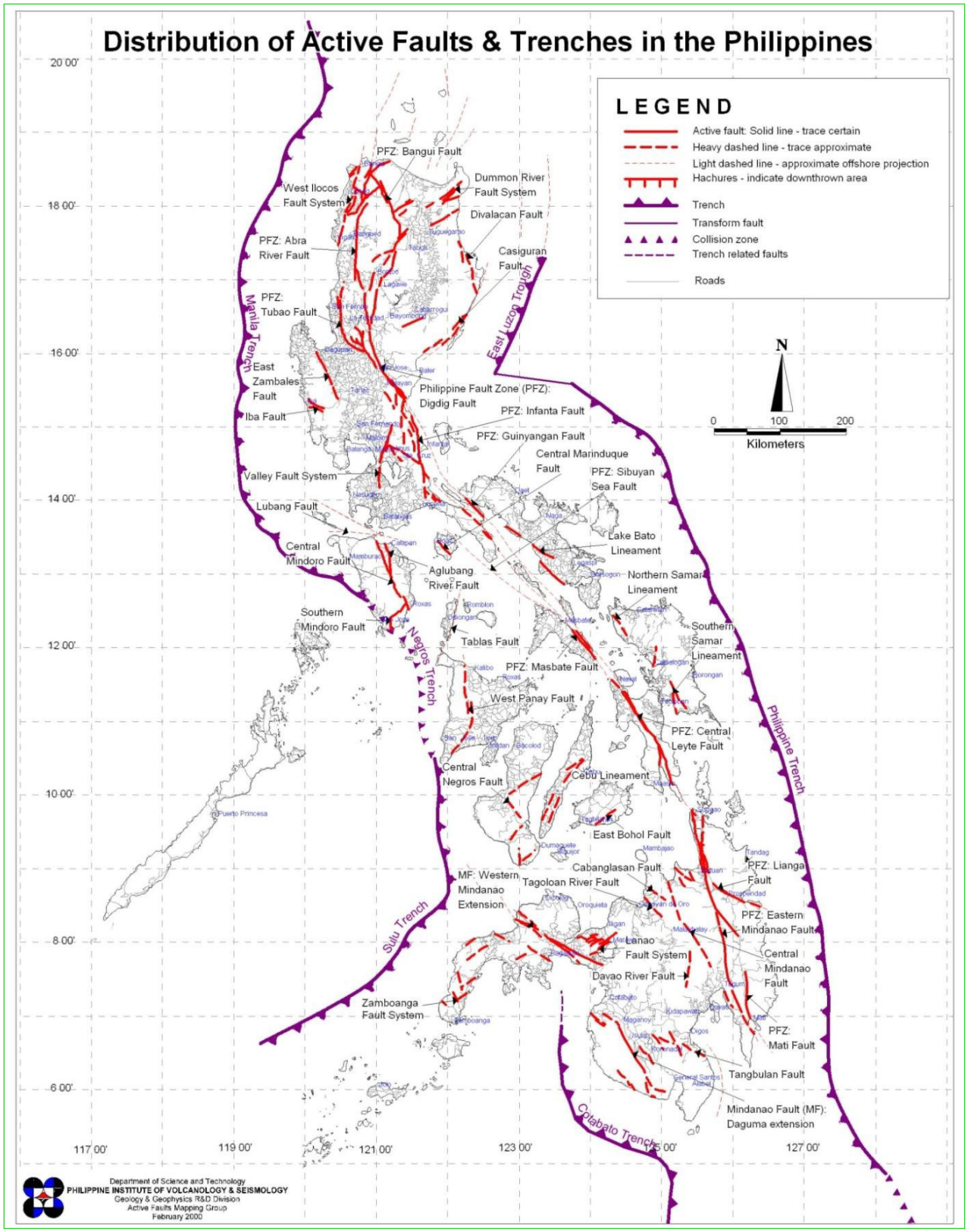


Figure 14. Distribution of Active Faults and Trench of the Philippines

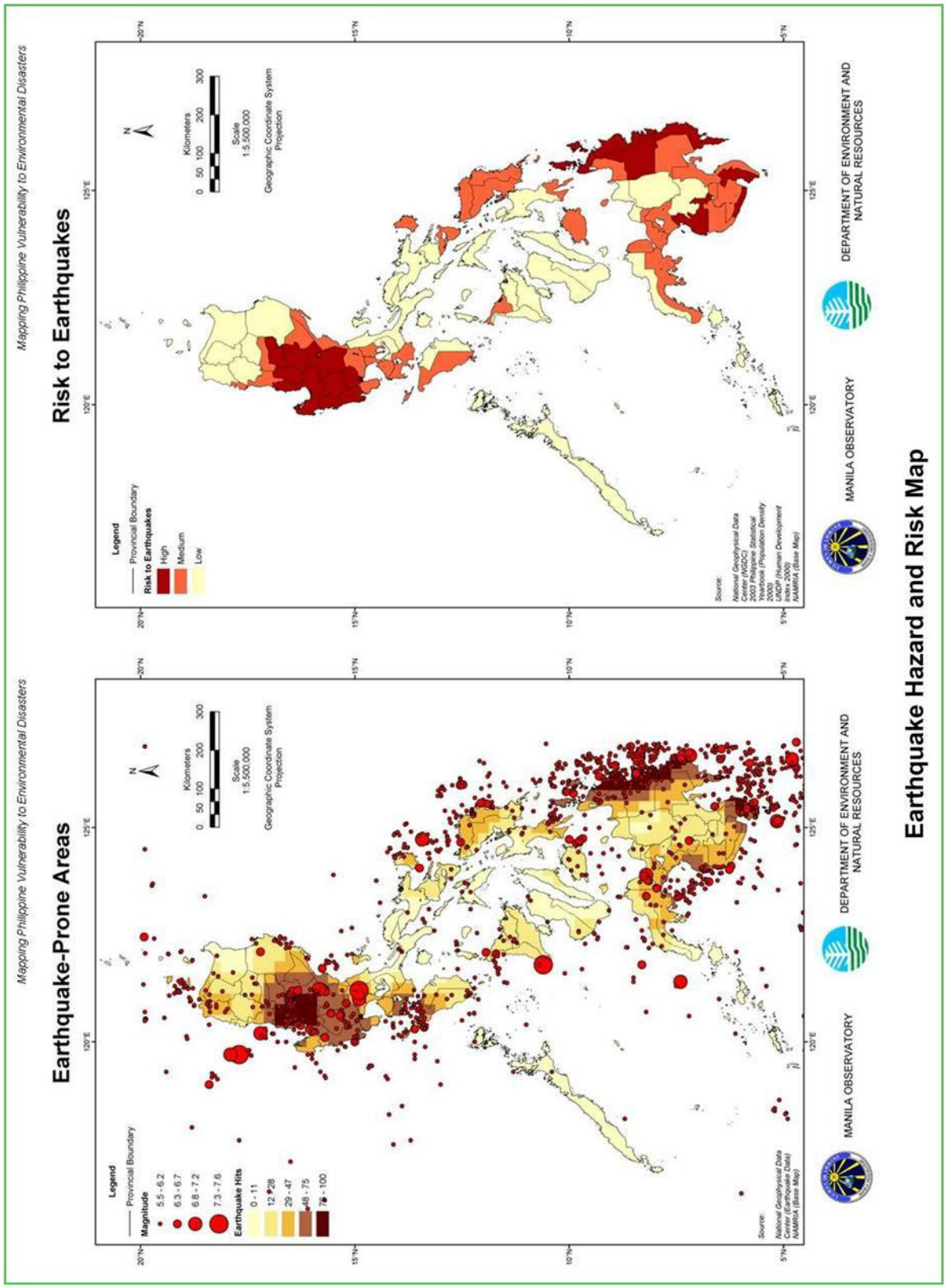


Figure 15. Earthquake Hazard and Risk of the Philippines.

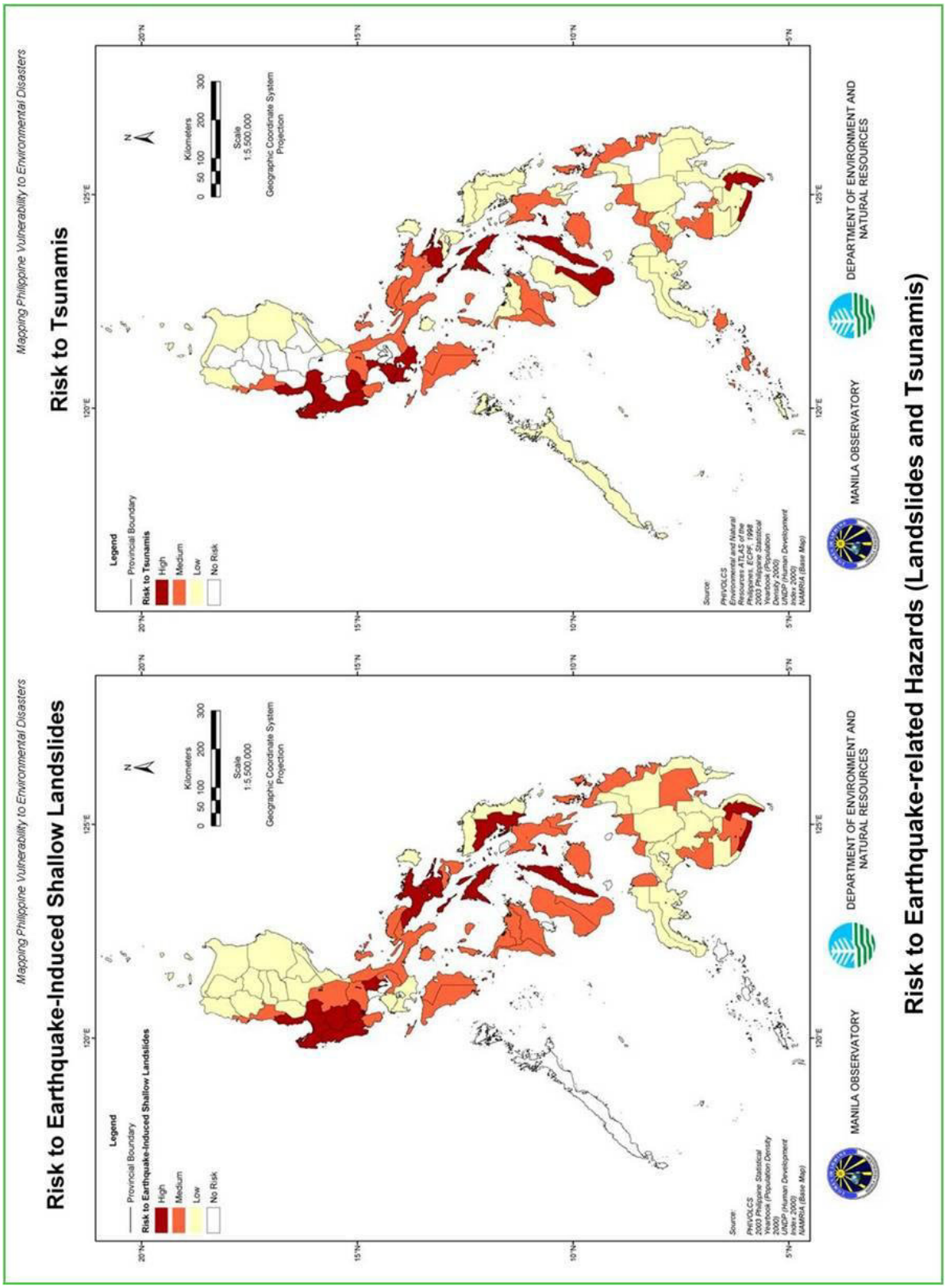


Figure 16. Risk to Earthquake-related Hazards (Landslides and Tsunamis) of the Philippines.

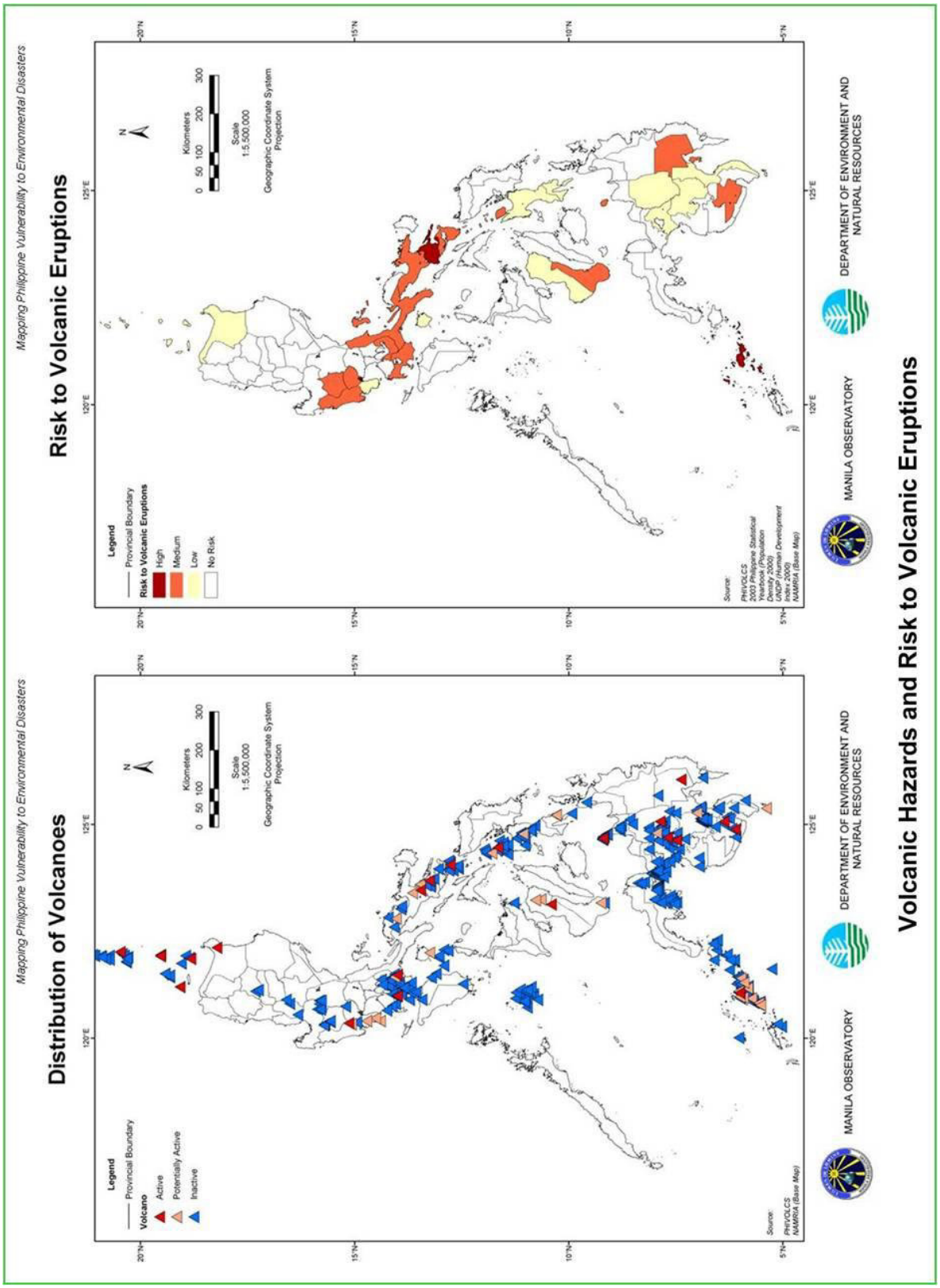


Figure 17. Distribution of Volcanoes and Risk to Volcanic Eruptions in the Philippines

3

BIOLOGICAL ENVIRONMENT

SECTION 3
BIOLOGICAL ENVIRONMENT

3.1 Methodology

Assessment of vegetation and habitat analysis was employed through a field survey to characterize the floristic and faunal composition of the Lambeten/Lamlahak Subwatershed, Lake Sebu, South Cotabato.

3.1.1 Landscape Approach

Landscape is a holistic and spatially explicit concept that is much more than the sum of its components: terrain, soil, land cover and use. It can be viewed as a cultural construction. Central to this approach is the use of maps such as vegetation, land use, digital elevation model (DEM) and topographic maps. Certain landscape elements with the current land uses were identified, delineated and overlaid in its corresponding vegetation map to determine the relationships with one another.

The maps overlays were used to plan for the, reconnaissance, ground verification and sampling activities. Reconnaissance survey was conducted to determine the sampling procedure to be employed for the field data collection for the study. This enabled the team to gather the residents' perception of the landscape type in the area. With these, a survey plan was developed.

3.1.2 Selection of Sampling Sites

The sites for flora and fauna survey were selected through a pre-survey analysis which includes literature review, map analysis, and consultation with persons familiar with the area. The assessment focused on the watershed areas and its vicinities with natural forest and on areas identified from survey maps during the pre-survey planning. The survey team concentrated on Lamlahak Subwatershed Area located southwestern of the Lamlahak, Lake Sebu, South Cotabato. The area was selected by the ERDB and PAWB DENR relevant to the assessment of IAS area (community arrangement, accessibility and consent of the lot owners) and based on the existing forest cover and drainage characteristics.

Field reconnaissance within Lambeten/Lamlahak Subwatershed Area was undertaken to select the specific location of the plots and transects for plants and animals. The team was assisted by the community residents (T'bolis) in validation of the areas included in the survey plan using 1:20,000 scale topographic or land use map and a compass.

The selection and delineation of specific sampling sites/plots/stations within the study area for flora and fauna was made on-site. The team ensured that observation areas were distributed within the study site. Locations of the sampling stations were determined using a standard random procedure. All subsequent findings or data were linked to the existing vegetation as habitat of wildlife found along the established sampling stations. **Table 5** shows the plots and its location.

Table 5. List of Identified Sampling Sites, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Sites	Land-use	Terrain	Stand Condition	Number of Plots/Transects/Observation points	Location / Remarks
Site 1	Riparian Vegetation/ Secondary Forest/ Farm/Plantation /*Piper aduncum* Stand	Along the creek, Sloping	Disturbed, Invaded by *P. aduncum*	1 transect with 12 observation points	North to West
Site 2	*Piper aduncum* stand/ Farm/Plantation/ Brushland	Very Steep to Undulating	Disturbed, Invaded by *P. aduncum*	1 transect with 14 observation points	Center to the South
Site 3	Brushland/ Farm/Plantation/ *Piper aduncum* stand and Riparian Vegetation/Secondary Forest	Undulating, Very Steep	Disturbed, Invaded by *P. aduncum*	1 transect with 9 observation points	Center to South
Site 4	Riparian Vegetation/Brushland/ Farm/Plantation	Flat to Rolling area	Disturbed, Invaded by *P. aduncum*	1 transect with13 observation points	Center to East
Site 5	Brushland/ Grassland/ Secondary Forest/ Farm/Plantation	Rolling area	Moderately Disturbed	1 transect with 21 observation points	Southeast to Northeast
Site 6	Farm/Plantation /*Piper aduncum* Stand	Undulating, Very Steep	Disturbed, Invaded by *P. aduncum*	24 plots/1 transect with 15 observation points/ trnasect for flora was divide into 8 sections.	Southwest
Site 7	Seedling Nursery/ Human Settlement	Undulating., Flat Areas	Very Disturbed, Patches of *P. aduncum*	1 transect with 10 observation points	North

Based on the existing forest cover and drainage characteristics, the project area was divided into seven (7) sampling sites and 24 plots (100 square meter plot for invaded area of *Piper aduncum* at Sampling Site 6) established and inventoried for vegetation analysis as presented in **Figure 18.** To determine the habitat – species relationship, sampling sites for wildlife vertebrates were established within the sampling area of the vegetation and additional transects within the vicinities of the project site.

3.1.3. Site Description and Physical Characteristics

This includes important physical details and other site factor information of the sampling sites. Within each established plot, the following site characteristics were taken:

1. Slope (%);
2. Elevation (masl);
3. Aspect or exposure;
4. Soil characteristics;
5. Presence and characteristics of river, creeks or streams;
6. Vegetation cover and dominant plant form;
7. Landform;
8. Presence of wildlife vertebrate and; and
9. Geographic position.

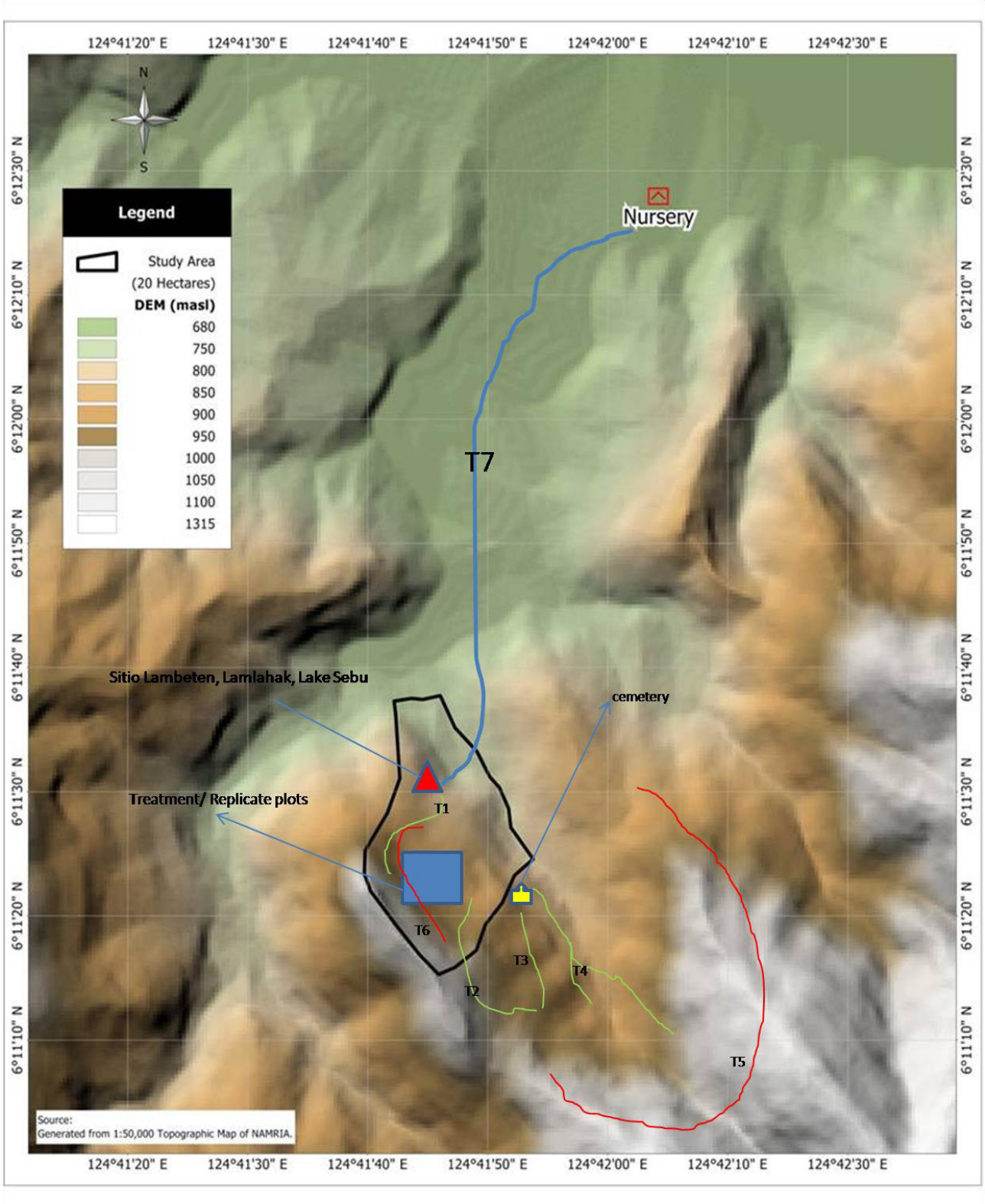


Figure 18a. Geographical Location of the Seven Sampling Sites and Treatment Plots, Lamlahak Subwatershed Lake Sebu, South Cotabato.

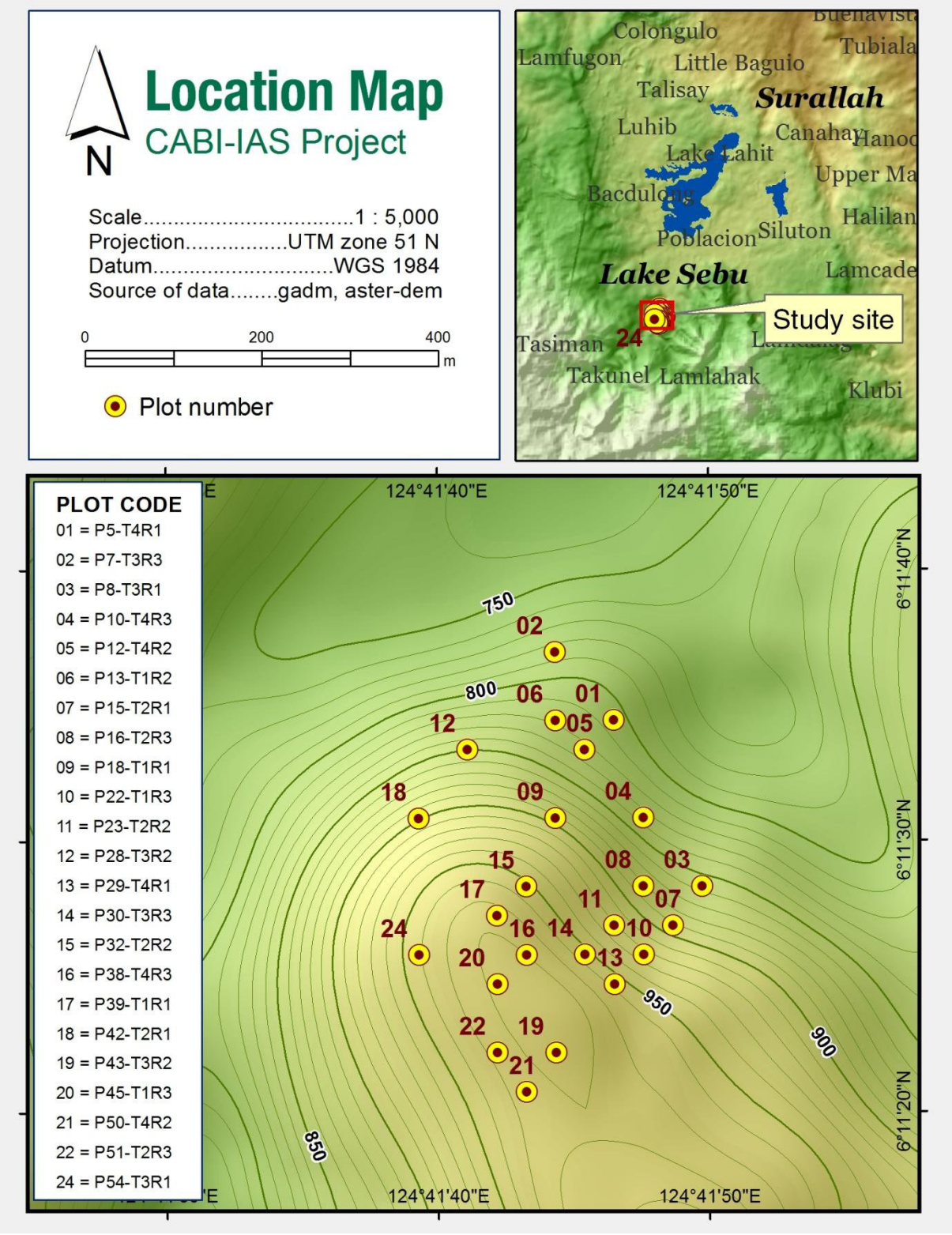


Figure 18b. Geographical Location of the 24 Treatment Plots, Lamlahak Subwatershed Lake Sebu, South Cotabato.

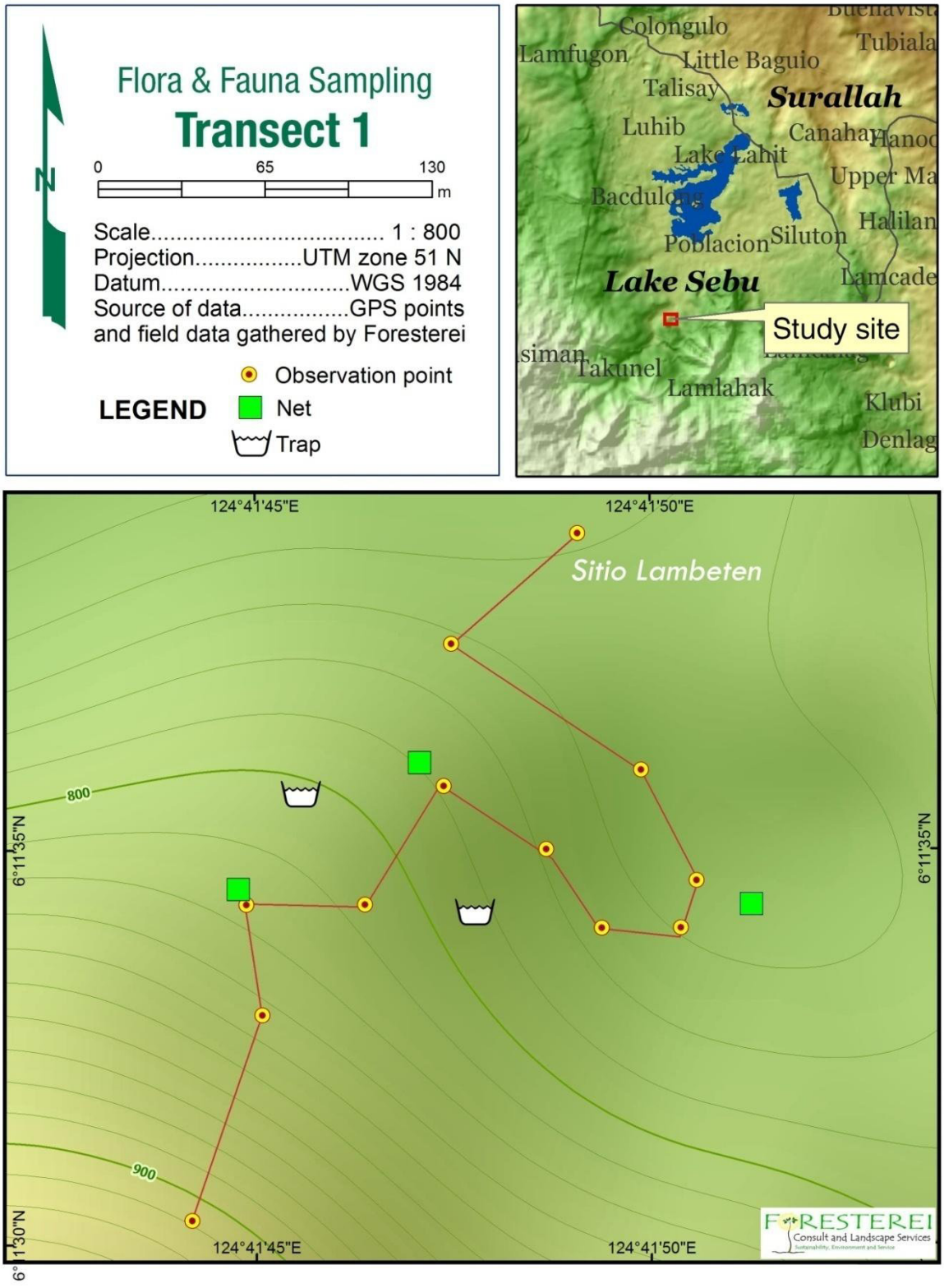


Figure 18c. Geographic Location of the Site 1(Wildlife Vertebrates and Arthropods), Lamlahak Subwatershed Lake Sebu, South Cotabato.

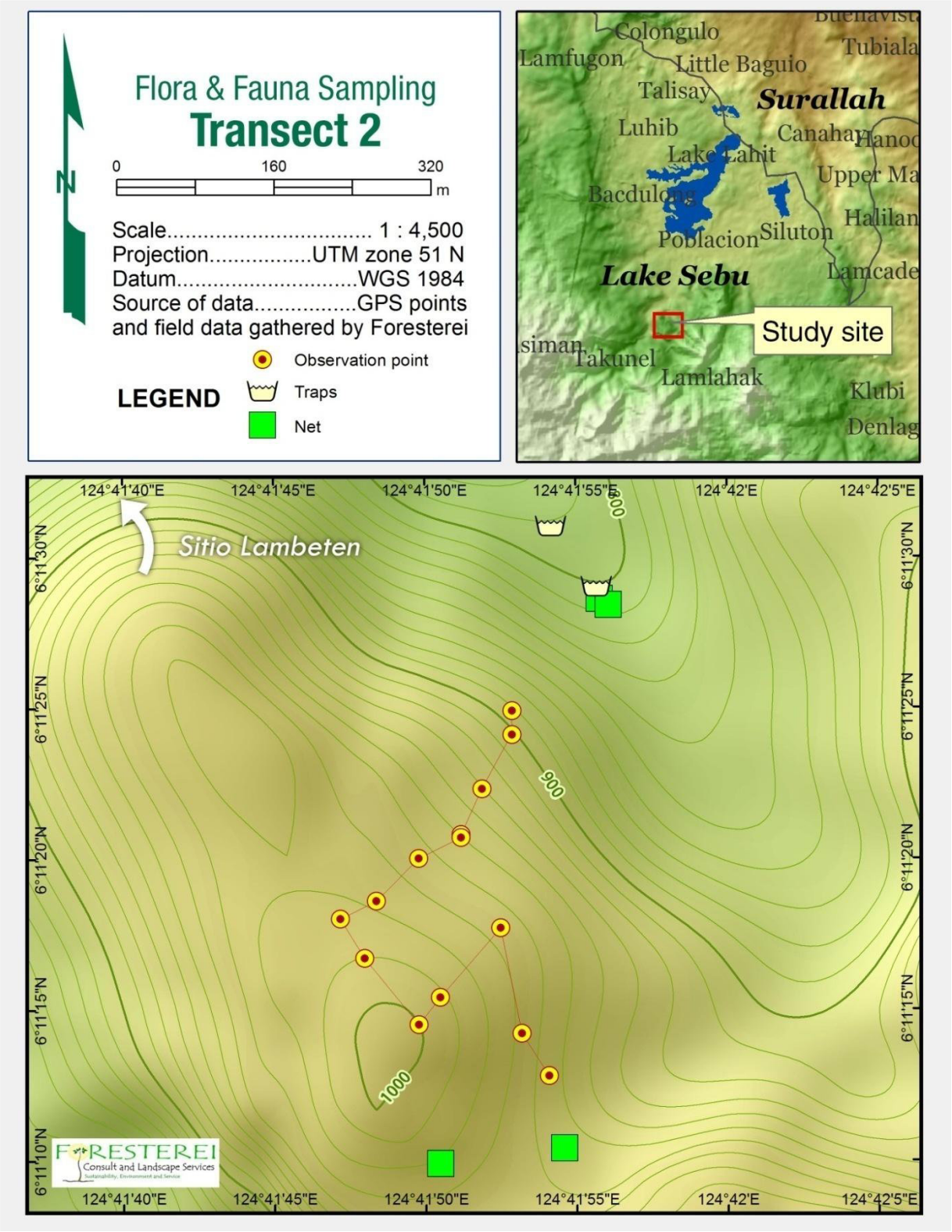


Figure 18d. Geographic Location of the Site 2 (Wildlife Vertebrates and Arthropods), Lamlahak Subwatershed Lake Sebu, South Cotabato.

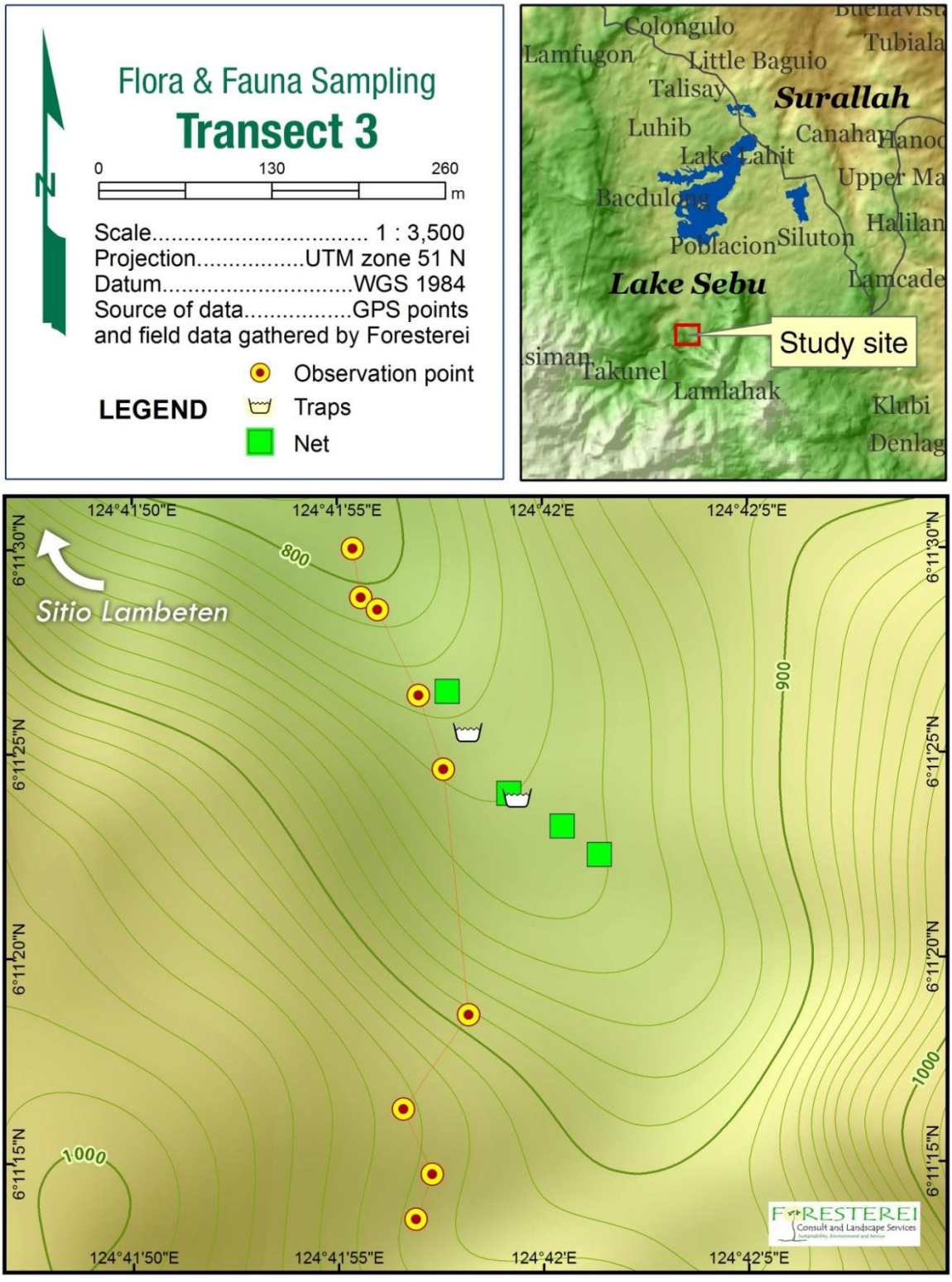


Figure 18e. Geographic Location of the Site 3 (Wildlife Vertebrates and Arthropods), Lamlahak Subwatershed Lake Sebu, South Cotabato.

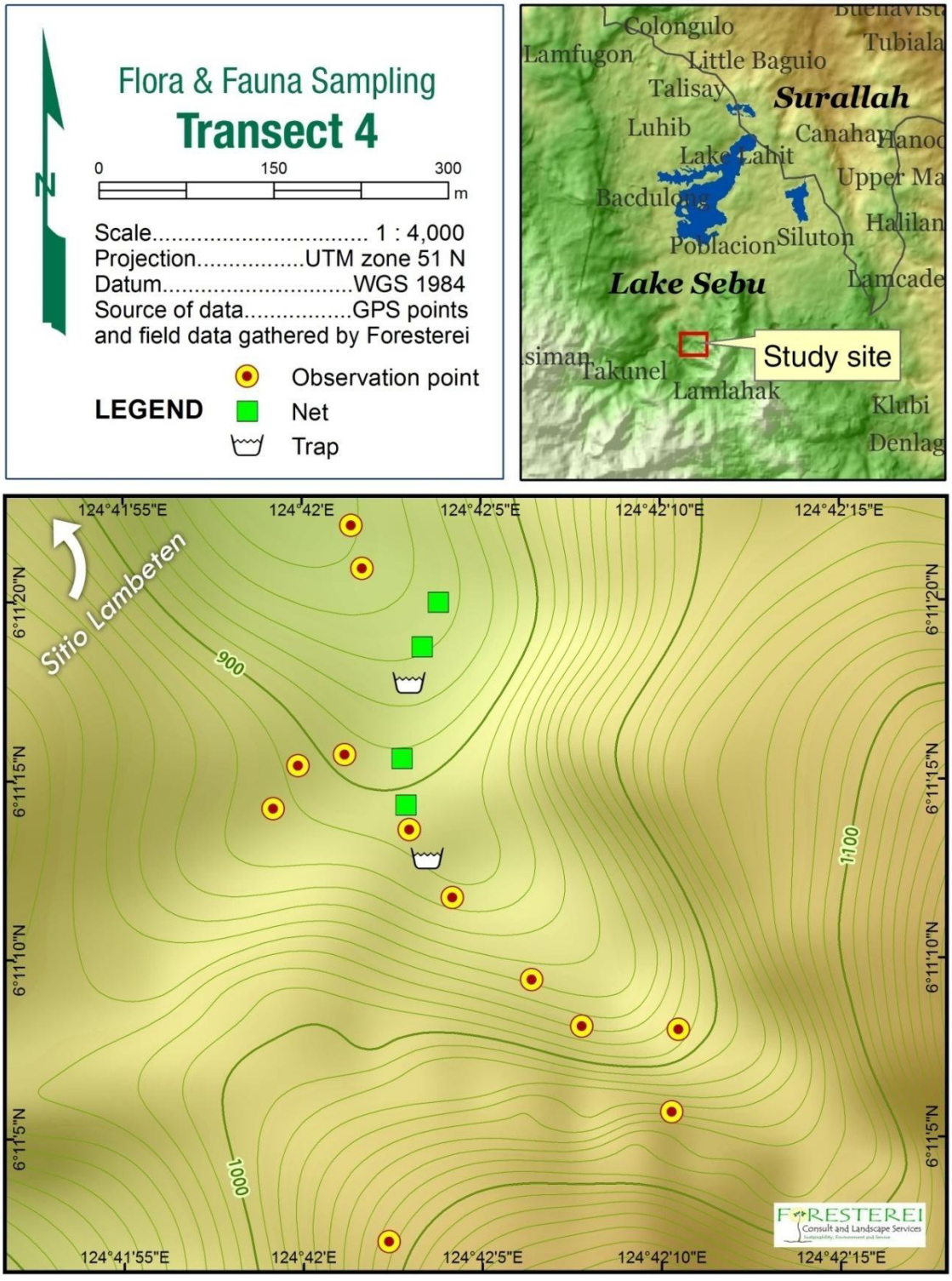


Figure 18f. Geographic Location of the Site 4 (Wildlife Vertebrates and Arthropods), Lamlahak Subwatershed Lake Sebu, South Cotabato.

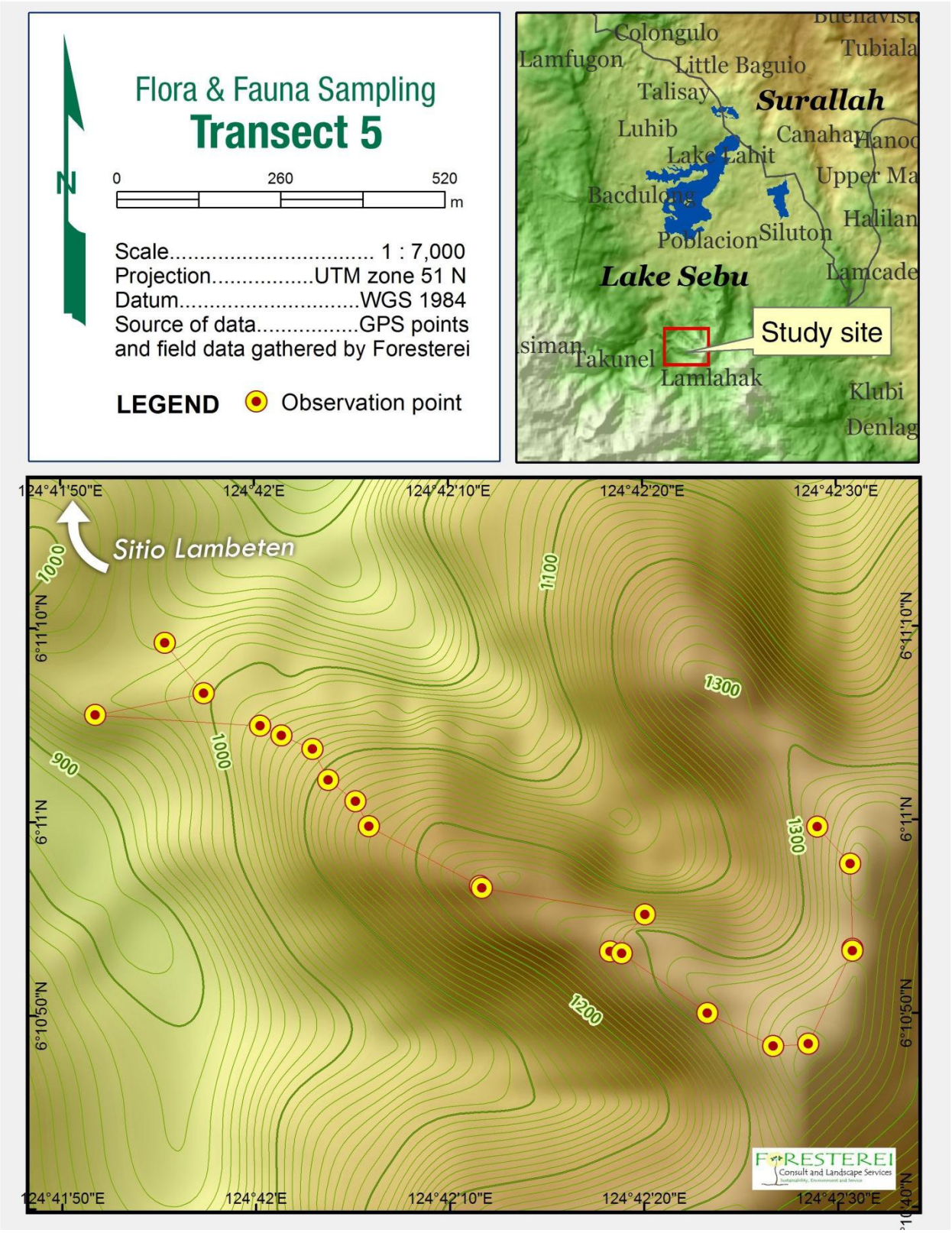


Figure 18g. Geographic Location of the Site 5 (Flora, Wildlife Vertebrates and Arthropods), Lamlahak Subwatershed Lake Sebu, South Cotabato.

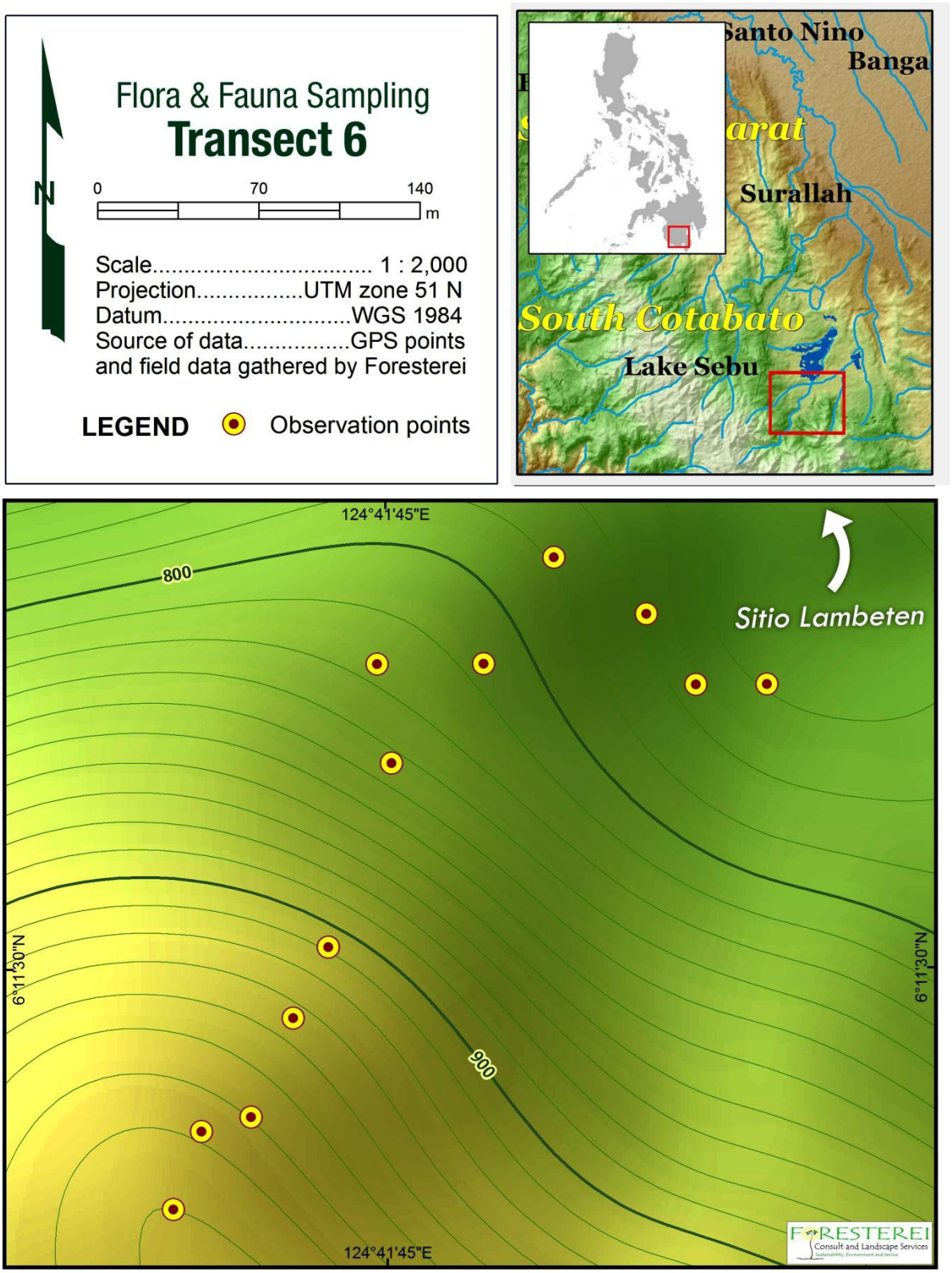


Figure 18h. Geographic Location of the Site 6 (Flora, Wildlife Vertebrates and Arthropods), Lamlahak Subwatershed Lake Sebu, South Cotabato.

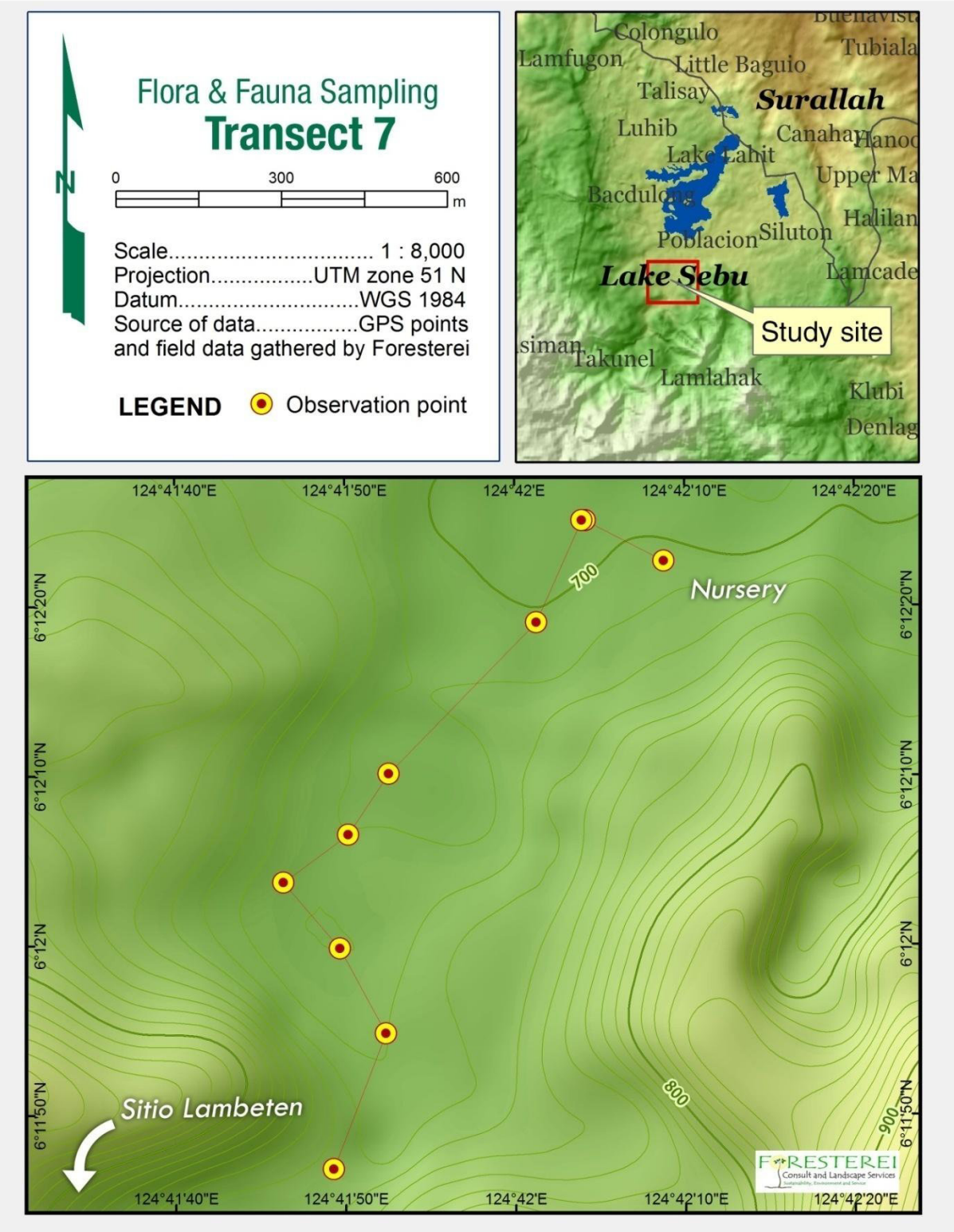


Figure 18i. Geographic Location of the Site 7 (Wildlife Vertebrates and Arthropods), Lamlahak Subwatershed Lake Sebu, South Cotabato.

Seven sampling sites represented by plots(for flora only: Site 6) and transect lines (Sites 1-7 for wildlife vertebrates and arthropods and Sites 5 and 6 for flora) were established inside the Lambeten/Lamlahak Subwatershed area; each site has minimum of five (5) and maximum of ten (10) observation points. The information below illustrates the different sampling sites.

Site	:	1
Geographical Location	:	N 06˚11'39.0" E 124˚41'48.9", N 06˚11'30.3" E 124˚41'44.0"
Elevation	:	750 -820masl
Slope	:	Flat to sloping terrain, along the creek
Soil Texture and Color	:	Generally loamy and reddish to yellowish in color, rocky and small sized-boulders are along the creeks, sandy loam near creek
Location of Plots	:	The transect and observations were established in the riparian area near community to upland farms near Piper aduncum stands
Type of Vegetation	:	Disturbed riparian vegetation, patches of brushes and grasses, agricultural farms.

Vegetation of Site 1

Site	:	2
Geographical Location	:	N 06˚11'24.9" E 124˚41'52.7" , N06˚11'12.8" E124˚41'53.9"
Elevation	:	950-1053 masl
Slope	:	Very steep slope, undulating terrain, upslope
Soil Texture and Color	:	Generally loamy and reddish to yellowish in color
Location of Plots	:	The transect and observations were established inside the *Piper aduncum* stands, agroforestry and brushland and grassland, agricultural

Vegetation of Site 2

farms

Type of Vegetation : *Piper aduncum* stands, agroforestry and brushland and grassland, agricultural farms

Site : 3

Geographical Location : N 06˚11'28.5" E 124˚41'55.8" , N 06˚11'13.6", E124˚41'56.7"

Elevation : 760-900masl

Slope : Rolling terrain upslope, Near Riparian area

Soil Texture and Color : Generally loamy and reddish to yellowish in color, sandy loam in riparian

Location of Plots : The transect and observations were established in riparian vegetation, brushland, plantation and agricultural areas

Type of Vegetation : Secondary forest riparian vegetation, brushland, plantation and agricultural area

Vegetation of Site 3

Site : 4

Geographical Location : N 06˚11'11.7" E 06˚11'11.7", N06˚11'02.1", E124˚42'02.2"

Elevation : 760-800 masl

Slope : Rolling terrain, flat areas to falls, upslope

Soil Texture and Color : Generally loamy and reddish to yellowish in color, sandy loam in riparian

Location of Plots : The transect and observations were established in riparian vegetation, brushland, plantation and agricultural areas

Type of : Secondary forest riparian

Vegetation of Site 4

Vegetation		vegetation, brushland, plantation and agricultural area

Site	:	5
Geographical Location	:	N 06˚11'09.2" E 124˚41'55.2" , N06˚10'59.6", E124˚42'28.8"
Elevation	:	1022-1416 masl
Slope	:	Rugged terrain , very steep slope
Soil Texture and Color	:	Generally loamy, reddish to yellowish in color
Location of Plots	:	The transect and observations were established in secondary forest, brushland and agricultural farms
Type of Vegetation	:	Secondary forest, Brushland, Piper aduncum stands, agricultural farms

Vegetation of Site 5

Site	:	6
Geographical Location	:	N 06˚11'34.0" E 124˚41'49.2" , N06˚11'27.7", E124˚41'42.2"
Elevation	:	780-1045 masl
Slope	:	Rolling and slope terrain
Soil Texture and Color	:	Generally clay loam to loamy, reddish to yellowish in color
Location of Plots	:	The 24 random plots (10x10m nested plots) were established in the Piper aduncum stands. Transect and observations were also established in this site
Type of Vegetation	:	Piper aduncum stand, agricultural farm, brushland

Vegetation of Site 6

Site	:	7
Geographical Location	:	N 06˚12'22.6" E 124˚42'08.6" , N06˚11'39.0", E124˚41'48.9"
Elevation	:	720-750masl
Slope	:	Flat area to roling terrain
Soil Texture and Color	:	Generally clay loam, reddish to yellowish in color, sandy loam along the river, soils are compacted along the road,
Location of Plots	:	The transect and observations were established in the human settlement from Nursery to Sitio Lambeten
Type of Vegetation	:	Brushland, grassland, agricultural farms, rice paddies

Vegetation of Site 7

3.1.4. Field Methods for Vegetation

The inventory focused on areas with existing natural forests/vegetation with consideration on its land uses and the area covered by the *Piper aduncum*. Random plot method was used for the area occupied by the *Piper aduncum*. Sampling points were established following the transect walks. These combined methods were used to enhance the results of data analysis. The plot sampling was used to obtain the quantitative information of the structure and composition of the terrestrial plant communities in the area. This technique is the most commonly used for sampling with plot standard size. It is also the most applicable technique for vegetation where almost all of the major types of plant communities are present. The said analysis was used to characterize its floristic composition, structure, and functional characteristics. The usual means of sampling vegetation for floristic description is the plot method *(Sajise, 1989; Kent and Coker, 1992; Mueller and Dumbois, 1974)*. The purpose of the plot method is to establish a standard area for vegetation investigation and analysis. The transect walk method is a rapid biodiversity assessment technique that employs a hike-walk recording of species, physical attributes, including the land uses and landscape. The technique starts out as a walk and hike through the sampling site in a random manner, then species are listed down as one walks through. Areas of vegetation and vegetation

homogeneity were one of the major considerations employed in the selection of sampling sites.

Species Composition Analysis

A total of twenty four (24) 100 square meter random plots were laid out in area occupied by the Piper aduncum. This area will be the treatment plots for the succeeding IAS project activities. To enhance the data on flora, two (2) long transect lines were randomly laid out in the designated sampling sites/stations (invaded and uninvaded areas) within the project site. Observation points were designated with the aid of GPS. These areas were chosen because of its forest cover (vegetation homogeneity) and drainage characteristics. All plant types such as trees, shrubs, herbs, vines, grasses, bamboo, ferns and wildlings were identified, counted, and recorded on the prepared data sheet. Also, in the vegetation assessment, all plants, its association, and diversity, including the tree-associated species such as bamboos, rattans, palms and orchids were recorded and analyzed to determine the biodiversity of the area. Within each plot (*10 m x 10 m plot)*, the following measurements were taken:

a) For trees 10 cm or larger in diameter, the species, diameter at breast height (dbh), total height were recorded;
b) Bamboo – species, number of culms at least 3 m long, in clump and average total height. Each clump is assigned one (1) number;
c) Rattan – number of canes at least 3 m long in a clump and mean length of mature canes. Each clump is assigned number 1;
d) Palms – number of stems in clump and a total height; and
e) Orchids and other epiphytes: presence is noted.

Tree species, its number of seedlings and saplings up to 14.9 cm in diameter, and all immature rattans, vines, other creepers, bamboos, palms, bananas, shrubs, herbs, creepers, ferns, grasses, other ground vegetation, and plants within transect were also noted.

3.1.5. Field Methods for Wildlife Vertebrates and Arthropods Fauna

The focus of fauna study in Lamlahak Subwatershed concentrated on the identification, classification and determination of species diversity, evenness, and importance values with the associated organisms. Meanwhile, the field method was designed to determine the habitat associations and general abundance of species rather than on quantitative sampling. Field method includes transect walk (Strip-Census Method), opportunistic observation, trapping and netting, microhabitat search, Participatory Rapid Biodiversity Assessment (PRBA), and Key Informant Interview (KII) and net sweeping for arthropods. To determine the habitat- species relationship, sampling

sites for wildlife vertebrates were established within the sampling area of the vegetation.

Participatory Rapid Biodiversity Assessment (PRBA) is a method which uses focus group discussion (FGD) and key informant interviews to generate information regarding on a certain biodiversity resource, which in this study is on the fauna resources. The information derived in this method is primary information which is based on the observation of local who are directly engaged in daily forest activities. The locals provided information on the presence of faunal species that are observed in the locality.

The team selected species present in Lamlahak Subwatershed, Lake Sebu based from the secondary sources. During the FGD, photographs assembled in a kit or guide was presented to the locals for confirmation and validation. The local name and other description of the animal occurrences were recorded as shown in **Appendix 7.**

Wildlife Vertebrates

Transect walk was done by traversing a long distance while recording and identifying animal species or specimen observed either by naked eye or thru binoculars. A total of seven (7) transect lines were established on the seven (7) sampling sites including the two sites of flora sampling sites. Observation sites were designated using GPS and are similar with two (2) flora survey sites. The procedure was conducted in the early morning (0600-0800H) and late afternoon (1500-1700H) within the area. Specimens were identified from the following:

a. Vocalization and call counts - is a means of communication of animals generated in many cases by their primitive versions of vocal cords. Mating animals are often making calls.
b. Track rates – is the presence of foot prints along their pathways and passageway.
c. Burrow - is a hole or tunnel dug into the ground by an animal to create a space suitable for habitation, temporary refuge, or as a byproduct of locomotion.
d. Excrete – is the waste matter of the animals found along the roads and pathways.
e. Scratches – are signs made by the claws of the animals usually found on the soil and plant parts.
f. Roadside counts – are animals pass through wayside
g. Other physical evidences – mostly this are fruits and foods eaten by the animals, bones, scales, skin, hairs and feathers or remains of the dead animals, nests, etc.

Trapping and Netting **-** This method connotes the use of devices in order to live-capture and takes certain species. It is useful in identifying highly mobile and or retiring animal species that may have been overlooked or bypassed in the Strip-Census Method. Such eventuality is more likely to occur considering the dense forest vegetation of the project area, the size of the animals to be observed, elusiveness, ability to mimic or match the surrounding environment and nocturnal characteristics of some species. Live trapping techniques used were mist net and snare trapping. Said trapping devices were strategically located along possible pathways leading to or from feeding areas within each sampling stations.

Microhabitat Search - Randomized selection of possible microhabitats can also be initiated and investigated. This involve intense sampling and thorough investigation of any individuals occupying a chosen microhabitat which includes trees holes, forest floor litter, spaces between buttresses, axils of palms, epiphytes, tree ferns, rocks, fallen and bodies of water among others. This method is used in determining the approximate number of species (species richness), relative abundance and population density. Observed animals were photo-documented, sketched, and were identified using taxonomic key pictures and related literature descriptions. Secondary data were also used to enhance and substantiate the results.

Terrestrial Arthropods

The arthropods samping sites are similar to the wildlife vertebrates. Collecting through sweeping nets were done in seven (7) designated transect lines. Line-transect or strip census method was employed in flat or plain, grassland and forested areas. All encountered arthropod species were collected and recorded. Data for each sampling unit was used to compute for relative abundance by recording the total population in each sampling unit. For each sampling unit, random 20-ground sweeps were done using an insect net. Collected specimens were placed in a killing bottle half-filled with denatured alcohol. Information such as date and time of collection, elevation, slope type of vegetation, and other biophysical conditions were recorded. In addition, the presence of other insects' different areas such as butterflies and colonies of termites and ants were likewise recorded.

Specimens were sorted and identified in the laboratory. Taxonomic classification was done from the order level down to the Species level, when possible. The number of individuals per species was counted and recorded. The recorded abundance values were then subjected to mathematical operations using biodiversity indices like the Shannon Diversity Index and Evenness index for each sampling plot.

Percent relative abundance of each taxon (group) or species of arthropods was also computed to determine which taxon is dominant in a particular sampling plot and site. A brief description and relevant information for each taxon was also provided.

3.1.6. Collection of Plant Specimen and Animal Species Handling

For plants, specimens of unidentifiable species were collected and properly tagged (indicating plot and species numbers corresponding to the tally sheets). These specimens were inserted between sheets of old newspapers, placed in large plastic bags, and preserved with ethyl alcohol. The specimens were processed for the proper identification. All specimens were deposited to the Philipine National Museum. The team followed the standard steps and procedures in collecting herbarium specimens. For fauna, all wildlife species that had been netted or trapped were immediately released in the area of capture after its identification and documentation. There were no collections of voucher specimens; instead, photographs were taken.

3.1.7. Data Management and Analysis

All field data and observations were entered in the field data sheets specifically designed for the survey. Other observations and information through interviews with the local people were entered in the field logbook. Errant entries in the field logbooks and data forms were marked with a single slash and initialed by the team leader. All data and measurements were encoded in a database (Microsoft Excel Program).

The following information and variables were analyzed:

a. Species listing for species composition and associations;
b. Regeneration of tree species;
c. Abundance and Frequency of species;
d. Relative Values and Species Importance Value;
e. Diversity Indices;
f. Description of physical attributes; and
g. Land use and changes.

Data were subjected to mathematical operations to determine its absolute values, relative values, importance values, dominant plants and animals, species composition, and associations in the area. The following formulas were used to find out the aforementioned information:

Abundance (Ab) = Number of individuals in the study sampling sites

$$Ab = \frac{\text{Number of Individuals of a Species}}{\text{Total Number of Individuals}}$$

Frequency (Fr) = Number of occurrences of a species out of the total number of plot

$$Fr = \frac{\text{Number of Plots in which Species Occurs}}{\text{Total Number of Plots}}$$

$$\text{Relative Abundance (RAb)} = \frac{\text{Abundance of a Species}}{\text{Total Abundance}} \times 100$$

$$\text{Relative Frequency (RFr)} = \frac{\text{Frequency of a Species}}{\text{Total Frequency}} \times 100$$

$$\text{Species Importance Value (SIV)} = \text{Relative Abundance (RAb)} + \text{RelativeFrequency (RFr)}$$

Species importance value was computed as the sum of all relative values. The values were ranked in descending order to determine the most ecologically important plant and animal species in the ecosystem.

3.1.8. Biodiversity Parameters

Diversity is indicator of ecosystem productivity and stability and is therefore measured to determine if an environment is degrading, (2) compare two or more environment and (3) eliminate the need for extensive lists. Diversity indices provide important information about the composition of a community, relative abundance of species, or evenness. When measuring species diversity, species richness and evenness must always both be considered. In addition, indices provide important information about species rarity and commonness in a population. These are important and common tools used by biologists in order to understand community structure. High evenness, which is the case when species are equally or virtually equal in abundance, is conventionally equated with high diversity (Magurran, 1988).

The obtained density or abundance values were used in the BIODAP® (Ecological Diversity and its Measurement) Software Program (2000) to determine the diversity and evenness indices:

To compute for the diversity and evenness indices, the formula used by the software is as follows:

$$\text{Shannon-Weiner Index } (H') = -\sum pi \ln pi$$

Where:

pi = proportion of individuals

ln = natural logarithm

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

Where:

H' = Shannon-Weiner Index

S = total number of species

ln = natural logarithm

Table 6 was used to qualitatively express the level of biodiversity in the area based on two numerical diversity indices, ***H'*** and ***J'.***

Table 6. Biodiversity scale as used by Fernando (1998).

Relative Values	Shannon-Weiner Index *(H')*	Evenness Index *(J')*
Very High	3.5-4.0	0.75-1.00
High	3.0-3.49	0.50-0.74
Moderate	2.5-2.99	0.25-0.49
Low	2.0-2.49	0.15-0.24
Very Low	1.0-1.99	0.05-0.14

3.1.9. Endemicity and Conservation Status

Endemicity and threatened species of plants and animals were determined based on the existing literature and memorandum from the Department of Environment and Natural Resources while the ecological and economic importance was based on the different flora and fauna books, literatures, and resources.

The conservation status of flora and fauna species was also determined. A species or subspecies is placed in a threatened species status when its population is at risk of extinction. This is categorized as critically endangered, endangered, vulnerable or other accepted categories. Each category is defined as follows:

1. **Critically endangered** – species or subspecies that is facing extremely high risk of extinction in the wild in the immediate future.

2. **Endangered** – species or subspecies that is not critically endangered but whose survival in the wild is unlikely if the causal factors continue operating.

3. **Vulnerable –** specie s or subspecies that is not critically endangered or endangered but is under threat from adverse factors throughout their range and is likely to move to the endangered category in the near future.

4. **Threatened –** species or subspecies that is not critically, endangered, endangered nor vulnerable but is under threat from adverse factors such as over collection, throughout its range and likely to move to the vulnerable category in the near future. This shall include varieties, formae or other infra specific categories.

5. **Non-threatened –** species that has the tendency to become threatened due to destruction of habitat or other similar causes as may be listed by the DENR Secretary upon recommendation of the National Wildlife Management Committee. This shall include varieties, formae or other infra specific categories.

International trade of the wildlife is subjected to CITES regulation. This requires that all import, export, re-export and introduction of species listed under CITES must have a license from the government. Wildlife regulated by CITES are listed in three appendices.

- Appendix I include species threatened with extinction. Trade of these species is permitted only in exceptional cases such as research.

- Appendix II include species not necessarily threatened with extinction but trade must be controlled in order to avoid exploitation that threatened their survival.

- Appendix III contains species that are protected in at least one country which has asked other CITES Parties for assistance in controlling the trade.

3.1.10. Mapping and Landscape Analysis

All sampling sites or plots were mapped using Arcview 3.2. Software. The study team conducted survey and mapping of the area with the use of a GPS instrument (Garmin 12). Global Positioning System (GPS) readings were made along the boundaries of the different vegetation and land-uses. The coordinates, elevation, accuracy, and important remarks were recorded. Illustrations of some areas were also made for its clarity and visualization before importing it to the Geographic Information System (GIS) software. In addition, GPS readings of important landmarks such road or trail locations, intersections, and other structures were recorded.

A 1:35 000 scale base maps that fits in a 8.5 x 11 inches bond paper size served as a reference guide and working map for the team members as they survey and traverse the entire Lamlahak Subwatershed Area.

In the assessment of landscape, Geographic Information System analysis was implemented. It integrates the spatial, temporal and survey data collected on the project area through the use of ArcGIS and Arcview softwares. The field data gathered, illustrations, important remarks, other secondary maps, and GPS readings were imported to ArcGIS and Arcview softwares to generate the maps needed. Likewise, GIS analysis was made to produce decision maps, substantiate the analyses, and support or strengthen the study team's recommendations.

3.2 Biological Characteristics

3.2.1 Biodiversity and Conservation of Lake Sebu and Its Vicinities *(Mallari et al, 2001)*

The whole project area lies near to the following protected area. The project sites serve as fly way, feeding areas and roosting for some species of wildlife. The vegetation of Lamlahak and Lake Sebu Watershed and its vicinities serve as biocorridors for the exchange of biogenetic pool within the whole Region.

The Riparian vegetation of the whole area has direct link with the upper locale vegetation and serve as habitat for many birds such as kingfishers, rails and ducks. The area supports the various population of plant and wildlife of the region. **Table 7** shows the Southwestern Part of Mindanao Region Wildlife Species and **Figure 19** shows the location of the Conservation Sites in Region XII.

The whole project area and the Lamlahak SubWatershed lies near to the following protected area 1.) **Liguasan Marsh** (IBA Code: PH102), located at North Cotabato (Kabacan, Pikit, Tulunan); Maguindanao (Datu Piang, Pagalungan, Buluan, Sultan sa Brongis); Sultan Kudarat (Sultan sa Barongis) with geographic location of 124° 35.00' East 6° 55.00' North, approximately 280,000 ha and has altitude Altitude10 - 30m); 2.) **Mount Daguma** (IBA Code: PH103) located at Sultan Kudarat (Isulan Bagumbayan) with geographic location of of 124° 28.00' East 6° 37.00' North, approximately 20,000 ha and has altitude of 200 - 1,898m; 3.) **Mt. Matutum** (IBA Code: PH104), Mount Matutum Protected Landscape located at South Cotabato (Tupi, Polomolok, Tmpakn) with geographic location of 125° 5.00' East 6° 22.00' North, approximately 14,000 ha and has altitude of 1,290 - 2,293m; 4.) **Mount Busa –Kiamba (**IBA Code: PH105), located at South Cotabato (SUrallah, T'boli, Polomolok, Lake Sebu with geographic location of 124° 42.00' East 6° 14.00' North, approximately 50,000 ha and has altitude of 700 - 2,083m); 5.) **Mount Latian Complex** (IBA Code: PH106), located at Sarangani (Malungun, Alabel, Malapatan); Davao del Sur (Don Marcelino, Jose Abad Santos) with geographic location of 125° 33.00' East 6° 9.00' North, approximately 50,000 ha and has altitude of 490 - 1,853m, identified by the Birdlife International as a Philippine Important Bird Areas and considered as Important Bird Area in Mindanao Region, thus, the

Watershed is an important ecological element which needs to be protected and rehabilitated.

Liguasan Marsh was declared a Game Refuge and Bird Sanctuary by Forestry Administrative Order No. 19 on 19 January 1941.It is in south central Mindanao, and is the largest swamp and marsh area on the island. It is a vast complex of river channels, small freshwater lakes and ponds, extensive freshwater marshes and arable land subject to seasonal flooding in the basin of the Mindanao River. Most of the area is underwater during periods of heavy rainfall, but some 140,000 ha dry out during dry periods and are cultivated. The marsh, although generally known as Liguasan, actually consists of two adjoining marshy basins, Liguasan Marsh and Libungan Marsh, with different water regimes. Liguasan lies at the confluence of the Pulangi, Maganoy, Buluan and Allah Rivers, and Libungan lies at the confluence of Libungan and Mindanao Rivers. There is c.5,000 ha of old growth forest within the marsh. The marsh is home to 112,000 Maguindanaon families whose primary means of livelihood are fishing when water levels are high and agriculture when they are low. Because of its very rich wildlife, the marsh has considerable potential for nature tourism. However, the area is a stronghold of insurgents, and access is restricted. The Government has recognized the importance both economically and politically of Liguasan Marsh and, in the Cotabato Agusan River Basin Development Project, has initiated the construction of a cut off channel from the Pagulungan sector of the Rio Grande de Mindanao to prevent and control floods. The marsh supports a great variety of aquatic wildlife. It is one of the last strongholds for the endangered Philippine crocodile Crocodylus mindorensis, and the estuarine crocodile C. porosus also occurs. The marsh is particularly rich in orchids. Several Threatened species have been recorded at Liguasan Marsh, including Philippine Eagle, but there is little recent information on their status there. It is likely that the relatively extensive lowland forests in this IBA support populations of more of the threatened and restricted-range birds of the Mindanao and Eastern Visayas Endemic Bird Are. The marsh is an important wetland site and supports resident or non-breeding populations of many waterbird species, including herons and egrets, rails, shorebirds and ducks. These include Mindanao subspecies of Little Grebe, *Tachybaptus ruficollis catabaco*, and Comb-crested Jacan *Irediparra gallinacea*, for which Liguasan is the only locality in the Philippines. The Marsh supports a great variety of aquatic wildlife. It is one of the last strong-hold for the endangered Philippine crocodile Crocodylus *mindorensis*, and the estuarine crocodile *C. porosus* also occurs. The marsh is particularly rich in orchids. The most serious threat to Liguasan Marsh is deforestation of watershed due to illegal logging, land conversion and shifting cultivation, which has resulted is soil erosion and siltation in the waterways. In some areas, the marsh has been drained for rice cultivation, conversion into fishponds and drilling activities for oil reserves. A 1973 survey indicated that 4,509 ha had been developed into fishponds. However, unlike other swampy areas in Mindanao (i.e. Agusan Marsh: PH085, and

Pagadian and Oanguil Bays), Liguasan Marsh has remained relatively pristine due to the peace and order problems brought about by the presence of insurgents. This has prevented development projects in the area from being completed. The 1994 DENR PASA report recommends the re-delineation of the marsh boundaries since a large area of the marsh, especially around the edges, is already occupied, cultivated or converted into fishponds. A Liguasan Marsh Development Master Plan has been developed by NEDA Region 12. This is a comprehensive plan encompassing socio-economic enhancement through livelihood opportunities, infrastructure and agricultural development and environmental conservation and management.

Mount Daguma is in eastern Sultan Kudarat Province, in the mountains to the west of Isulan. It includes a steep mountain ridge that runs from north-west to south-east, and forms a steep escarpment at the edge of the Allah River valley. A block of old growth forest is shown in this area on recent forest cover maps. Much of this forest must be montane, but there may be some lowland forest remaining on the lower slopes. Part of this IBA has been proposed as a Natural Biotic Area under the NIPAS. It would cover 3,000 ha with the coordinates: 6o33' to 6o41'N and 124o25' to 124o31'E. Some of the threatened and restricted-range species of the Mindanao and Eastern Visayas Endemic Bird Area have been recorded in the vicinity of this IBA, including the threatened Philippine Hawk-eagle; it is likely that several of this species have populations in the extensive forests that are reported to remain there.A company with a Timber Licensed Agreement is actively (and legally) logging the forest of this IBA. Settlers are encroaching into the forest and converting it into permanent agricultural spots. Kaingins are found along the forest perimeter on the northern part of the range, which have cleared any buffer area of second growth and brush, as the presence of insurgents has discouraged the entry of outsiders. However, the insurgents are reported to be carrying out harvesting operations themselves. Wildlife hunting, especially for birds, is prevalent. Although reforestation projects have been initiated, the trees chosen for reforestation are exotic species like gmelina, bagras and *Acacia mangium*, which are of limited value to the native wildlife or watershed protection.

Mt. Matutum is a steep mountain north of the town of General Santos in South Cotabato Province. A recent forest cover survey reported that the forest stands on Mt Matutum are found at 1,290 to 2,270 m, and are therefore all montane in type. Mt Matutum has a forest reserve of 14,000 ha, of which c.3,000 ha is reported to still be primary forest. The boundaries of this reserve are used to define the IBA. Mount Matutum Protected Landscape/Seascape17,497 protected area contains site14,000**.** Many of the threatened and restricted-range species of Mindanao and Easter Visayas Endemic Bird Area have been recorded on Mt Matutum, most of them during collecting expedition in the 19960s. They include several montane forest specialists, which are likely to still have substantial populations in the remaining montane forest

there, including Mindanao Racquet-tail, Whiskered Flowerpecker, Olive-capped Flowerpecker, Black-masked White-eye and the threatened Blue-capped Kingfisher. However, almost all of the forest has been cleared from the lower slopes of Mt Matutum, and this IBA is unlikely to support significant populations of the lowland and mid-altitude of the forest specialists which are found there in the past, such as Mindanao Bleeding-heart, Mindanao Brown-dove, Spotted Imperial-pigeon, Wattled Broadbill, Philippine Leafbird and Celestial Monarch. Philippine Eagle has recently been recorded on Mt Matutum, and this IBA is probably still important for the conservation of this critically endangered species. A sub-species of the Snowy-browed Flycatcher, *Fecidula hyperythra matutumensis* is only known from Mt Matutum. Several species of threatened mammals are known from Mt Matutum. The major threats in the forests on Mt. Matutum include clearance for farming and pasture, and the extraction of logs and other forest products. In 1986, a Philippine Eagle breeding attempt failed because the area around the nest was burned by the kaingineros, and in 1998, a large area at Upper Linan was found to have been totally cleared, and most of the forest edges had been burned. In 1996, the Mahintana Foundation was funded by the Foundation for the Philippines Environment (FPE) to implement its Matutum Integrated Conservation and Development Project. It also spearheaded the joint NGO-LGU-GO Mt Matutum Working Group, which has submitted draft proclamation papers for Mt Matutum National Park under the NIPAS, which have been endorsed by DENR to the President of the Philippines. This had funding support from FPE. Related consortiums of four NGOs and one PO have developed a joint program of action for community organization and wildlife conservation. A joint NGO-LGU-GO Mt Matutum Working Group has submitted draft proclamation papers for Mt Matutum National Park under the NIPAS, which are endorsed by DENR to the President of the Philippines.

Mount Busa –Kiamba comprises the coastal range of mountains in South Cotabato Province that includes Mt Busa, Mt Parker and Mt Three Kings. Several of the peaks reach over 1,000 m and Mt Busa over 2,000 m. Lake Sebu lies on the flank of the mountains and the nearby village of Sitio Siete is now a popular site with birdwatchers. These mountains have one of the two major forest blocks remaining in South Cotabato Province, with forests extending from north-west of Lake Sebu to south-west of General Santos City. Closed canopy broadleaf forests are found from 895 m to the highest peaks, and there are extensive areas of second growth forest. There is some lowland rainforest on the lower slopes of the mountains, but much larger areas of montane and mossy forest. There are also areas of secondary grassland, rivers and streams and caves, which provide additional habitats for wildlife. Some forest has been converted into permanent agricultural plots in areas where small settlements have been established, and kaingin is also practised. Lake Sebu is a small (350 ha) freshwater lake and associated marshes on flank of the rugged mountains. The shoreline of the lake is very indented, and there are two small islands, Tugayo and Rom's. The lake is

surrounded by grassland. The areas surrounding the lake have been designated as ancestral lands and reservation areas for cultural minorities, including the Tasaday tribe. The lake is used for fishing, duck raising and the harvesting of freshwater shrimps and snails. Sitio Siete near Lake Sebu is a popular site for birdwatchers, with trails up into the mossy forest above the village, and there are many records there of the threatened and restricted-range species of Mindanao and Eastern Visayas Endemic Bird Area. There have also been collecting expeditions to several of the mountains in the EBA during the 1990s. the relatively extensive areas of lowland forest which remain on the lower mountains slopes appears to support important populations of several threatened species, including Spotted Imperial-pigeon, Lesser Eagle-owl and Little Slaty Flycatcher, and many montane species occur at higher altitudes, including the threatened Blue-capped Kingfisher. The recent records of Philippine Eagle there suggest that this IBA is an important part of the network of sites required to conserve this critically threatened species. The lake has a diverse fish fauna, and supports large populations of the freshwater snails *Vivipara angularis* and *Ampullaria luzonica* which are heavily harvested. The area is not officially protected. As elsewhere on Mindanao, the lower altitude forests of this IBA are threatened by clearance for kaingin and permanent agriculture.

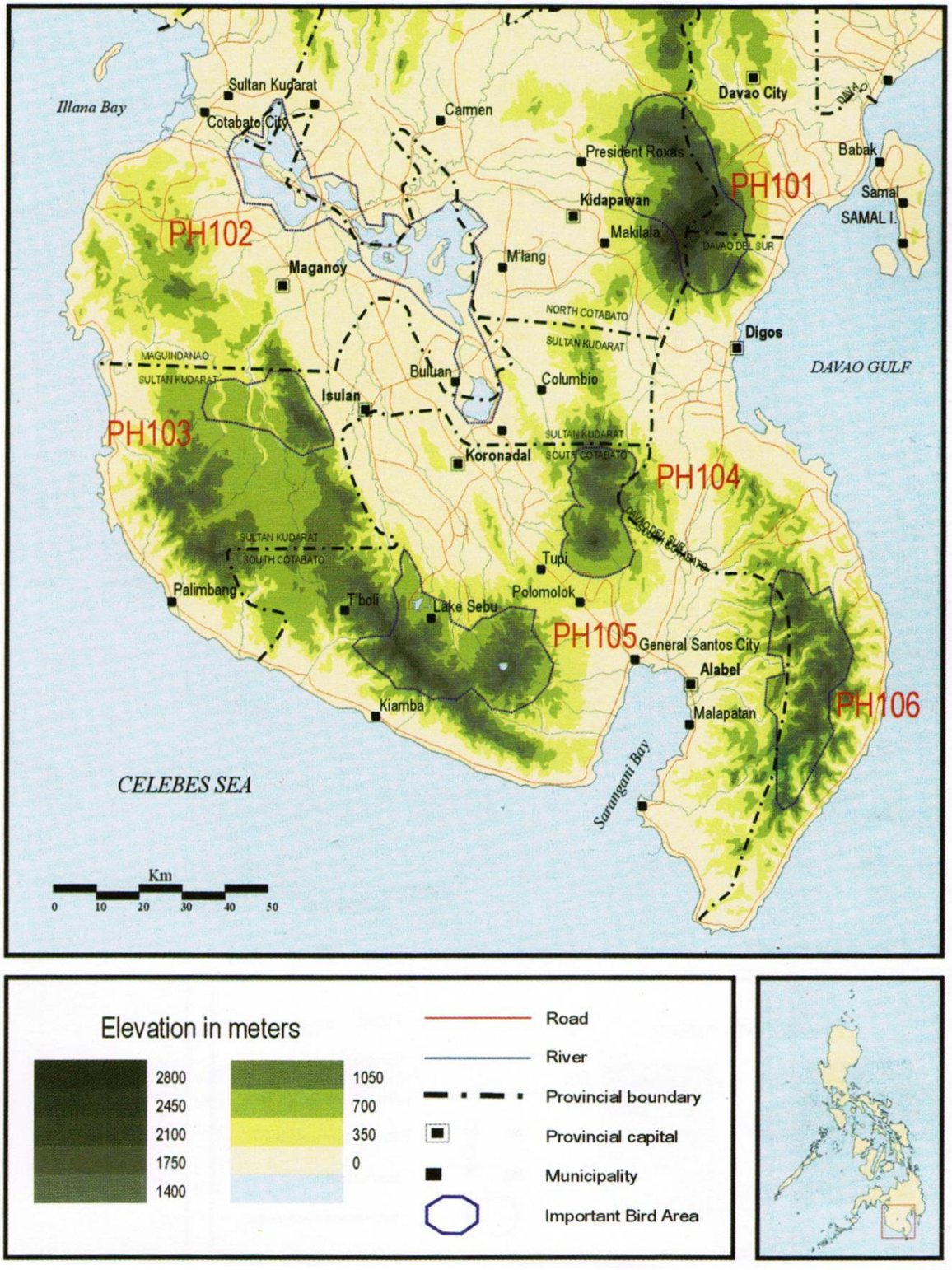
Mount Latian Complex is a large range of mountains extends southwards along the border between South Cotabato and Davao del Sur Provinces, from near Mt Latian in the north to near Mt Daingan in the south, which include several peaks which rise to well over 1,000 m. A large block of forest is shown there on recent forest cover maps, which includes substantial areas of both montane forest around the peaks and lowland forest on the lower slopes. On Mt Daingan, for example, there are old-growth dipterocarp forests at elevations ranging from 490 to 1,800 m. These forests are vital for the protection of the watersheds of several major rivers, such as the Big Glan, Big Lun and Little Lun, which feed agricultural lands to the north and south of General Santos City. Several of the threatened and restricted-range species of the Mindanao and Eastern Visayas Endemic Bird Area have been recorded in this, mainly during a collecting expedition to Mt Tuduk in 1966. They are mainly birds of lowland and mid-altitude forest, including Lesser Eagle-owl, Silvery Kingfisher, Wattled Broadbill and Azure-breasted Pitta. The extensive, relatively low-altitude forests that are reported to survive in the Mt. Latian complex are likely to support significant populations of many of these and of other birds of conservation concern. This could prove to be one of the most important sites for the conservation of the lowland bids in the EBA. There are a number of threats to the forest of this IBA. There are several roads from the densely populated lowlands to the edge of the closed canopy forests, which has allowed access for kaingin. For example, a block of 500 ha of closed canopy forest in the vicinity of Mt Tangali has recently been reported to have been converted into cornfields. Uncontrolled forest fires re also a problem. Poor monitoring, detection and reporting

facilities and slow reaction often allows these fires to get out of control. Not officially protected.

Table 7. The Southwest Mindanao Region Wildlife Species

No.	Scientific Name	Common Name	Criteria
1	*Aceros leucocephalus*	Writhed Hornbill	R
2	*Actinoides hombroni*	Blue-capped Kingfisher	RT
3	*Aethopyga boltoni*	Apo Sunbird	R
4	*Aethopyga primigenius*	Grey-hooded Sunbird	R
5	*Alcedo argentata*	Silvery Kingfisher	RT
6	*Bradypterus caudatus*	Long-tailed Bush-warbler	R
7	*Ceyx melanurus*	Philippine Kingfisher	T
8	*Chloropsis flavipennis*	Philippine Leafbird	RT
9	*Collocalia whiteheadi*	Whitehead's Swiftlet	RT
10	*Coracina mcgregori*	McGregor's Cuckoo-shrike	R
11	*Dicaeum nigrilore*	Olive-capped Flowerpecker	R
12	*Dicaeum proprium*	Whiskered Flowerpecker	R
13	*Ducula carola*	Spotted Imperial-pegion	T
14	*Erythrura coloria*	Red-eared Parrotfinch	R
15	*Eurylaimus steerii*	Wattled Broadbill	RT
16	*Ficedula basilanica*	Little Slaty Flycatcher	RT
17	*Ficedula crypta*	Cryptic Flycatcher	R
18	*Gallicolumba criniger*	Mindanao Bleeding-heart	RT
19	*Gorsachius goisagi*	Japanese Night-heron	T
20	*Hypocryptadius cinnamomeus*	Cinnamon Ibon	R
21	*Hypothymis coelistis*	Celestial Monarch	RT
22	*Irediparra gallinacea*	Comb-crested Jacana	C
23	*Lophozosterops goodfellowi*	Blacked-masked White-eye	R
24	*Micromacronus leytensis*	Miniature Tit-babbler	RT
25	*Mimizukugurneyi*	Lesser Eagle-owl	RT
26	*Orthotomus cinereiceps*	White-eared Tailorbird	R
27	*Orthotomus nigriceps*	Black-headed Tailorbird	R
28	*Otus mirus*	Mindanao Scops-owl	R
29	*Parus semilarvatus*	White-fronted Tit	R
30	*Pelecanus phillippensis*	Spot-billed Pelican	CT
31	*Penelopides affinis*	Mindanao Hornbill	R
32	*Phapitreron brunneiceps*	Mindanao Brown-dove	RT
33	*Pithecophaga jefferyi*	Philippine Eagle	T
34	*Pitta steerii*	Azure-breasted Pitta	RT
35	*Prioniturus waterstradti*	Mindanao Racquet-tail	R
36	*Ptilocichla mindanensis*	Striated Wren-babbler	R
37	*Rhinomyias goodfellowi*	Slaty-backed Jungle-flycatcher	R
38	*Rhipidura nigrocinnamomea*	Black-and-cinnamon Fantail	R
39	*Spizaetus philippensis*	Philippine Hawk-eagle	T
40	*Stachyris capitalis*	Rusty-crowned Babbler	R
41	*Stachyris plateni*	Pygmy Babbler	R
42	*Todirhampus wincheelli*	Rufous-lored Kingfisher	T
43	*Trichastoma woodi*	Bagobo Babbler	R
44	*Trichoglossus johnstoniae*	Mindanao Lorikeet	R

Note: Threatened (T), Restricted-range (R) birds, Congregatory (C) birds



Source: Mallari et al 2001, Key Conservation Sites of the Philippines

Figure 19. Location of the Conservation Sites in the Southeastern Part of Northern Luzon Region

3.2.2 Vegetation and Forest Cover of Lamlahak Subwatershed

The Lamlahak Subwatershed is a mountainous and rugged terrain with a very steep slope subject for tree plantation, agroforestry and upland agricultural area. Its peak ranges from 700 to 1450 masl. The study area is characterized by four major types of vegetations *(Lowland Forest Ecosystem, Piper aduncum stand, Brushland/Grassland and "Parang" Vegetation, and the Riparian Vegetation)*

Lowland Forest Ecosystem

In general, the remnants of the original forest in the watershed are basically characterized as low mountainous forest. The said forests are found in the gullies and some patches that remained from the changes of landscape through time. Remnants of its original forest have been manifested through its vegetation type and species composition found at the ridges and gullies of the area. Present landscape have been developed through natural phenomena and artificially formed due to human factor such as, land conversion, *kaingin* and other land development activities. Among the notable forest tree species that are recorded in the study area include species from Dipterocarpaceae, and some species that also compose pioneer vegetation, grassland, brushland, and *parang* ecosystem.

On the Study Site (Lamlahak Subwatershed), the dominating species include *Piper aduncum, Bambusa vulgaris*, *Omalanthus macradenius* and *Shorea contorta.* In other areas in the Philippines *some* of this is present like duguan, kalumpang, kaatoan bangkal, banaba, raintree, and kupang associated with dao and narra, while the forest floor is dominated by bikal, bolo, pandan, luya-luyahan, agpoi, and few rattan and palms. Forest area is only found on the gullies and riverside. The woody vines or lianas are the least recorded in the study sites.

Forest area species are pagsahingin, dao, antipolo, anang, bayok, taluto, malasambal, hauili, kupang, banaba, is-is, tangisang bayawak, lanete, binunga, mali-mali, kanapai, banato, balinghasai, makabuhay, anubing, pandakaki, ligas, sablot, tibig, anabiong, ipil-Ipil, akleng parang, alagau, alim, amlong, banai-banai, bignai, bignai-pugo, bitongol, dalunot, dita, hagimit, himbabao, kahoi dalaga, kalios, lago, lunas, marang, matang-hipon, niog-niogan, putat, raintree, takip-asin, tan-ag, tiesa, binayuyu, rimas, molave, salinggogon, danglin, pugahan, betis, tagotoi, kaatoan bangkal, *Sellaginella sp*., orchids, bikal, kawayan tinik, kawayan kiling, bolo, kupang, matang-araw, and alahan.

Among the habitat types are riparian vegetation found along the rivers, its network in the area, plantations, and agroforestry ecosystem. The boundary in between and above the habitats mentioned creates another form considered as ecotones.

On a landscape perspective, forests can be found from the gullies, footslope to the peak areas of Lamlahak Subwatershed area while grassland or brushlands were observed in the low-lying areas to agricultural areas. Patches and scattered trees were also spotted. Piper aduncum stands are anywhere and proliferate in the whole area.

Piper aduncum Stand

This type of vegetation is purely dominated by *Piper aduncum* and associated with *Imperata cylindrical, Desmodium triflorum Elephantopus tomentosus Selaginella delicatula Scleria scrobiculata Schismatoglottis calyptrata Leucosyke capitellata Acalypha amentacea Viburnum luzonicum var. apoense Elatostema lagunense* and so on.

Brushland, Grassland and Parang Vegetation

Brushlands and grasslands are distributed all over the area. These could have been due to the conversion of forest areas to agricultural areas and intensive use of the land. Due to ecological succession over time, the vegetation of the degraded area was converted from a previously grass dominated to shrub occupied area.

Brushlands and grasslands are usually found outside the secondary forest or abandoned area. The most dominating species vegetation in brushlands are cogon (*Imperata cylindrica*) and scattered trees of anabiong (*Trema orientalis*), hauili (*Ficus septica*), tibig (*Ficus nota*) and binunga (*Macaranga tanarius),* shrubs and grasses such as malatungaw (*Melastoma malabathricum)* and coronitas (*Lantana camara)*, gonoi (*Chromolaena odorata*), carabao grass (*Paspalum conjugatum*), salibangon (*Pollia secundiflora*), kasupangil (*Clerodendrum intermedium*), malasambal (*Dracaena angustifolia*), sarat (*Scleria scrobiculata*), kollo-kollot (Urena lobata), payang-payang (*Moghania strobilifera*), sambong (*Blumea balsamifera*), zingibers and clumps of bamboos bolo (*Gigantochloa leavis*). Large tracts of brushlands and grasslands are found on the lower slopes and previous clearings.

Riparian Vegetation

This type of vegetation can be found along or near the river. It serves as protection to the river banks. Species such *as Pandanus* sp., *Bambusa* sp., *Panicum* sp., *and Ficus* sp., among others were observed. This ecosystem is found along the main creeks and small streams.

Vegetation Dominated by Pioneer Species

Forest edges are mostly occupied by pioneer species. Most of the species found along the way to lower area were pioneer species since these species occupy the initial forest formation and the foremost in the succession stage.

Previously cleared and residential areas are mostly dominated by pioneer plant species. These pioneer species namely *Macaranga hispida* batino *(Alstonia macrophylla),* anabiong (*Trema orientalis)*, alim (*Melanolepis multiglandulosa*) and bamboos (*Bambusa sp.)* can also be found in the upper slopes.

Agricultural and Horticultural Areas

Generally, surrounding areas are cultivated and considered as agricultural vegetation. Common crops in this area are corn, banana, pineapple, and root crops such as cassava, sweet potato, and peanut. In horticulture, this is usually perennial crops (often cash crops). Crops sighted in other areas are fruit-bearing trees and plantations. These types of vegetation occur in residential and nearby-residential areas.

Agroforestry farms or sites are situated in the nearby deforested areas which are prone to erosion. Erosion is a process by which the topsoil is removed from an area of higher elevation to areas of lower elevations contributing to soil nutrient loss and increased in soil acidity making it unsuitable for agricultural crops. The acidity of the soil in these areas is evident from the invasion of perennial grasses and lacks of water which adds up to the dryness of the soil.

Some species of fruit trees grown in the area santol *(Sandoricum koetjape),* mango *(Mangifera indica),* langka *(Artocarpus heterophyllus)*, sampalok *(Tamarindus indica),* duhat *(Syzygium cumini),* caimito *(Chrysophyllum cainito)*, *avocado (Persea gratissima) Citrus* species and tiesa (*Pouteria rivico*a) intercropped with banana *(Musa sapientum),* papaya *(Carica papaya)* and gabi *(Colocasia* sp.*)*. Few coconuts *(Cocos nucifera)* were observed in the area. Vegetable plants like sitaw, talong, okra, kadyos, and ampalaya are also present in the area.

Man-made forest or plantation

Man-made forest or plantation forest occupies a large area of the watershed. It is mostly planted with mangium (*Acacia mangium),* narra *(Pterocarpus indicus),* mahogany (*Swietenia macrophylla),* and gmelina (*Gmelina arborea)*.

3.3 Vegetation and Flora Resources of the Lamlahak Subwatershed

In general, the study area characterized by forest cover is secondary in nature as reflected in the activities conducted in the areas. The secondary forest is the results of plant succession after after the occurrence of a disturbance over a long period. The remnants of the original forest in the watershed are basically lowland forest with mixed dipterocarp. The said forests are found in the gullies as well as in some patches that remains from the changes of landscape through time. Remnants of its original forest have been manifested through its vegetation type and species composition found at the selected sites such as ridges and gullies. Present landscape have been developed through natural phenomena and artificially formed due to human factor such as land conversion, *kaingin* and other land development activities.

A. Species Composition and Plant Habit

1. Species Composition of the Whole Study Site of Lambeten, Lamlahak

A total of 174 plant species belonging to 77 families and 150 genera were recorded at Lamlahak Subwatershed and its vicinity. A complete list of species and families is given in **Appendices 1 and 3** respectively, while the dominant families are shown in **Appendix 5.**

Results of the combined approaches in vegetation assessment suggests that of the 77 plant families recorded in the study site, the dominant families include ASTERACEAE with 11 species, MORACEAE and POACEAE both with 9 species, while EUPHORBIACEAE, MIMOSACEAE, RUBIACEAE and URTICACEAE have 9 species each as shown in **Table 8**.

Table 8. Overall Dominant Families, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Family	No. of Species
ASTERACEAE	11
MORACEAE	9
POACEAE	9
EUPHORBIACEAE	7
FABACEAE: MIMOSOIDEAE	7
RUBIACEAE	7
URTICACEAE	7

Table 9 shows the 10 most dominant genera in the study area. Of the one hundred fifty (150) genera recorded in the study area, the *Ficus* from family MORACEAE recorded the highest number with eight (8) species, followed by *Shorea* and *Sphaerostephanos* from DIPTEROCARPACEAE and THELYPTHERIDACEAE respectively, which both recorded 3 species. The genera *Acalypha, Acmella, Bambusa, Celtis, Cyathea, Elephantopus, Euphorbia* are among the species with two (2) species each. These genera belong to families EUPHORBIACEAE, ASTERACEAE, POACEA and CELTIDACEAE. The leading genera in the list belong to trees, herbs and shrubs in growth form or habit.

Table 9. Distribution of Genera, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Genus	Family	No. of Species	Rank
Ficus	Moraceae	8	1
Shorea	Dipterocarpaceae	3	2
Sphaerostephanos	Thelyptheridaceae	3	3
Acalypha	Euphorbiaceae	2	4
Acmella	Asteraceae	2	5
Bambusa	Poacea	2	6
Celtis	Ulmaceae	2	7
Cyathea	Asteraceae	2	8
Elephantopus	Asteraceae	2	9
Euphorbia	Euphorbiaceae	2	10
Lithocarpus	Fagaceae	2	11
Litsea	Lauraceae	2	12
Lygodium	Schizaeaceae	2	13
Maoutia	Urticaceae	2	14
Musa	Musaceae	2	15
Piper	Piperaceae	2	16
Saurauia	Actinidiaceae	2	17

The measure of relative dominance of species in a plant community is the Importance Value (IV). The IV of the species represents the species occurrence, number of

individuals abundance or density, the vegetation covered by the speces in a certain community or vegetation.

Table 10 shows the ten species with the highest importance value in all sites. The most dominant among the identified species include *Imperata cylindrica* with 23.50, *Piper aduncum* with 20.75 and *Desmodium triflorum* with 9.74 recorded IVs.

Table 10. Overall Importance Value of Plant Species, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Scientific Name	Common Name	Family	SIV	Rank
Imperata cylindrica	Cogon	POACEAE	23.50	1
Piper aduncum	Boyo-boyo	PIPERACEAE	20.75	2
Desmodium triflorum	Desmodium tryflorum	FABACEAE	9.74	3
Elephantopus tomentosus	Elephantopus	ASTERACEAE	4.87	4
Scleria scrobiculata	Scleria scrobiculata	CYPERACEAE	4.41	5
Selaginella delicatula	Selaginella	SELAGINELLACEAE	4.07	6
Elatostema lagunense	Elatostema	URTICACEAE	3.38	7
Schismatoglottis calyptrata	Schismatoglottis	ARACEAE	2.85	8
Viburnum luzonicum var. *apoense*	Medulla	ADOXACEAE	2.54	9
Miscanthus floridulus	Miscanthus	POACEAE	2.42	10
Amomum sp.	Tagbak	ZINGIBERACEAE	2.24	11
Shorea contorta	White Luan	DIPTEROCARPACEAE	2.08	12
Acalypha amentacea	Acalypha	EUPHORBIACEAE	2.00	13

Imperata cylindrica is very abundant and considerd as indigenous species commonly used in thatching, pulp and paper, pasture and forage grass. *Piper aduncum* is an introduced shrub to small tree that forms thicket. In its original habitat, *P. aduncum* can be used as species for agroforestry and source of traditional medicine. *Desmodium triflorum* is a perennial legume that can be a source of forage to grazing animals.

In terms of growth form, the study area is dominated by trees with 75 species recorded followed by herbs with 69, shrubs with 18 species and the vines with 12 species and has the least numer of species recorded.

The abundance, endemicity, economic uses, and ecological values of these species are shown in **Appendix 2** while **Appendix 4** shows the complete list of species including its relative and importance values.

2. Species Composition of 24 Nested Plots – Invaded Area

There were 82 species belonging to 43 families and 72 genera recorded wihin the 24 plots. Of the 43 families recorded, the families Moraceae, Poaceae, Urticaceae have the highest representative species with 6 species followed by ASTERACEAE, FABACEAE and RUBIACEAE with 5 species as shown in **Table 11.** The least number of representative species per family is one (1) species which is observed in almost half of the families recorded.

Table 11. Dominant Plant Families in the 24 Plots, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Family Name	No. of Species	Rank
MORACEAE	6	1
POACEAE	6	2
URTICACEAE	6	3
ASTERACEAE	5	4
FABACEAE: MIMOSOIDEAE	5	5
RUBIACEAE	5	6
EUPHORBIACEAE	4	7
THELYPTERIDACEAE	3	8

Of the 82 species recorded, *Piper aduncum* yield the highest recorded Importance values in the invaded area of the study site with 32.34. This is followed by *Imperata cylindrical* with 27.94 and *Desmodium triflorum* gaining 11.09 with the 3rd highest importance values. Among the other species with high IV include *Elephantopus tomentosus, Selaginella delicatula, Scleria scrobiculata, Schismatoglottis calyptrata, Leucosyke capitellata, Acalypha amentacea, Viburnum luzonicum* var. *apoense* and *Elathostema lagunense* as shown in **Table 12**. The complete list of the species importance value is listed in **Appendix 4**.

Table 12. SIV of plant in the 24 plots within invaded area, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Scientific Name	Common Name	Family Name	SIV	Rank
Piper aduncum	Boyoboyo	PIPERACEAE	32.34	1
Imperata cylindrical	Cogon	POACEAE	27.94	2
Desmodium triflorum	Desmodium tryflorum	FABACEAE	11.09	3
Elephantopus tomentosus	Elephantopus	ASTERACEAE	8.10	4
Selaginella delicatula	Celagenela	SELAGINELLACEAE	7.10	5
Scleria scrobiculata	Scleria scrobiculata	CYPERACEAE	5.96	6
Schismatoglottis calyptrata	Chismatoglosis	ARACEAE	5.94	7
Leucosyke capitellata	Leocosyke/Magilom	URTICACEAE	4.75	8
Acalypha amentacea	Acalaypa	EUPHORBIACEAE	4.70	9
Viburnum luzonicum var. *apoense*	Calicarpa (Midula)	ADOXACEAE	4.55	10
Elathostema lagunense	Elathostema sp.	URTICACEAE	4.48	11

In overall 24 plots in the study area are composed of 40 species of trees, 29 herb species, 8 shrubs, and 5 vines. The abundance, endemicity, economic uses, and ecological values of these species are shown in **Appendix 2**.

3. Species Composition in Plots (1x1m, 5x5m and 10x10m Plots) - *Invaded Area*

The overall number of species recorded within the different plot sizes is shown in **Table 13**. There are 51 species belonging to 28 families and 44 genera recorded in 1x1m plots. The 5x5m plots yielded 38 species belonging to 26 families and 35 genera while in the 10x10m plots there are 16 species recorded belonging to 14 families and 16 genera. The data shows a general decreasing trend in the number species observed with the corresponding increase in plot size.

Table 13. The summary of species, family and generic representation in the different plots within the study area. in Lamlahak, Lake Sebu, South Cotabato.

Taxa	No. of Species		
	1x1m	5x5m	10x10m
Species	51	38	16
Family	28	26	14
Genera	44	35	16

The stratification of plant habit in the different plots is presented in **Table 14.** The 1x1m plot in general is dominated by herbs with 26 species followed by trees (16), vines (5) and shrubs which recorded the least number with 4 species. Meanwhile, no vines are recorded in the 5x5m plots where trees dominate with 28 species, shrubs (5) and herbs with 5 species. Only trees were observed in the 10x10m plots with 16 trees recorded.

Table 14. Growth Form Composition in the Stratified Plot Sampling, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Growth Habit	No. of Species		
	1x1m	5x5m	10x10m
Trees(T)	16	28	16
Shrubs (S)	4	5	0
Vines (V)	5	0	0
Herbs(H)	26	5	0

The abundance, endemicity, economic uses, and ecological values of these species are shown in **Appendix 2** while **Appendix 4** shows the complete list of species including its relative and importance values.

4. Species Composition of the *Site 6 (Invaded Area)*

There were ninety – nine (99) species belonging to 47 families and 87 genera were recorded in transect line as shown in **Table 15.** Of the 47 families recorded in the study area, ASTERACEAE has the highest number of species representation with 9 species, followed by POACEAE with 8 species recorded. MORACEAE and THELYPTERIDACEAE are among the families with high species representation in the study site.

Table15. Plant families in Site 6, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Family	No. of Species	Rank
ASTERACEAE	9	1
POACEAE	8	2
MORACEAE	6	3
THELYPTERIDACEAE	6	4
EUPHORBIACEAE	5	5
FABACEAE: MIMOSOIDEAE	5	6
URTICACEAE	5	7
ARACEAE	4	8
RUBIACEAE	4	9
DIPTEROCARPACEAE	3	10
PHYLLANTHACEAE	3	11
ZINGIBERACEAE	3	12

The species importance value identified in the transect method ranges from 9.95 for *Piper aduncum* and 0.68 from 42 other species. **Table16** shows the 10 species with the highest IVs in the study area using the line intercept method. *P. aduncum* (PIPERACEAE) has the highest IV followad by *E. tomentosus (ASTERACEAE) with 8.36 and Viburnum luzonicum* var. *apoense (ADOXACEAE)* with 7.41 recorded IV.

Table 15. SIV of Plants in Site 6, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Scientific Name	Common Name	Family	SIV	Rank
Piper aduncum	Boyo-boyo	PIPERACEAE	9.95	1
Elephantopus tomentosus	Elephantopus	ASTERACEAE	8.36	2
Viburnum luzonicum var. *apoense*	Medulla	ADOXACEAE	7.41	3
Leucosyke capitellata	Leucosyke	URTICACEAE	6.50	4
Sphaerostephanos sp. 2	Fern sp	THELYPTERIDACEAE	6.44	5
Melastoma malabathricum	Melastoma	MELASTOMATACEAE	6.35	6
Schismatoglottis calyptrata	Schismatoglottis	ARACEAE	5.79	7
Scleria scrobiculata ssp. *Scrobiculata*	Scleria	CYPERACEAE	5.40	8
Curculigo capitulata	Curculigo	HYPOXIDACEAE	4.75	9
Elatostema lagunense	Elatostema	URTICACEAE	4.61	10

The ninety – nine (99) species is composed of thirty – four (34) trees, eight (8) shrubs, five (5) vines and fifty – two (52) herbs. The area is dominated by herbs with the vine as the least recorded or least observed growth form classification in the areas. The abundance, endemicity, economic uses, and ecological values of these species are shown in **Appendix 2** while **Appendix 4** shows the complete list of species including its relative and importance values.

5. Species Composition of Site 5 in Tawolon (Uninvaded Area)

The Tawolon area is considered the uninvaded site where a transect method was employed. Sixty-two (62) species belonging to 48 families and 62 genera were recorded in the area. The highest species representation in the family level belong to families ARECACEAE, LAURACEAE, ORCHIDACEAE and RUBIACEAE each with 3 species in the study site while DIPTERIDACEAE, GESNERACEAE, MELASTOMATACEAE, MYRSINACEA, MYRTACEAE and PANDANACEAe with 2 species each (**Table 17**).

Table 17. Dominant Families in Site 5, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Family	No. of Species	Rank
ARECACEAE	3	1
LAURACEAE	3	2
ORCHIDACEAE	3	3
RUBIACEAE	3	4
DIPTERIDACEAE	2	5
GESNERIACEAE	2	6
MELASTOMATACEAE	2	7
MYRSINACEAE	2	8
MYRTACEAE	2	9
PANDANACEAE	2	10

Of the 62 species the *Pinanga sp* (ARECAEAE) has the highest SIV of 8.46 followed by *Elaeocarpus sp.* (ELAEOCARPACEAE) with 7.3. The third highest IV is 5.05 which is computed for 8 species such as *Alstonia sp.* (APOCYNACEAE), Aralia *bipinnata, Ardisia sp* among others (**Table 18**). Other values are 4.80 for 2 species, 3.66 for 7 species and 2.53 for the rest of the remaining 43 species recorded in the site as shown in **Appendix 4**.

Table 18. SIV of Plants in Site 5, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Scientific name	Common Name	Family	SIV	Rank
Pinanga sp.	Pinanga	ARECACEAE	8.46	1
Elaeocarpus sp.	Elaeocarpus	ELAEOCARPACEAE	7.32	2
Alstonia sp.	Batino	APOCYNACEAE	5.05	3
Aralia bipinnata	Aralia	ARALIACEAE	5.05	4
Ardisia sp.	Ardisia	MYRSINACEAE	5.05	5
Canarium sp.	Canarium/Sahing	BURSERACEAE	5.05	6
Cinnamomum sp.	Cinnamomum	LAURACEAE	5.05	7
Clethra canescens var. *novoguineensis*	Clethra	CLETHRACEAE	5.05	8
Dinochloa sp.	Bikal	POACEAE	5.05	9
Prunus sp.	Prunus	ROSACEAE	5.05	10

The 62 species recorded in the study site is composed of trees (30), shrubs (10), vines (4) and herbs (18). The vegetation in the Tawolon site is dominated by trees and shrubs while vines are the rarely observed growth habit. The abundance, endemicity, economic uses, and ecological values of these species are shown in **Appendix 2**.

B. Diversity of Species

Species diversity is the number of different species in a particular area (*species richness*) weighted by some measure of abundance such as the number of individuals or biomass. However, it is common for conservation biologists to explain of species diversity even when they are actually referring to species richness. Another measure of species diversity is the *species evenness*, which is the relative abundance of species within a represented area. An *ecosystem* on the other hand, represented by the same number of individuals has high species evenness, and those species represented by very few individuals has low species evenness.

In the process of plant succession at a favorable environment, an increased in the number of species means that the area accommodates the species and implies a high probability for more plant species to thrive in that area. Gaps are needed to be filled with the growing number of species. Species present in the area is also an important consideration in assessing the biodiversity and the number of species should be taken into account rather than the number of individuals. Also, species importance in terms of economic and ecological values should be carefully considered and prioritized.

Magurran (1988) notes that species richness is an index that is subject to sampling intensity. Any changes on the size and number of plots have great effect in its index. It increases as the sampling area extends or the number of samples taken is increased. The Shannon Index is a better measure of diversity. According to Odum (1971), the Shannon index combines the variety and evenness components as one overall index of diversity. This index is one of the best techniques for making comparisons.

Table 19 shows that flora diversity value of Lamlahak Subwatershed is high (*H'*=3.19) whereas evenness is also high with 0.62 values. The study area is well- stocked with regenerants which infers that it is undergoing progressive succession. The recorded diversity can be attributed to favorable environmental conditions. The eveness value implies a highly clustered species distribution and abundance. **Figure 20** shows the derived values of diversity and evenness of flora species in the three (3) sampling sites while **Appendix 6** shows the derived values.

Table 19. Overall Floral Diversity, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Diversity Index	Relative Values
H`	3.19
J'	0.62
No. of Individuals (N)	3753
No. of Species (S)	174

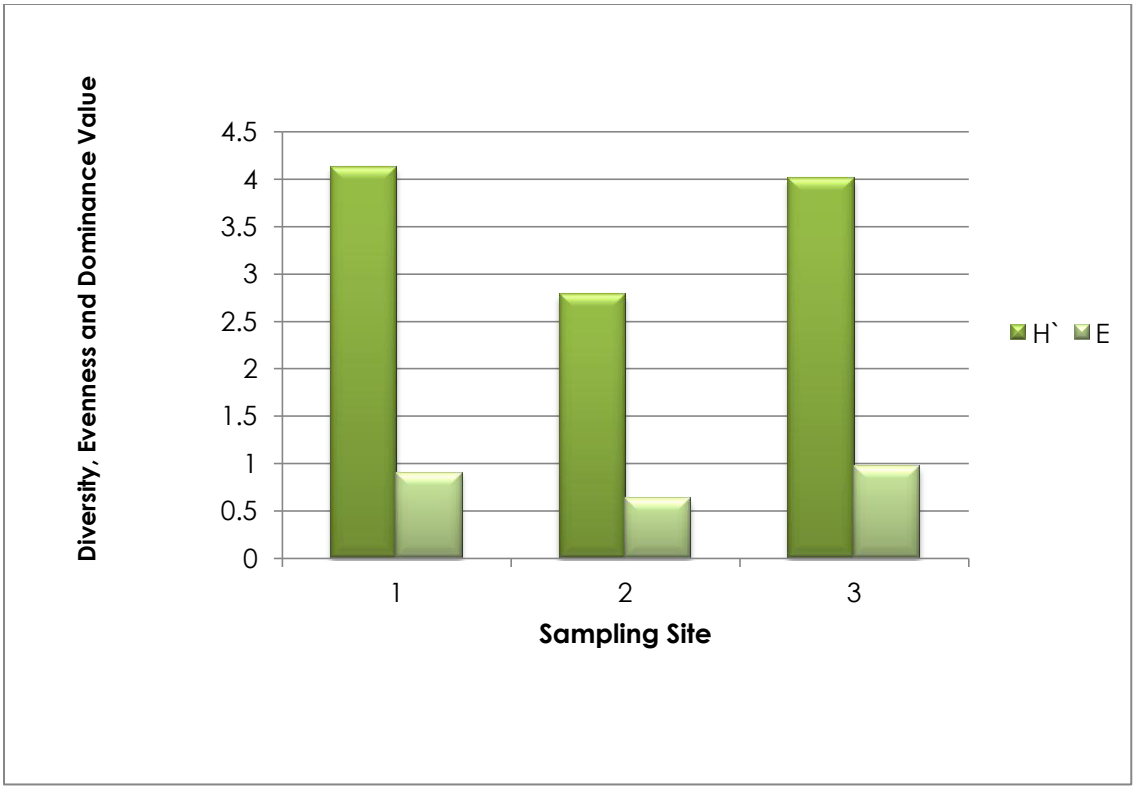


Figure 20. Species Diversity and Evenness per Site. Lamlahak Subwatershed Lake Sebu, South Cotabato.

Diversity in 24 Plots

The overall diversity in the 24 plots is presented in **Table 20.** Results show that the highest diversity among the plots is recorded in Plot 18 with 2.19 diversity (H') value followed closely by Plot 4 with 2.18 and Plot 8 with 2.1 diversity index. These values however fall within the low range in the diversity scale. The distribution of species within the different plots is very high with 0.88 recorded at Plots 8 and 12.

Table 20. Diversity of 24 plots within the invaded area, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Plot	Number of Species	Diversity Index Values	
		H`	*J'*
1	10	1.46	0.63
2	14	2.06	0.78
3	15	1.19	0.44
4	13	2.18	0.85
5	5	0.99	0.62
6	11	1.31	0.55
7	5	1.08	0.67
8	11	2.1	0.88
9	9	1.09	0.5
10	5	0.91	0.57
11	13	1.7	0.66
12	5	1.42	0.88
13	6	1.24	0.69
14	3	0.89	0.81
15	8	1.64	0.79
16	7	1.66	0.85
17	6	1.31	0.73
18	18	2.19	0.76
19	6	1.18	0.66
20	10	1.55	0.67
21	10	1.85	0.8
22	13	1.72	0.67
23	6	1.33	0.74
24	13	1.85	0.72

Stratified sampling of 1x1m, 5x5m and 10x10m plots was also conducted. The summary of diversity indices and evenness values are summarized in **Table 21**.

The *H'* and *J'* values for 1x1 plot is 2.33 and 0.59, respectively for 51 species identified. The diversity is within the low diversity range while the evenness is at the high range based on Fernando's scale of biodiversity. The diversity index for 5x5m on the other hand is 2.21 with evenness value computed at 0.61 for 31 species identified. Finally, the 10x10m plots with 16 species identified yielded 0.65 computed values for H' and 0.24 value for J'. These overall values for diversity fall within the low and very low species diversity even if the species distribution in the plots is high.

Table 21. Diversity of Flora in 1x1m, 5x5m and 10x10m plots within the invaded area Lamlahak Subwatershed, Lake Sebu, South Cotabato

Diveristy Index	Relative Values		
	1x1m	5x5m	10x10m
H`	2.33	2.21	0.65
J'	0.59	0.61	0.24
No. of Individuals (N)	2121	809	359
No. of Species (S)	**51**	**37**	**16**

Diversity in 1x1m Plots

The diversity of plants within the individual 1x1m plots is presented in **Table 22.** Of the 24 plots, the highest species abundance was recorded in Plot 3 with 893 individuals representing 13 species whereas the highest computed diversity and evenness values are located in Plot 15 with 1.67 (*H')* and 0.93 (*J'*). On the other hand, the lowest diversity values and number of species were recorded in Plot 9 and Plot 10, respectively.

Table 22. Species Diversity in 1x1m Plots, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Plot No.	No. of Individuals (N)	No. of Species (S)	Relative Values	
			H`	J'
1	132	5	0.42	0.26
2	69	10	1.56	0.68
3	893	13	0.94	0.37
4	46	7	1.46	0.75
5	14	4	1.33	0.96
6	272	6	0.65	0.36
7	19	4	1.26	0.91
8	37	7	1.65	0.85
9	31	4	0.42	0.31
10	11	4	1.12	0.81
11	30	9	1.13	0.52

Plot No.	No. of Individuals (N)	No. of Species (S)	Relative Values	
			H`	J'
12	18	2	0.64	0.92
13	24	4	0.78	0.56
14	40	1	-	-
15	32	6	1.67	0.93
16	26	3	0.77	0.7
17	66	3	0.89	0.81
18	41	6	1.26	0.7
19	86	5	0.82	0.51
20	53	7	1.27	0.65
21	55	4	1.05	0.76
22	28	6	1.33	0.74
23	79	4	0.94	0.68
24	19	5	1.28	0.79

The diversity and evenness values for the 1x1m individual plots are in the very low range in Fernando's biodiversity scale. The computed overall diversity value for 1x1m plots is 2.33 while evenness value is 0.59. The diversity for this plot size fall within the low range but the evenness value or the distribution of species in the plots is high as shown in **Table 23.**

Table 23. Overall Diversity in 1x1m Plots, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Diversity Index	Relative Values
H`	2.33
J'	0.59
No. of Individuals (N)	2121
No. of Species (S)	51

Diversity in 5x5m Plots

The diversity of 5x5m plots is presented in **Table 24.** The highest diversity of plants in individual plots is recorded in Plot 18 with 1.89 *H'* and 0.79 (*J'*) while the lowest is recorded in Plot 15 with 0.27 *H'* and 0.39 (*J'*) diversity and evenness values, respectively. Similarly, the highest species abundance was recorded in Plot 18 with 11 species.

Table 24. Species Diversity in 5x5m Plots, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Plot No.	No. of Individuals (N)	No. of Species (S)	Relative Values	
			H`	*J'*
1	74	5	1.37	0.85
2	25	4	1.06	0.77
3	55	2	0.59	0.85
4	27	6	1.47	0.82
5	22	1	-	-
6	79	4	1.09	0.79
7	36	1	-	-
8	52	4	1.26	0.91
9	29	5	0.69	0.43
10	11	1	-	-
11	74	5	1.14	0.71
12	11	2	0.3	0.44
13	18	2	0.64	0.92
14	39	2	0.51	0.73
15	13	2	0.27	0.39
16	12	2	0.64	0.92
17	4	3	1.04	0.95
18	37	11	1.89	0.79
19	36	1	-	-
20	26	4	0.77	0.56
21	44	3	0.77	0.7
22	33	5	0.63	0.39
23	8	3	1.04	0.95
24	44	6	1.11	0.62

The 5x5m plots which yield 37 species has 2.21 *H'* value and 0.61 *J'* value which falls within the low and high diversity values in Fernando's scale (**Table 25**). Data shows that in the 5x5m plots, *Piper aduncum* dominates the plots composed of shrubs, grass and a number of tree species. The highest 1.89 computed values for diversity for in 5x5m plots are in very low range while there is very high evenness of 0.79 indicating that there is even distribution of species within the plots. It was observed that four (4) plots i.e. Plot5, Plot7, Plot10 and Plot19 are *Piper aduncum* dominated plots.

Table 25. Overall Diversity for 5x5m Plots, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Diversity Index	Relative Values
H`	2.21
J'	0.61
No. of Individuals (N)	809
No. of Species (S)	37

Diversity in 10x10m Plots

The diversity of plants species recorded in the 10x10m plots is shown in **Table 26.** It was previously discussed that there are 16 species recorded in the 10mx10m plots. The highest species abundance and the diversity index are recorded at Plot 24 with 5 species and a yield of 1.3 H' diversity value. The distribution of species in the plots is very high at 0.81 evenness value. The lowest diversity was recorded at Plot 18 with 0.15 diversity value and 0.21 evenness values.

Table 26. Species Diversity in 10x10m Plots, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Plot	No. of Individuals (N)	No. of Species (S)	Relative Values	
			H`	*E*
1	26	2	0.16	0.24
2	4	1	-	-
3	17	2	0.55	0.79
4	13	2	0.69	1
5	12	1	-	-
6	6	2	0.45	0.65
7	-	-	-	-
8	-	-	-	-
9	24	1	-	-
10	17	1	-	-
11	-	-	-	-
12	15	1		
13	25	2	0.28	0.4
14	27	1	-	-
15	16	1	-	-
16	19	3	0.63	0.58
17	33	1		
18	30	2	0.15	0.21
19	15	1	-	-

Plot	No. of Individuals (N)	No. of Species (S)	Relative Values	
			H`	*E*
20	25	1	-	-
21	17	4	0.66	0.48
22	4	3	1.04	0.95
23	5	1		
24	9	5	1.3	0.81

Of the 24 plots, 11 plots are *Piper aduncum* invaded that there are no other plant species recorded. Also, there are plots that there are no trees <15 cm dbh. This may imply that these plots have sapling trees only or dominated by herbs or shrub <15cm diameter that are outside the sampling size for plants.

Diversity in* Site 6 *(Invaded Area)

Results of the overall species diversity analysis shows that all sites have very high values for both diversity and evenness indices as shown in **Table 27** and **Figure 21**. In general, the plant species are evenly distributed in all sampling sites. These plant communities of different vegetation types continue in its process of succession, and at this stage the area accumulate a significant number of species. Most of the vegetation in the watershed is found along gullies where sufficient water run and remains moist during dry season. Gullies are considered areas of high soil nutrient contents since water proceeds to that area during rainy season. There are 8 divisions of transect line employed for this method.

Table 27. Values and Diversity Indices of Site 6, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Location	No. of Species (S)	Species Diversity (*H'*)	Relative Values	Evenness (*J'*)	Relative Values
Transect 6a	26	3.09	High	0.95	Very high
Transect 6b	22	2.96	Moderate	0.96	Very high
Transect 6c	36	3.40	High	0.95	Very high
Transect 6d	33	3.21	High	0.92	Very high
Transect 6e	22	2.87	Moderate	0.93	Very high
Transect 6f	23	3.09	High	0.99	Very high
Transect 6g	44	3.73	Very high	0.99	Very high
Transect 6h	36	3.57	Very high	1.00	Very high

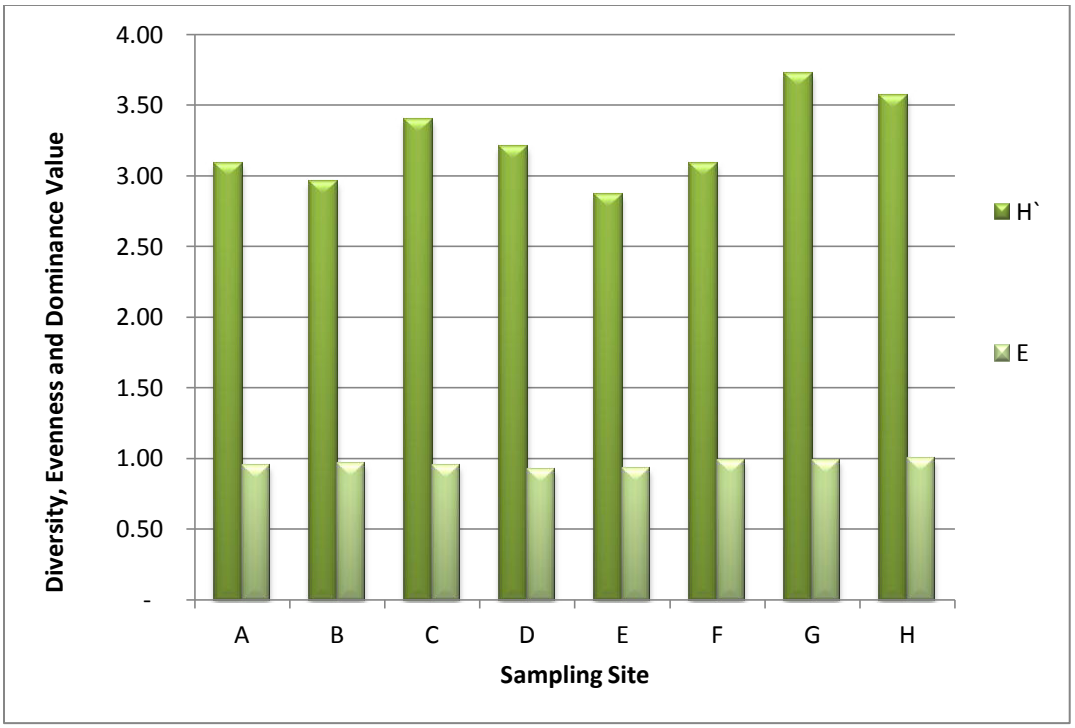


Figure 21. Diversity Values of Site 6 (A-H), Lamlahak Subwatershed Lake Sebu, South Cotabato.

Diversity of Site 5 in Tawolon (Uninvaded Area)

There is high species diversity in the uninvaded sit as suggested by the results of Shannon Weiner index of biodiversity with H' that is 4.01 and J' value of 0.97 for the uninvaded site in Brgy Tawolon (**Table 28**).

Table 28. Diversity of Site 5 in Tawolon, Lamlahak Subwatershed, Lake Sebu, South Cotabato

Diversity Index	Relative Values
H`	4.01
J'	0.97
No. of Individuals (N)	88
No. of Species (S)	62

C. Comparison of Invaded and Uninvaded Area of *Piper aduncum*

To compare for the diversity of ecosystems with and without invasion of *Piper aduncum,* the transect line in Tawolon site to represent the uninvaded site and the transects were compared.

Table 29 shows the taxonomic and distribution in the study area. The data shows that the invaded site has higher number in terms of species and number of genera with 99 and 87, respectively. The uninvaded site on the other hand has higher family representation compared to the invaded site. The results suggest that while the invaded area has higher number of species and genera, it still supports a greater diversity in terms of families compared to the invaded site.

Table 29. Taxonomic Distribution of Two Transects (Sites 5 and 6), Lamlahak Subwatershed, Lake Sebu, South Cotabato

Taxa	Uninvaded (Tawolon)	Invaded by *P. aduncum*
Species	62	99
Family	48	47
Genera	62	87

As shown in **Table 30**, the comparison of the growth habit in the transect line in Tawolon site and the transect line in the *Piper aduncum* invaded sites are both represented by trees, shrubs, vines and herbs. The Tawolon site is represented by trees (30), Shrubs (10), vines (4) and herbs (18) while the transect line in the invaded site is composed of trees (34), Shrubs (8), vines (5) and herbs (52). Trees dominate the Tawolon site in terms of species while herbs dominate the transect line in the invaded area.

Table 30. The Comparison of the Growth Habit in Two Transects (Sites 5 and 6), Lamlahak Subwatershed, Lake Sebu, South Cotabato

Growth Habit	No. of Species	
	Uninvaded (Tawolon)	Invaded by *P. aduncum*
Trees (T)	30	34
Shrubs (S)	10	8
Vines (V)	4	5
Herbs (H)	18	52

The uninvaded site is at very high range for 4.01(*H'*) value computed for diversity and very high evenness value while the invaded site has high diversity with 4.13 (*H'*) diversity value and high evenness valueas shown in **Table 31.**

Table 31. Diversity of Plants in Two Transects (Sites 5 and 6), Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Diversity Index	Uninvaded (Tawolon)	Invaded by *P. aduncum*
H'	4.01	4.13
E	0.97	0.9
No. of Individuals (N)	88	376
No. of Species (S)	62	99

Based on the Biodiversity scale used by Fernando (1998), while both invaded and uninvaded areas ranges from high to very high diversity values, the uninvaded area has higher values for Shannon-Weiner Index (*H'*) and evenness index (J) compared to the invaded areas within the study site. It can be inferred from the results that the uninvaded area is indeed high in diversity of species that is also evenly distributed within the study area.

D. Conservation Status

There are seven (7) plant species recorded in **Table 32** that are listed under DENR Administrative Order 01 series 2007. Of seven, six (6) plant species, *Drynaria quercifolia, Pterocarpus indicus, Asplenium nidus*, *Cyathea contaminans*, *Shorea contorta* and *Shorea polysperma* classified as Vulnerable (VU) while one (1) is considered endangered; *Medinilla pendula***.**

Table 32. List of Threatened Plant Species, Lamlahak Subwatershed, Lake Sebu, South Cotabato

No.	Family Name	Scientific Name	Common Name	Conservation Status
1	POLYPODIACEAE	*Drynaria quercifolia*	Kabkab/Pakpak lawin/Drynaria	Vu
2	FABACEAE: FABOIDEAE	*Pterocarpus indicus*	Narra	Vu
3	MELASTOMATACEAE	*Medinilla pendula*	Medinilla/Baladu	En
4	ASPLENIACEAE	*Asplenium nidus*	Pakpak lawin lalake/Asplenium	Vu
5	CYATHEACEAE	*Cyathea contaminans*	Pakong buwaya/Cyathea	VU
6	DIPTEROCARPACEAE	*Shorea contorta*	White Lauan/Lauan Pula	VU
7	DIPTEROCARPACEAE	*Shorea polysperma*	Tanguile/Takuban/ Tangile	VU

Legends: EN – endangered; VU – vulnerable to threats; OTS– other threatened species

E. Plant Endemism

Endemic species are those that are found only in Philippines either within one specific location or island or within neighboring islands within the Philippines. The plants and their endemicity are found in **Appendix 2** and **Table 33**. There were sixty-two (62) species endemic to the Philippines (35.63%), ninety-eight (98) species or 56.32% indigenous species, and the remaining 8.05% or fourteen species are exotic. It discloses a fact that the watershed area is still dominated by indigenous species helpful in natural regeneration and succession.

Table 33. Plant Endemism, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Category	Number of Species	Percent (%)
Endemic	62	35.63
Exotic	14	8.05
Indigenous	98	56.32
Total	**174**	**100**

3.4 Fauna Resources of Lamlahak Subwatershed

A. Species Composition and Distribution in the Whole Study Site

A total of 196 species of terrestrial vertebrates were identified and recorded belonging to 149 genera and 74 families (**Appendix 7**) through combination of field survey and PRBA methods. One hundred-twenty eight (128) were recorded through direct sighting during field survey while a total of 74 species were recorded through interviews with the aid of secondary materials such as laminated species field guides produced for the survey and PRBA. Forty-seven (47) birds and 27 mammals were identified by the locals. There were three species of bats came from the netting techniques and one species of rat was trapped.

Birds accounts the largest number with 131 species (67%) followed by mammals with (36 species, 18%), reptiles (21 species, 11%) and amphibians (8 species, 4%). Ninety-nine terrestrial wildlife species representing 51% of the total were recorded as endemic to the Philippines including species endemic in Mindanao faunal region. **Table 34** below summarizes the diversity of fauna species recorded in the study area.

Table 34. Taxonomic Distribution of Wildlife Vertebrates, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Class	No. of Families	No. of Genera	No. of Species	Endemics
Amphibians	4	7	8	4
Reptiles	7	18	21	18
Birds	49	94	131	73
Mammals	14	30	36	4
TOTAL	74	149	196	99

A. Wildlife Vertebrates Composition

This section is a result of Strip Census Method. It explains the importance value, diversity and endemism of the wildlife vertebrate class.

One hundred twenty (128) species were directly recorded from seven faunal transect sites established in the area (**Table 35**). These include eight amphibians, 21 reptiles, 15

mammals and 84 birds. Species occurrence of eighteen (18) species is recorded in all sampling sites (**Table 36**). Seventeen (17) of which are birds and only one mammals.

Table 35. Wildlife Species Distribution in All Sites, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Class	No. of Species per Site							Total Number of Species
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7	
Amphibians	6	3	6	5	3	3	3	8
Reptiles	8	12	9	8	7	5	12	21
Mammals	7	7	6	9	8	7	4	15
Birds	53	58	60	53	46	38	44	84
TOTAL	74	80	81	75	64	53	63	128

Table 36. Wildife Species Present in All Sampling Sites, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Number	Scientific Name	Common Name	Family Name
1	*Aplonis minor*	Short-tailed Glossy Starling	STURNIDAE
2	*Bradypterus caudatus*	Long-tailed Ground-Warbler*	SYLVIIDAE
3	*Centropus bengalensis*	Lesser Coucal	CUCULIDAE
4	*Centropus melanops*	Black Faced Coucal	CUCULIDAE
5	*Centropus viridis*	Philippine Coucal	CUCULIDAE
6	*Chalcophaps indica*	Common Emerald Dove	COLUMBIDAE
7	*Chloropsis flavipennis*	Philippine Leafbird*	CHLOROPSEIDAE
8	*Collocalia esculenta*	Glossy Swiftlet	APODIDAE
9	*Collocalia mearnsi*	Philippine Swiftlet	APODIDAE
10	*Coracina mcgregori*	McGregor's Cuckoo-shrike*	CAMPEPHAGIDAE
11	*Coturnix chinensis*	Blue-breasted Quail	PHASIANIDAE
12	*Culicicapa helianthea*	Citrine-Canary Flycatcher	STERINIDAE
13	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	DICAEIDAE
14	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	DICAEIDAE
15	*Hirundo tahitica*	Pacific Swallow	HIRUNDINIDAE
16	*Lonchura malacca*	Chesnut Munia	ESTRILDIDAE
17	*Passer montanus*	Eurasian Tree Sparrow	PLOCEIDAE
18	*Rattus exulans*	Polynesian Rat	MURIDAE

A one hundred twenty (128) species were recorded from seven faunal sampling sites established in the area. The number of species recorded ranged from 53 in Site 6 to as high as 81 species in Site 3 or an average of 70 species per Site. Refer to **Table 37** for faunal species composition recorded in seven sampling sites.

Table 37. Faunal Species Composition In Seven Sampling Sites, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Site/ Transect	Taxon	Amphibians	Reptiles	Mammals	Birds	Total
1	Family	2	3	3	29	37
	Genera	5	7	5	39	56
	Species	6	8	7	53	74
	Individuals	12	15	15	111	153
2	Family	3	6	3	30	42
	Genera	3	11	5	43	62
	Species	3	12	7	53	80
	Individuals	10	18	17	175	220
3	Family	3	6	3	31	43
	Genera	6	9	4	45	64
	Species	6	9	6	60	81
	Individuals	15	16	24	161	216
4	Family	3	4	4	30	41
	Genera	5	8	5	45	63
	Species	5	8	9	53	75
	Individuals	10	12	24	140	186
5	Family	2	4	4	29	39
	Genera	3	6	5	36	50
	Species	3	7	8	46	64
	Individuals	8	15	23	129	175
6	Family	3	3	4	26	36
	Genera	3	4	5	32	44
	Species	3	5	7	38	53
	Individuals	5	10	19	108	142
7	Family	3	5	2	26	36
	Genera	3	11	3	34	51
	Species	3	12	4	44	63
	Individuals	11	29	12	139	191

Sampling site 3 obtained the highest number of species, family and genera recorded. While, among the 58 vertebrate families recorded in seven (8) sampling sites family MUSCICAPIDAE dominated the list with eight species, followed by MURIDAE (7), and NECTARINIIDAE (6).

Meanwhile, Eurasian Tree Sparrow (*Passer montanus*), Chesnut Munia (*Lonchura malacca*) and Polynesian Rat (*Rattus exulans*), and are the three species with highest ranking among fauna species in terms of importance value. The said species are very common in human-habitation and agricultural areas including the study area and its surrounding vicinities. Species importance values of dominant species recorded in seven sampling sites are shown in **Table 38**.

Table 38. Wildlife Species Importance values (IV), Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Scientific Name	Common Name	SIV
Passer montanus	Eurasian Tree Sparrow	5.33
Lonchura malacca	Chesnut Munia	5.02
Rattus exulans	Polynesian Rat	4.32
Hirundo tahitica	Pacific Swallow	3.93
Chloropsis flavipennis	Philippine Leafbird*	3.69
Chalcophaps indica	Common Emerald Dove	3.38
Collocalia esculenta	Glossy Swiftlet	3.38
Coturnix chinensis	Blue-breasted Quail	3.30
Bradypterus caudatus	Long-tailed Ground-Warbler*	2.99
Centropus melanops	Black Faced Coucal	2.99
Culicicapa helianthea	Citrine-Canary Flycatcher	2.99
Centropus bengalensis	Lesser Coucal	2.83
Dicaeum trigonostigma	Orange-Bellied Flowerpecker	2.83
Aplonis minor	Short-tailed Glossy Starling	2.76
Bufo marinus	Giant Marine Toad	2.74
Dicaeum ignipectus	Fire Breasted Flowerpecker	2.68
Collocalia mearnsi	Philippine Swiftlet	2.60
Rattus argentiventer	Rice-field rat	2.50
Aethopyga boltoni	Apo Sunbird*	2.47

B. *Wildlife Class Composition*

Amphibians

Microhabitat such as the rocky environment and forest floors at the site provide ideal place for the herpetofaunas species in the area. A total of eight (8) amphibian species and 71 individuals, with seven (7) genera were recorded belonging from four (4) families. **(Appendix 7)** Notable species recorded includes four endemic species: *Rana magna*, *Platymantis dorsallis, Platymantis corrugatus and Kaloula picta*. No amphibian species however, is considered threated in any threat category based on any international and national assessment (e.g. IUCN, CITES, CMS and DENR DAO).

Among the amphibians recorded in the area, the ubiquitous Marine Cane Toad *(Bufo marinus)* is the most abundant as shown in **Table 39**.

Table 39. Importance Values (IV) of Amphibians, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Scientific Name	Common Name	SIV
Bufo marinus	Giant Marine Toad	48.23
Pelophryne brevipes	Southeast Asian Toadlet	29.29
Polypedates leucomystax	Common Tree Frog	27.88
Kaloula picta	Slender-digit Chorus Frog	21.61
Rana magna	Giant Philippine Frog	20.84
Platymantis dorsalis	Common Forest Frog	20.20
Platymantis corrugatus	Rough backed Forest Frog	15.98
Occidozyga laevis	Puddle Frog	15.98

Reptiles

The occurrence of diverse habitat in the area provides perfect food and refuge sites of reptiles in the area. Twenty-one (21) reptile species and 115 individuals belonging from seven (7) families and 18 genera were recorded, with 13 lizards and eight snakes **(Appendix 7).** Four (4) endemic species were recorded in the area which includes: *Draco fimbriatus, Varanus salvator, Naja samarensis,* and *Dasia sp*. Three species were

listed as threatened by IUCN, CITES and DENR assessment: *Ophiophagus hannah, Elaphe erythrura* and *Python reticulatus*.

Based on species importance value, Tokay Gecko (*Gekko gecko*) species is the most dominant reptile species followed by *Dasia grisea*, a Tree skink as shown in **Table 40**.

Table 40. Importance Values (IV) of Reptiles, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Scientific Name	Common Name	SIV	Rank
Gekko gecko	Tokay Gecko	23.85	1
Dasia grisea	Northern Keel-scaled Tree Skink	19.40	2
Mabuya multifaciata	Common Mabouya	17.66	3
Hemidactylus frenatus	Common House Gecko	16.22	4
Lygosoma quadrupes	Oriental Slender Skink	16.02	5
Lamprolepis smaragdina	Spotted Green Tree Skink	11.77	6
Gekko monarchus	Variable-back Narrow-disked Gecko	10.14	7
Varanus salvator	Water Monitor Lizard	1014	8

Mammals

Mammalian species played an important in the ecosystem and area they thrive in. Its ecosystem roles are so diverse which makes it hard to generalize across the group. Fifteen (15) species recorded during the field survey belonging to eight (8) families and eleven (11) genera. This includes seven species of murid/rodents and two species of civet cats. Eight species are endemic including six species confined Mindanao Faunal Region.

Three species are considered threatened namely: Philippine Warty Pig (*Sus philippensis),* Philippine flying Lemur *(Cynocephalus volans) and Long-tailed Macaque (Macaca fascicularis)*. Species Importance Value (IV) as indicated in **Table 41** the top three (3)

most dominant mammalian species are the Polynesian Rat (*Rattus exulans*), Rice-field rat (*Rattus argentiventer*) and Mindanao lowland forest mouse (*Apomys littoralis)*.

Table 41. Importance Values (IV) of Mammals, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Scientific Name	Common Name	SIV
Rattus exulans	Polynesian Rat	42.20
Rattus argentiventer	Rice-field rat	24.60
Apomys littoralis	Mindanao lowland forest mouse	17.88
Rattus everetti	Common Philippine forest rat	17.72
Rattus tanezumi	Asian Black Rat	14.46
Sus philippensismindanensis	Philippine Warty Pig	12.22
Cynocephalus volans	Kagwang, Philippine flying lemur	11.47
Mus musculus	House Mouse	10.88
Macaca fascicularis	Long-tailed macaque	9.39
Apomys insignis	Mindanao montane forest mouse	8.64
Paradoxurus hermaphroditus	Common palm civet	8.49
Sundasciurus philippinensis	Philippine tree squirrel	7.15
Crocidura beatus	Common Mindanao shrew	6.41
Viverra tangalunga	Malay civet, *tangalung*	5.66
Urogale everetti	Mindanao tree shrew	2.83

Avifauna

Eighty-four (84) bird species and 963 individuals belonging to thirty-nine (39) families were recorded during the survey. Thirty-five endemic species were recorded including 9 restricted-range species of Mindanao Faunal Region. Notable bird species recorded includes threatened endemic species such as Walden's Hornbill, Silvery Kingfisher, Blue-capped Kingfisher and Dark-eared Brown Dove.

The most dominant family of birds recorded is MUSCICAPIDAE: Flycatchers with eight (8) species. It is followed by NECTARINIIDAE: Spiderhunters and Sunbirds with six (6) species, APODIDAE Swifts; and COLUMBIDAE: Doves and Pigeons with five (5) species each were

recorded. Eurasian Tree Sparrow (*Passer montanus)* Chestnut Munia *(Lonchura malacca)* and Apo Sunbird (*Aethopyga boltoni*) are the top three (3) dominant species in terms of IV as shown in **Table 42**.

Table 42. Importance Values (IV) of Avifauna , Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Scientific Name	Commn Name	SIV
Passer montanus	Eurasian Tree Sparrow	7.19
Lonchura malacca	Chesnut Munia	6.77
Hirundo tahitica	Pacific Swallow	5.32
Chloropsis flavipennis	Philippine Leafbird	5.01
Chalcophaps indica	Common Emerald Dove	4.59
Collocalia esculenta	Glossy Swiftlet	4.59
Coturnix chinensis	Blue-breasted Quail	4.49
Bradypterus caudatus	Long-tailed Ground-Warbler	4.07
Centropus melanops	Black Faced Coucal	4.07
Culicicapa helianthea	Citrine-Canary Flycatcher	4.07

C. Vertebrate Species Diversity

Species diversity is almost similar to each sampling sites. In reference to the scale of determining biodiversity (Fernando, 1998), varied relative values of diversity and evenness were recorded. Diversity in Sites 1-7varies from moderate to very high, while very high evenness is apparent in all sites. It means that the wildlife vertebrate species are evenly distributed within the ecosystem of the study area (**Table 43** and **Figure 22**).

Table 43. Species Diversity of All Sites, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Diversity	Sampling Site/ Transect						
	1	2	3	4	5	6	7
Species Diversity (H`)	3.93	4.12	4.17	4.08	4.03	3.8	3.94
Species Evenness (J')	0.91	0.94	0.95	0.95	0.97	0.96	0.95
No. of Individuals (N)	153	220	216	186	175	142	191
No. of Species (S)	74	80	81	75	64	53	63

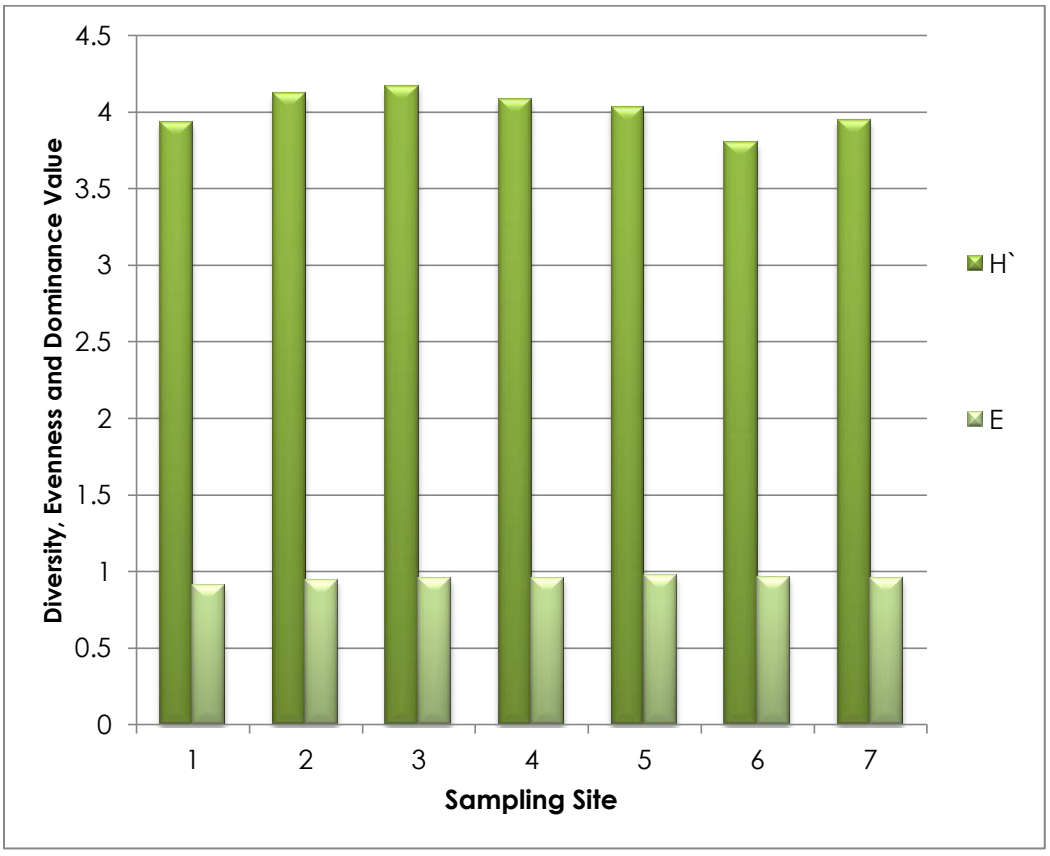


Figure 22. Diversity of 7 Sampling Sites, Lamlahak Subwatershed Lake Sebu, South Cotabato.

D. Distribution and Conservation Status

Fifty-one (51) species or 39% of the 128 species recorded are endemic to the Philippines including species restricted to Mindanao Faunal Region. These include four amphibians, four reptiles, eight mammals and 35 bird species (**Table 44**).

Table 44. Endemic and Threatened Species, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Class	No. of Species	Endemics species	Threatened species
Amphibians	8	4	0
Reptiles	21	4	3
Mammals	15	8	2
Birds	84	35	15
TOTAL	128	51	20*

**14 species are IUCN/DAO threatened while 12 species are threatened based on CITES*

On the other hand, of one hundred twenty-eight (128) fauna species recorded during the survey, 11 species are listed under DENR DAO while 9 species are under CITES list. Birds dominated the list with the most number of threatened species recorded in the area among them are restricted-range endemic species of Mindanao Faunal Region. These include: Crested Goshawk, Writhed Hornbill, Walden's Hornbill, Blue-capped Wood-Kingfisher, Silvery Kingfisher, Cattle Egret, Philippine Leafbird, McGregor's Cuckoo-shrike, Little Slaty Flycatcher, Mindanao Bleeding Heart, Bhraminy Kite, Colasisi, Dark-Eared Brown Dove, Steere's Pitta and Montane Racquet Tail. Table 45. lists the threatened species recorded in the study area based on DENR DAO and CITES assessment categories.

Table 45 . List of Threatened Species based on DENR DAO Assessment Categories , Lamlahak Subwatershed, Lake Sebu, South Cotabato.

No.	Scientific Name	Family	Common Name	DAO 2004-15	CITES
1	*Accipiter trivirgatus*	ACCIPITRIDAE	Crested Goshawk		Appendix II
2	*Aceros leucocephalus*	BUCEROTIDAE	Writhed Hornbill		Appendix II
3	*Aceros waldeni*	BUCEROTIDAE	Walden's Hornbill	CR	Appendix II
4	*Actenoides hombroni*	ALCEDINIDAE	Blue-capped Wood-Kingfisher	Vu	
5	*Alcedo argentata*	ALCEDINIDAE	Silvery Kingfisher	Vu	
6	*Bubulcus ibis*	ARDEIDAE	Cattle Egret		Appendix III
7	*Chloropsis flavipennis*	CHLOROPSEIDAE	Philippine Leafbird	Vu	
8	*Coracina mcgregori*	CAMPEPHAGIDAE	McGregor's Cuckoo-shrike	Vu	
9	*Elaphe erythrura*	COLUBRIDAE	Common Rat Snake		Appendix III
10	*Ficedula basilanica*	MUSCICAPIDAE	Little Slaty Flycatcher	Vu	
11	*Gallicolumba criniger*	COLUMBIDAE	Mindanao Bleeding Heart	En	
12	*Haliastur indus*	ACCIPITRIDAE	Bhraminy Kite		Appendix II
13	*Loriculus philippensis*	PSITTACIDAE	Colasisi		Appendix II
14	*Ophiophagus hannah*	ELAPIDAE	King Cobra		Appendix II
15	*Phapitreron cinereiceps*	COLUMBIDAE	Dark-Eared Brown Dove	CR	
16	*Phyton reticulatus*	PHYTONIDAE	Reticulated Phyton	OTS	
17	*Pitta steerii*	PITTIDAE	Steere's Pitta	Vu	
18	*Prioniturus montanus*	PSITTACIDAE	Montane Racquet Tail		Appendix II
19	*Sus philippensis*	SUIDAE	Philippine Warty Pig	Vu	

*CR= Critically Endangered, En=Endangered, Vu= Vulnerable, OTS=Other threatened species

Furthermore, the species listed in CITES are: Crested Goshawk (*Accipiter trivirgatus*), Writhed Hornbill (*Aceros leucocephalus*), Walden's Hornbill (*Aceros waldeni*), Cattle Egret (*Bubulcus ibis*), Common Rat Snake (*Elaphe erythrura*), Bhraminy Kite (*Haliastur indus*), Colasisi (*Loriculus philippensis*), King Cobra (*Ophiophagus hannah*) and Montane Racquet Tail (*Prioniturus montanus*).

E. Trophic Relations

The trophic group or the feeding guilds are groups defined by their shared use or technique of acquiring food resources. For example, all birds of prey capture animal food and thus represent a trophic group consisting of carnivores. The totality of trophic groups (including plants, as well as animals) constitutes a food web. A healthy food web and ecosystem generally contain representatives of several trophic groups, each filling a different function that sustains ecosystem processes. In **Tables 46a and 46b,** the animal species in the study area are categorized into trophic groups.

Table 46a. Trophic Groups of Wildlife, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Trophic Groups/ Feeding Guilds	Amphibians		Reptiles		Birds		Mammals	
Primary Consumers	**No. of Species**	**%**	**No. of Species**	**%**	**No. of Species**	**%**	**No. of Species**	**%**
Frugivore	-	0	-	0	7	8.33	2	13.33
Graminivore	-	0	-	0	4	4.76	-	0
Nectivore	-	0	-	0	6	7.14	-	0
Intermediate Consumers	**No. of Species**	**%**	**No. of Species**	**%**	**No. of Species**	**%**	**No. of Species**	**%**
Graminivore/Insectivore	-	0	-	0	-	0	5	33.33
Insectivore/Carnivore	-	0	6	28.57	-	0	-	0
Insectivore/Frugivore	-	0	-	0	5	5.95	-	0
Insectivore/Graminivore	-	0	-	0	17	20.24	-	0
Omnivore	-	0	-	0	-	0	6	40.00
Piscivore	-	0	-	0	8	9.52	-	0
Secondary Consumers	**No. of Species**	**%**	**No. of Species**	**%**	**No. of Species**	**%**	**No. of Species**	**%**
Carnivore	-	0	3	14.29	1	1.19	-	0
Insectivore	8	100	12	57.14	29	34.52	2	13.33
Insectivore/Vermivore	-	0	-	0	4	4.76	-	0
Insectivore/Piscivore	-	0	-	0	1	1.19	-	0
Raptorial	-	0	-	0	2	2.38	-	0
	Amphibians		**Reptiles**		**Birds**		**Mammals**	
Total No. of Trophic Groups/ Feeding Guilds	1		3		10		5	
No. of Species	8		21		84		15	
No. of Individuals	71		115		963		134	

The variety of feeding guilds is indicative of a wide variety of food sources. It also determines the ecosystem quality of the study area. **Appendix 9** shows the trophic guild of each species found in sampling sites.

Table 46b. Trophic Groups, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Trophic Groups/ Feeding Guilds	Birds		Mammals	
Primary Consumers	**No. of Species**	**%**	**No. of Species**	**%**
Frugivore	3	6.38	11	40.74
Graminivore	4	8.51	-	0
Graminivore/Frugivore	-	0	4	14.81
Herbivore	-	0	1	3.70
Nectivore	-	0	1	3.70
Intermediate Consumers	**No. of Species**	**%**	**No. of Species**	**%**
Insectivore/Frugivore	3	6.38	4	14.81
Insectivore/Graminivore	3	6.38	1	3.70
Omnivore	-	0	2	7.41
Piscivore	7	14.89	-	0
Secondary Consumers	**No. of Species**	**%**	**No. of Species**	**%**
Frugivore/Carnivore	-	0	1	3.70
Insectivore	18	38.30	2	7.41
Insectivore/Vermivore	5	10.64	-	0
Raptorial	4	8.51	-	0
	Birds		**Mammals**	
Total No. of Trophic Groups/ Feeding Guilds	8		9	
No. of Species	47		27	
No. of Individuals	963		134	

F. Participatory Rapid Biodiversity Assessment

The PRBA for fauna vertebrates resulted to seventy-four (74) species of sixty-four (64) genera belonging to thirty-eight(38) families. Forty-seven (47) species are birds and twenty-seven (27) mammals. The avian group consists of twenty-four (24) families and thirty-nine (39) genera. The mammalian group has twenty-five (25) genera belonging to thirteen (13) families. Under endemicity, half of the PRBA fauna or thirteen (13) species are identified as Philippine endemics and the remaining half are non-endemics.

The result of the Participatory Rapid Biodiversity Assessment (PRBA) indicates that the area is diverse in terms of animal species, each filling a different function or role that sustains their ecosystem. Some of the species in the area are threatened and endemic (**Appendix 2**).

Table 47 shows that there are 11 domesticated animals found at Study Area. In upland and lowland agriculture, horses and carabao or water buffalo were very useful in their daily farm activities.

Table 47. List of Domesticated Animals Observed in Lamlahak Subwatershed, Lake Sebu, South Cotabato.

No.	Scientific Name	Common Name	Local Name	Family Name
1	*Anas platyrhynchos domestica*	Duck	Pato	ANATIDAE
2	*Canis familiaris*	Dog	Aso	CANIDAE
3	*Capra aegagrus hircus*	Goat	Kambing	BOVIDAE
4	*Felis domestica*	Cat	Pusa	FELIDAE
5	*Gallus gallus domesticus*	Domesticated Fowl, Chicken	Manok	PHASIANIDAE
6	*Bubalus bubalis*	Water Buffalo, Carabao	Kalabaw	BOVIDAE
7	*Bos premigenius*	Cattle, Cow	Baka	BOVIDAE
8	*Anser anser domesticus*	Domesticated Geese	Gansa	ANATIDAE
9	*Meleagris gallapavo*	Guinea Fowl, Turkey Bird	Pabo	PHASIANIDAE
10	*Equusferus caballus*	Horse	Kabayo	EQUIDAE
11	*Sus scrofa domestica*	Pig	Baboy	SUIDAE

3.5 Arthropod Composition and Diversity

One hundred seven (107) arthropod species belonging to 101 genera and 61 families and 11 orders were recorded in the study site. Complete list of the Arthropods at the project site are found in **Appendix 16**. Among the 61 families recorded, the family PAPILIONIDAE (Pieridae) ranked 1 in the number of representation with 9 species recorded followed by FORMICIDAE with 7 species, ACRIDIDAE and LIBELLILIDAE both with 5 species and

Apidae and Pseudococcidae both with 4 species recorded (**Table 48**). The abundant and frequent number of Lepidopterans and Hymenopterans butterflies, moths and bees) is dependent on the available food source. This means that the host for the caterpillars is abundant as well as nectar coming from the reproductive parts of plant. Ecological importance are found in **Appendix 17.**

Table 48. Dominant families of Arthropods, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Family	No. of Species	Rank
PAPILIONIDAE/ Pieridae	9	1
FORMICIDAE	7	2
ACRIDIDAE	5	3
LIBELLULIDAE	5	4
APIDAE	4	5
PSEUDOCOCCIDAE	4	6
COCCINELLIDAE	3	7
EUMENINAE/ Vespidae	3	8
LINYPHIIDAE	3	9
MANTODAE	3	10

Table 49 shows the list of insect orders recorded within the whole study site consisting of 7 Sites whereby 11 insect orders were identified. The highest number of species recorded for the 11 orders belong to LEPIDOPTERA with 24 species, followed by HYMENOPTERA with 16 species, COLEOPTERA with 15, ORTHOPTERA with 14 and Homoptera wih 12 species. THYSANOPTERA has the least number of species representation with only 1 species recorded.

Table 49. Order Distribution of Arthropods, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

No.	Order	No. of Species	Rank
1	LEPIDOPTERA	24	1
2	HYMENOPTERA	16	2
3	COLEOPTERA	15	3
4	ORTHOPTERA	14	4
5	HOMOPTERA	12	5
6	HEMIPTERA	9	6
7	DIPTERA	5	7
8	ODONATA	5	8
9	ARANEAE	3	9
10	ISOPTERA	3	10
11	THYSANOPTERA	1	11
Total		**107**	

The importance values (IVs) of the insect species recorded in the study sites is presented in **Appendix 18.** Based on the Species Importance Value (SIV) **(Table 50)**, *Culex sp*. CULICIDAE (DIPTERA) has the highest computed SIV with 8.81, followed by 6.75 *Isoptera sp*. TERMITIDAE (ISOPTERA), 6.65 *Gastrimargus marmoratus* ACRIDIDAE (ORTHOPTERA), 4.17 Atypus *sp*. from family LINYPHIIDAE (ARANAE), 3.74 *Apidomopha sp*. COCCINELLIDAE (COLEOPTERA).

Table 50 . Importance Values of Arthropods Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Scientific Name	Common Name	SIV
Culex sp.	Common mosquitoes	8.81
Isoptera sp.	Termites/ White ants	6.75
Gastrimargus marmoratus	Band-winged Grasshopper	6.65
Atypus sp.	field spider	4.17
Apidomopha sp.	no infromation	3.74
Musca domestica	Common housefly	3.59
Euscyrtus concinnus	Crickets	3.53
Liriomyza sativae	Gall making /Leaf miner flies	3.27
Apis mellifera	Honeybees; western honey bee or European honey bee	3.16
Agrilus sexsignatus	Varicose borer	3.11
Menochilus sexmaculata	Ladybird beetles	3.01
Trialeurodes vaporariorum	White flies	3.01

Arthropod Diversity

The computed *H'* and *J'* values for the arthtopods in the study area is 4.4 and 0.94, respetively. Using Fernando's diversity scale, both values fall within the very high level of diversity where the H' or Shannon-Weiner Index even went beyond the scale as shown in **Table 51**. The high arthropod diversity may be attributed to the varied ecosystems within the study area.

Table 51. Diversity of Arthropods, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

Diversity Index	Relative Values
H`	4.4
J'	0.94
No. of Individuals (N)	632
No. of Species (S)	107

Arthropods in *Piper aducum* – Invaded and Uninvaded Areas

In **Table 52,** all orders are represented in Site 2 and 4 with different dominant order representation whereas 7 orders were recorded in Site 3 which ranked 2 with 10 species recorded. Sites 5, 6, and 7 followed wth the 9 species recorded in each site. Finally, the Site 1 recorded the lowest number of species observed in the study site. In terms of insect individual counts, Site 3 has the highest number of species recorded followed by Site 4 and Site 6 which are among the invaded areas within the study site. The arthropods recorded in Site 5 which is considered the uninvaded portion of the study site yielded 87 species. Site 1 yielded the least number of species recorded with only 57 species.

Table 52. Order Distribution on All Sites, Lamlahak Subwatershed, Lake Sebu, South Cotabato. Lake Sebu, South Cotabato.

ORDER	No. of Species in Order of Arthropods						
	S1	S2	S3	S4	S5	S6	S7
LEPIDOPTERA	6	2	8	6	6	7	4
HYMENOPTERA	3	2	7	7	4	4	6
COLEOPTERA	5	4	6	6	5	7	5
ORTHOPTERA	4	7	7	8	4	3	4
HOMOPTERA	2	3	7	5	3	0	3
HEMIPTERA	2	2	2	4	4	2	1
DIPTERA	4	3	1	3	3	2	3
ODONATA	0	2	2	3	2	0	1
ARANAE	0	2	3	2	1	2	2
ISOPTERA	0	1	2	2	0	2	0
THYSANOPTERA	0	1	0	1	0	1	0
Number of Orders	**7**	**11**	**10**	**11**	**9**	**9**	**9**
Number of Families	**21**	**23**	**33**	**35**	**23**	**29**	**24**
Number of Species	**25**	**28**	**46**	**47**	**32**	**30**	**29**
Number of Individuals	**57**	**68**	**130**	**124**	**87**	**91**	**75**

Among the seven (7) Sites, Site 3 has the highest number of insects recorded in the study sites with 130 individuls followed by Site 4 with 124 individuals and transect 6 with 91 individuals. Site 1 has the least number of individuals recorded with 57 individuals as shown in **Table 53.**

Table 53. Arthropod Order with Number of individuals per Site, Lamlahak Subwatershed, Lake Sebu, South Cotabato.

ORDER	No. of Individuals per Site						
	S1	S2	S3	S4	S5	S6	S7
LEPIDOPTERA	16	6	19	17	23	17	7
HYMENOPTERA	5	3	16	14	11	17	17
COLEOPTERA	13	10	22	10	11	14	9
ORTHOPTERA	11	11	21	18	6	6	16
HOMOPTERA	2	11	19	11	9	0	4
HEMIPTERA	3	3	5	13	15	7	6
DIPTERA	7	7	5	17	7	12	12
ODONATA	0	2	5	7	3	0	2
ARANAE	0	7	8	3	2	3	2
ISOPTERA	0	5	10	12	0	14	0
THYSANOPTERA	0	3	0	2	0	1	0
TOTAL	57	68	130	124	87	91	75

Site 6 as representative area of fully invaded by *Piper aduncum* got 30 number of species with 91 individuals while the uninvaded area has 32 species with 87 individuals. Both sampling sites have nine counts of orders.

3.6. Land Use and Landscape Analysis

On the national scale, the study area falls under Public forest land and alienable and disposable lands and brushland/ grassland/ agriculture as shown in Figures 3. The observation was supported by Maps and Photodumentation section of the Report. Brushlands maybe degraded or untimbered areas dominated by a discontinuous cover of shrubby vegetation and grasses. The forest land are found in the upper areas and nearly to be invade by the Piper aduncum. The mountainous areas or land surrounding the study area, on the other hand, is classified as game refuge and bird sanctuary zone and dipterocarp forest as shown in Figure 1. Game refuge and bird sanctuary refers to a forest land designated for the protection of game animals, birds and fish closed to hunting and fishing in order that the excess population may flow and re-stock surrounding areas. Lowland or Mixed dipterocarp forest is a forest type dominated by trees of dipterocarp and non dipterocarp species.

An analysis of the prevailing land use configuration in study area must account for the changes in the local landscape. It must be pointed out that the assessment made was, to some degree, qualitative due to the unavailability of updated land use maps in GIS format. Any development and landscape change may be accounted to the development of the project site.

The Project Site can be divided into six general land uses, namely: forest area, Piper aduncum stand, grassland, brushland, agricultural land, agroforestry area, and built-up areas. Built-up areas are classified into barren and tourism and part of residential and commercial. The forest cover is situated starting from the middle areas of the mountains up to its peak. Piper aduncum stand is continous and progressive from the lower elevation to the peak of the mountain. Any gaps may be an avenue for the P. aduncum to proliferate. The periphery of the remnants of forest is covered with grassland and brushland species and even the Piper aduncum.

The forest area as natural resources is vital to the region by providing irrigation, industrial, and domestic water supply to the surrounding communities. The clearings and kaingins may lead to the progressive growth of the P. aduncum.

MANAGEMENT PLAN

Integrated Prevention and Control Management of IAS

Control of IAS and restoring the original forest composition in Lamlahak Subwatershed is bringing back the integrity of the whole subwatershed area that is beneficial to the ecosystem and the dependent communities surrounding the area as a whole.

In contrast with other machineries in the removal of invasive species, the case of the Lamlahak Subwatershed should have a unique framework that is ecologically and economically sound. The subwatershed drains down to the lake and thus the use of intervention such as the chemical control that can potentially pollute the soil and water in the watershed should be avoided. Thus, integration of mechanical and biological control in eradicating this AIS is preferentially favored.

1. **Reduction and Removal of the IAS Population**

- In the study sites, complete survey on the areas infected of the AIS within the study area can be a jumpstart activity through community participation. The initial information and map that can be derived in the process may serve as basis in the continuous study on the extent of the invasion in AVPL and the speed of invasion.

- IASs are controlled through mechanical, chemical and biological control and approaches (http://www.arc.agric.za) as in the case in Africa. Mechanical control entails uprooting and complete removal of the plant. As this is a labor – intensive measure, this can be a community effort where volunteerism and community participation is promoted.

2. **Replacement and Restoration of the Original Vegetation**

- After determining the extent of invasion in the study site, establishment of Buffer areas to prevent further expansion of *Piper aduncum* with the Lamlahak Watershed to the large Allah Valley Protected Lanscape ;

- Rainforestation. The government has set in in motion the implementation of using the indigenous species as technique in restoring the previous vegetation in the country's rainforests. Continuous production of indigenous species was programmed to provide the planting stocks in the nationwide need for continuous greening of every public areas in the country.

3. Monitoring, maintenance and protection from re-invasion

- Collaborative effort on the monitoring and maintenance of the IAS – free area

- Further study on the impact of *Piper aduncum* to other flora and fauna in the Sampling Sites;

- Creation of legislations adopting national policies on control of alien invasive species that are understandable to the general public;

- Legal instrumentation for the protection of the remaining un-invaded sites and implementation of adoption of national and international enactments on IAS

- Education Information Communication campaign on the impact of IAS in local biodiversity

- Strict Implementation of the laws on control, monitoring and conservation of biological diversity;

- Incorporation of conservation of indigenous biological gene pool management in the AVPL Management Plan

- Strengthening of management framework through capability – building, coordination and awareness building at the local level.

5

CONCLUSION

Section 5
CONCLUSIONS

The Lambeten/Lamlahak Subwatershed is a bastion of natural resources that is thretaned by the presence of the AIS *Piper aduncum*. Vital to the sustainable protection and conservation of the biodiversity resources in the area is ecologically sound management approach that will restore and enhance the subwatershed area. As it is the life support ecosystem to nearby indigenous peoples communities, diversity of wildlife and different plant species, protection and conservation of Lambeten/Lamlahak Subwatershed is necessary.

A total of 174 plant species belonging to 77 families and one hundred fifty genera were recorded at Lambeten/Lamlahak Subwatershed and its vicinity. In terms of growth form, the study area is dominated by trees with 75 species recorded followed by herbs with 69, shrubs with 18 species and the vines with 12 species and has the least numer of species recorded.

The data from invaded and uninvaded site both invaded and uninvaded areas ranges from high to very high diversity values in the biodiversity scale by Fernando (1998). The uninvaded area has higher values for Shannon-Weiner Index (H') and evenness index (J) compared to the invaded areas within the study site. The data suggests that the uninvaded area is indeed high in diversity of species that is also evenly distributed within the study area.

There are three (3) plant species that are in the list of threatened plant species under DENR Administrative Order 01 series 2007 and Convention on the International Trade in Endangered Species of Wildlife Flora and Fauna (CITES). Of the three, two(2) plant species, *Shorea polysperma* and *Shorea contorta* classified as Vulnerable (VU) in DAO 2007-01 while two (2) vulnerable species *Artocarpus blancoi* and *Pterocarpus indicus* are listed in CITES which are sources of premium quality wood and needs protection from any threat.

A total of 196 species of terrestrial vertebrates were identified and recorded belonging to 148 genera and 74 families. One hundred-twenty eight (128) recorded through direct sighting during field survey, 74 species through interviews the aid of secondary materials, forty-seven (47) birds and 27 mammals identified by locals were accounted in the study site. Of the 196 speies, birds accounted the largest number with 131 species (67%) followed by mammals with (36 species, 18%), reptiles (21 species, 11%) and amphibians (8 species, 4%). Ninety-nine terrestrial wildlife species representing 51% of the total species recorded as endemic to the Philippines including species endemic in Mindanao faunal region.

One hundred seven (107) arthropod species belonging to 101 genera and 60 families and 11 orders were recorded in the study sites. The highest number of species recorded for the 11 orders belong to Lepidoptera with 24 species, followed by Hymenoptera with 16 species, Coleoptera with 15, Orthoptera with 14 and Homoptera wih 12 species while Thysanoptera has the least number of species representation with only 1 species recorded.

Moreover, 12 species some previously identified as threatened species by IUCN and DAO, are listed under CITES assessment. Birds has the highest number of species under CTIES category with seven, followed by mammals (3) and and reptiles with two species.

The species listed in CITES are: Long-tailed macaque *(Macaca fascicularis),* Mindanao tree shrew(*Urogale everetti),* Common palm civet (*Paradoxurus hermaphroditus),* Crested Goshawk (*Accipiter trivirgatus),* Writhed Hornbill (*Aceros leucocephalus),* Walden's Hornbill *(Aceros waldeni),* Cattle Egret (*Bubulcus ibis*), Bhraminy Kite (*Haliastur indus*), Colasisi (*Loriculus philippensis*), Montane Racquet Tail (*Prioniturus montanus*), Samar Cobra/Peter's Cobra (*Naja samarensis*), Reticulated Phyton (*Phyton reticulatus*).

Lambeten/Lamlahak Subwatershed is endowed with rich natural resources coupled with affluent people vital in its protection, conservation, and management. The dynamic interactions of diverse life forms in Lambeten/Lamlahak Subwatershed warrants attention and protection.

6 REFERENCES

_____1998. **Forest Land Use Planning Guidelines** CBFM Office, DENR, Manila.

_____2002. **Philippine Biodiversity Conservation Priorities**. A second Iteration of the National Biodiversity Strategy and Action Plan.

Alcala, Angel C. and Brown, Walter C. 1998. **Amphibians An Illustrated Field Guide**. Bookmark Inc. Makati City, Philippines.

Alcala, A.C. 1986. **Guide to Philippine Flora and Fauna. Vol X. Amphibians and Reptiles**. Natural Resources Mgt. Center and University of the Philippines, Quezon City.

Agpaoa A., D. Endangan, S. Festin, J. Gumayagay, TH. Hoenninger, G. Seeber, K. Unkel, and H. D. Weidelt, German Appropriate Technology Exchange (GTZ), 1976, "**Manual of Reforestation and Erosion Control for the Philippines**," German Appropriate Technology Exchange, Eschborn, Germany.

Andrews N. 2005. **Flora and Fauna Assessment. Red Swamp Lagoon Catchment and Long Beach Dunes, Long Beach, Batemans View.** 45pp.

Aragones, E. Jr. G., J. P. Rojo, and F. Jr. Pitargue. **Mangroves Trees: Botanical Identification Handbook** 1498pp.

Astorga L., H. Granholm, S. Johansson, and T. Oksanen. 1992. **Planning and Management of Participatory Forestry Projects.** 90pp.

Bantayan N. C..2006. **GIS in the Philippines: Principles in Forestry and Natural Resources.**

Barangay Government of Lamlahak. 2011. **Barangay Profile.**

Birdlife International 2003. **Threatened Birds of Asia**. International Red Data Book. Cambridge, UK: Birdlife International.

Brown, W. H. 1919, **Vegetation of Philippine Mountains**. Department of Agriculture and Natural Resources. Bureau of Printing, Manila. 434pp.

Carandang, W. M. (1993), **Site Factors and the Development of Forest Stands**, Department of Silviculture and Forest Influences – CF, UPLB

Carballo, J. L., L. Gregorio, N. A. Villanueva, and R. Villavicencio. 1983. **Guide to Grassland Plants.** A Resource Material for Biology Teachers: Pundasyun sa pagpapaunlad ng kaalaman sa pagtuturo ng Agham 1pk. SEC. UP NRMC, Ministry of National Resources and UP. 176pp.

Chokkalingam, Unna 2001, **"Secondary Forest: A Working Definition and Typology" International Forestry Review Volume 3 No. 1**

Chung, H. H., Tang, S. L., Y. S. Huang. 1992. **Toward Conservation of Biodiversity in South East Asia. Proceeding on International Workshop on Biodiversity**. Taiwan Forestry Research Institute, Taipei, Taiwan, ROC.

Convention on International Trade in Endangered Species of Wild Fauna and Flora, 2006 CITES-Listed Species Database, United Nation on Environmental Protection-WCMC, 3 October, 2006.

Crombie, R.I. 1994. **A Working List of the Currently Recognized Species of Amphibians and Reptiles found in the Philippines (unpublished manuscript).** National Museum of Natural History. Smithsonian Institution Washington D.C. USA.

De Guzman, E. D., R. M. Umali, and M. D. Sotalbo. 1986. **Guide to Philippines Flora and Fauna, Vol. III: Dipterocarps and Non Dipterocarps.** 414pp.

DENR 1998. **Forest Land Use Planning Guidelines** CBFM Office, DENR, Manila.

.

DENR Administrative Order No. 2004-**15 Establishing the List of Threatened Species and their Categories, and the List of other Wildlife.**

DENR Administrative Order No. 2007-01 **Establishing the List of Threatened Philippine Plants and their Categories, and the List of Other Wildlife.**

DENR Administrative Order No. 2007-24 Amending DAO 2007-01 **Establishing the List of Threatened Species and their Categories, and the List of other Wildlife.**

DENR and NORDECO. 2001. **Biodiversity Monitoring System Manual for Protected Areas**.

DENR Memorandum Circular No. 2001-04. **Revised Guidelines on the Conduct of Monitoring and Evaluation of the Forestry Sector Project.**

DENR, PAWB. Undated. **Framework for Philippine Plant Conservation Strategy and Action Plan.**

DENR. 1991. **Handbook on Community Profiling. For People-Oriented Forestry Projects.** 158pp.

Diaz N., and D. Apostol. **Forest Landscape Analysis and Design.**

Dickinson E.C, Kennedy R.S., and Parkes K.C, 1991 **Birds of the Philippines** BOU Checklist No. 12 British Ornithologist Union Cambridge UK. 507 p.

Dudley, N., and Philips, A. 2006. **Forests and Protected Areas, Guidance on the use of the IUCN Protected Area Management Categories**. Pg 58

Ecosystems Research and Development Bureau -**Development and Management of Forest Plantations – A Guidebook**. College Laguna DENR ERDB 1998 208pp.

ECPFI-DENR. 1991. **Manual for the Preparation of an Area Ecological Profile.**

Escobin, R.P. and M.C.N.Banaticla. 2005. **Botanical Identification Handbook of Philippine Commercial and Potentially Commercial Forest Vines**. FPRDI, College, Laguna 4031, Philippines.

Espiritu-Afuang, L.M. and J.C Gonzalez with contributions from A.T.L. Dans .1995. **A Manual in Wildlife 101. Introduction to Philippine Wildlife**. Wildlife Biology Laboratory, IBS, CAS UPLB

Fernandez, J., F. Fernandez, and E. Imelda. 1995, 2002. **Palawan Flora and Fauna.** PTFPP/PCSDS – EU. 75pp.

Fernando, E. I et. al (1998) **Resources Inventory and Assessment of Biodiversity in the Subic Bay Metropolitan Authority**

Fernando, E.S. et al 2008, **Forest Formation of the Philippines**, NIES-UPLB, AKECOP

Fernando, E.S. et al 2008, T**hreatened Plants of the Philippines: A Preliminary Asssessmen**t, Asia Life Sciences Vol 3: 1-52, The Asian International Journal of Life Sciences.

Fisher, Tim and Hicks, Nigel. 2000. **A Photographic Guide to the Birds of the Philippines**. New Holand Publisher, United Kingdom.

Food and Agriculture Organization of the United Nations 1996. " *Forest Resources Assessment 1990, Survey of Tropical Forest Cover and Study of Change Processes* "FAO FORESTRY PAPER, 130, **Technical report of a major global cooperative effort coordinated by the Forest Resources Assessment** 1990 Project Rome.

Forest Management Bureau – Department of Environment and Natural Resources 2007. **Greenbook 1: Production of Planting Materials**. Visayas Avenue, Diliman, Quezon City 1100 Philippines. 143 pp.

Forest Management Bureau – Department of Environment and Natural Resources 2007. **Greenbook 2: Procedures and Techniques in Planting.** Visayas Avenue, Diliman, Quezon City 1100 Philippines. 93 pp.

Forest Management Bureau – Department of Environment and Natural Resources 2007**. Greenbook 3: Care, Maintenance and Protection of Planted Seedlings.** Visayas Avenue, Diliman, Quezon City 1100 Philippines. 70 pp.

Foresty/Fuelwood Research and Development Project. 1994. **Growing Multipurpose Trees on Small Farms** (2nd ed). Bangkok, Thailand: Winrock International. 320 pp.

Hernandez E. A., and V. Uddameri. **Risk Based Methodologies for Watershed Management.** 49pp.

Gonzalez, J.C.T. 1997. **A Pictorial Guide to Philippine Endemic Forest Birds of Mount Makiling**, Luzon Island, Philippines. Part 1, UPLB Museum of Natural History, UPLB, College, Laguna.

Gonzalez, J.C.T. 1997.**A Guide to the Birds of El Nido Northern Palawan, Philippines**, Ten Knots Development Corporation.

Heaney, L.R., D.S Balete, M.M.L. Dolar, A.C. Alcala, A.T.L. Dans, P.C. Gonzalez, N.R. Ingle, M.V. Lepiten, W.L.R Oliver, P.S. Ong, E.A. Rickart, B.R. Tabaranza Jr., and R.C.B. Utzurrum. 1998. **A Synopsis of the Mammalian Fauna of the Philippine Islands**, Fieldiana (zZool.) 88:61p.

Jongman, R. H. G., C. J. F. ter Braak and O.F.R. van Tongeren. Eds. 1987. **Data Analysis in Community and Landscape Ecology**. Pudoc Wageningen. p. 174 – 206.

Kennedy R.S., P.C. Gonzales, E.C. Dickinson, H.C. Miranda and T.H. Fisher 2001. **A Guide to the Birds of the Philippines** Oxford University Press. p. 369.

Krebs, C.J. 1989. **Ecological Methodology**. Harper Collins Publishers. p. 293 – 327.

Kurian, J. C. 2010. **Amazing Healing Plants Vol. 1**. Philippine Publishing House. P. 1-203.

Lasco R. D., M. V. O. Espaldon, and M. A. Tapia. 2005. **Ecosystem and People: The Philippine Millennium Ecosystem Assessment (MA) Sub-global Assessment.**

Lindberg, K., B. Furze, M. Staff and R. Black. 1997. **Ecotourism and other services derived from forest in the Asia-Pacific Region: Outlook to 2010. Asia-Pacific Forestry Sector Outlook Study Working Paper Series.** Forestry Policy and Planning Division, Rome, Regional Office for Asia and the Pacific, Bangkok. Forest Service United States Department of Agriculture.

Madulid, D. 2002. **A Pictorial Guide to the Noteworthy Plants of Palawan.** PTFPP – PCSDS. 129pp.

Madulid, D. A. 2000. **A Pictorial Cyclopedia of Philippine Ornamental Plants.** 388pp.

Magurran, A. E. 1988. **Ecological Diversity and Its Measurements**. Princeton University Press. p. 179.

Mallari N. A. D., Tabaranza B.R, and M.J Corby; with contribution for M.V Lepiten-Tabao and G.V.A Gee; in collaboration with the Department of Environment and Natural Resources and Bookmark, Inc. (2001). **Key Conservation Sites in the Philippines**: a Haribon Foundation and Birdlife International directory and important bird areas. Makati City Bookmark Inc.

Margules, C.R. & R.L. Pressey. 2000. **Systematic Conservation Planning**. Nature 405, 243-253.

Miner Lake Improvement Board. 2002. **Recreational Carrying Capacity Study Miner Lake Allegan County.**

Ministry of Environment of Korea-Korea Environment Institute-The World Bank. **Integrated Watershed Management for Laguna de Bay.**

MMA-DENR. 1993. **Implementing Guidelines for Landscape Development in Metropolitan Manila**.

Moody, K., C. E. Munroe, R. T. Lubigan, and E. C. Jr. Paller. 1984. **Major Weeds of the Philippines.** Weed Science Society of the Philippines, UPLB, College Laguna. 328pp.

National Statistics Office. (2007). **Census of Population**.

Nandi P. K. 2004. **Management of Upper Lake Watershed.**

Odum E. P. 1971. **Fundamentals of Ecology**. 3rd ed. Reprint, JMC Press Inc., Quezon City. p. 547.

Odum E. P. and G. W. Barrett. 2005. **Fundamentals of Ecology.** 5th ed. _597pp.

Ong, P. S., N. P. Ibuna. 2000. **Highlights of the National Biodiversity Conservation Priority-Setting Workshop**. White Rock Resort Hotel, Subic Zambales.

PAWB – DENR. 2000. **Statistics on Philippine Protected Areas and Wildlife Resources.**

PCARRD DOST. 1987. **Manual on Vegetational Analysis for Grassland and Forest Ecosystems**. Book Series No. 50.

PCARRD-DOST-DENR-FMB-DA-UPLB-CFNR-FDC-ENFOR. 1999. **Guidelines for Watershed Management and Development in the Philippines.** Los Baños, Laguna: PCARRD-DOST-DENR-FMB- DA-UPLB-CFNR-FDC-ENFOR. 241pp.

Philippine Council for Agriculture, Forestry and Natrural Resouirces Resaerch and Development. **The Philippine Recommends for Watershed Management.** Los Baños, Laguna.PCARRD 1991.88p (Phils. Recommends Ser. No.72 1999)

Philippine Council for Agriculture, Forestry and natural Resources Research and Development. **The Philippines Recommends for Reforestation**. Los Baños, Laguna: PCARRD, 1992. 113p. (Philippines Recommends Series No. 49-A).

Philippine Council for Agriculture, Forestry and Natural Resources Research and Development. **Establishment and Utilization of Cover Crops in Reforestation Areas**. Los Baños, Laguna: PCARRD, 1991. 19p.

Protected Area and Wildlife Division. Region IV- Mainland Province. 2001. **Relevant Policy Concerning Biodiversity Conservation**. Superstar Resort, Bgy. Malabrigo, Lobo, Batangas.

Pulhin F. B. and Lasco R. D. **Consultation Meeting for the International Conference on Trophical Forest and Climate Change: *Status, Issues and Challenges.***

Pulhin J. M., F. A. Agra, R. V. O. Cruz, R. D. Lasco, F. B. Pulhin, R. J. J. Peras, and M. A. Tapia. July 2004. **Institutional Impacts and Adaptation Strategies to Climate Variability and Extreme in Pantabangan-Carralagan Watershed.**

Pulhin J. M., L. L. Rebugio, and F. B. pulhin. **Sustainable Mountain Ecosystems. Philippines' Challenge for the 21st Century.** 173pp.

Rabor, Dioscoro R.,. 1977. **Philippine Birds and Mammals.** UP Science Education Center UP Press Quezon City p. 284

R.A. 7586. 1992. An Act for the establishment and management of **National Integrated Protected Areas System**, Defining its scope and coverage, and for other purposes. Philippine Congress.

R.A. 9147. 2001, An Act adopting for the **Conservation and Protection of Wildlife Resources and their Habitats**, appropriating funds therefore and for other purposes. Philippine Congress.

Rambaldi, G., Callosa, J. (2000). **Manual on Participatory 3-Dimensional Modeling for Natural Resource Management**

Rojo, J. P. 1999. **Revised Lexicon of the Philippine Trees.** FPRDI – DOST. 484pp.

Rojo, J. P., and E. G. Aragones Jr. 1997. **Philippine Dipterocarps: Botanical Identification Handbook.** FPRDI – DOST. 97pp.

Rojo, J. P., C. A. Roxas, F. Jr. C. Pitargue, and C. A. Britas. 2000. **Philippine Erect Bamboos: A Field Identification Guide**. FPRDI-DOST. 161pp.

Salvosa, F. M. 1963. **Lexicon of Philippine Trees.** FPRDI UP. 136pp.

.

Santos, J. V., E. D. De Guzman, and E. S. Fernando. 1986. **Guide to Philippine Flora and Fauna, Vol. I: Bamboos, Grasses and Palms**. 255pp.

Seeber, G., H. J. Weidelt, and V. S. Banaag. 1979. **Dendrological Characters of Important Forest Trees from Eastern Mindanao.** GTZ Eschborn Philippine-German Rainforest Development Project.

Seidenschwarz, F. 1994. **Plant World of the Philippines.** An Illustrated Dictionary of Visayan Plant Names with their Scientific, Tagalog and English Equivalents**.** University of San Carlos, Cebu City. 368pp.

Serote, Ernesto M. 2004. **Property, Patrimony and Territory. Foundation of Land Use Planning in the Philippines.** 463pp.

Sinha C. C., and L. R. Heany. 2006. **Philippine Biodiversity Principles and Practice.** 495pp.

.

Tanguilig H. C., and Estoque R. C. **Water Carrying Capacity of Naguilian River Basin Watershed**. 15pp.

Warbach J. D., M. A. Wyckoff, G. A.Fisher, P. Johnson, and G. Gruenwald. 1994. **Regulating Keyhole Development Carrying Capacity Analysis.** 57pp.

Wildlife Conservation Society of the Philippines. 1997. **Philippine Red Data Book: Red List of Threatened Animals**, Makati City Bookmark, Inc.

World Conservation Union or International Union for the Conservation of Nature and Natural Resources (IUCN), **List of Endangered Species 2001-2007**, Latest version

Yap, N. T. (2005). ***Towards an Inclusive Framework for Environmental Impact Assessment.*** **Environmental Systems Analysis Limited.**

Zamora, P. M., and L. Co. 1986. **Guide to Philippine Flora and Fauna, Vol. II: Economic Ferns, Endemic Ferns and Gymnosperms.** 273pp.

NEDA Regional Office XII. March 2012. **Allah Valley Landscape Area Development Plan, 2011-2016**.

Howard R. Lahti Ph.D., P. Geo. Scott Robson B.Sc. Geol. MAusIMM (CP), MAIG, GSP. **Technical Report on T'Boli Gold and Silver Project, South Cotabato, Mindanao, Philippines**. 1 October 2012

Web Sources:

Lake Sebu Profile: Municipality of Lake Sebu Province of South Cotabato. http://www.nscb.gov.ph/ru12/Municipal%20Profile/Lake%20Sebu/Lake_Sebu_Profile.htm. August 2013

DENR Region 12 website. http://r12.denr.gov.ph/. August 2013

Google Earth Map. August 2013

http://www.mb.com.ph/articles/354946/mindanao-lakes-dev-t-programs-up. August 2013

APPENDICES

Appendix 1: General List of flora species found in Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family	Habit	Tot # Ind.
1	*Acalypha amentacea*	Acalypha	EUPHORBIACEAE	S	44
2	*Acalypha caturus*	Acalaypha	EUPHORBIACEAE	S	5
3	*Acer laurinum*	Letsia (Novol)	ACERACEAE	T	8
4	*Acmella grandiflora*	Compositae sp2-1790	ASTERACEAE	H	2
5	*Acmella paniculata*	Compositae	ASTERACEAE	H	1
6	*Aeschynanthus sp.*	Eschycalanthus (Ailanthus)	GESNERIACEAE	H	1
7	*Agalmyla* sp.	Agalmyla	GESNERIACEAE	H	1
8	*Ageratum conyzoides*	Ageratum	ASTERACEAE	H	1
9	*Albizia acle*	T-SPI	FABACEAE	T	2
10	*Alocasia macrorhizos*	Alocasia sp	ARACEAE	H	1
11	*Alstonia* sp.	Batino	APOCYNACEAE	T	2
12	*Amomum* sp.	Tagbak	ZINGIBERACEAE	H	53
13	*Appendicula reflexa*	Appendecula	ORCHIDACEAE	H	1
14	*Aralia bipinnata*	Aralia	ARALIACEAE	T	2
15	*Ardisia* sp.	Ardisia	MYRSINACEAE	T	2
16	*Arisaema polyphyllum* var. *polyphyllum*	Arosema polyphyllum	ARACEAE	H	1
17	*Artocarpus odoratissimus*	Marang	MORACEAE	T	1
18	*Asplenium nidus*	Asplenium	ASPLENIACEAE	H-F	1
19	*Bambusa blumeana*	Kawayan	POACEAE	T-G	6
20	*Bambusa vulgaris*	Kawayan	POACEAE	T-G	40
21	*Begonia* sp.	Begonia sp4	BEGONIACEAE	H	1
22	*Bidens pilosa*	Bidens pilosa	ASTERACEAE	H	1
23	*Bischofia javanica*	Bischopia javanica	PHYLLANTHACEAE	T	11
24	*Buchanania* sp.	Bucanania	ANACARDIACEAE	T	1
25	*Calamus* sp.	Calamus sp	ARECACEAE	V-Pm	1
26	*Callophyllum blancoi*	Takas	CLUSIACEAE	T	2
27	*Canarium* sp.	Ninay/Gapuga/Sahing	BURSERACEAE	T	4
28	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	H	13
29	*Caryota cumingii*	Caryota/takipan	ARECACEAE	T-P	9
30	*Celtis philippinesis*	Subang	CELTIDACEAE	T	11
31	*Celtis* sp.	Celtis	ULMACEAE	T	1
32	*Cheilocostus speciosus*	Costus	COSTACEAE	H	6
33	*Cheiropleuria bicupsis*		DIPTERIDACEAE	H-F	1
34	*Chingia ferox*	Fern 1764	THELYPTERIDACEAE	H-F	4
35	*Chromolaena odorata*	Hagonoy	ASTERACEAE	S	16
36	*Cinnamomum* sp.	Cinnamomum	LAURACEAE	T	2
37	*Clethra canescens* var. *novoguineensis*	Clethra	CLETHRACEAE	T	2
38	*Costus speciosus*	Costos	COSTACEAE	H	8
39	*Crassocephalum crepidioides*	Gynura procumbens	ASTERACEAE	H	5
40	*Cuphea carthagenensis*	Cuphea carthagenensis	LYTHRACEAE	H	4
41	*Curculigo capitulata*	Curculigo	HYPOXIDACEAE	H	28
42	*Curcuma domestica*	Zingiber (Curcuma domestica)	ZINGIBERACEAE	H	1
43	*Cyathea contaminans*	Cyathea	CYATHEACEAE	H-F	2
44	*Cyathea* sp.	Cyathea/Tree fern	CYATHEACEAE	T-F	4
45	*Cypholophus moluccanus*	Urticaceae	URTICACEAE	S	16
46	*Dacrycarpus imbricatus*	Iging	PODOCARPACEAE	T	1
47	*Dendrobium milaniae*		ORCHIDACEAE	H	1
48	*Derris* cf. *elliptica*	Derris	FABACEAE	V	3
49	*Desmodium triflorum*	Desmodium tryflorum	FABACEAE	H	350
50	*Dianella ensifolia*	Dianella	LILIACEAE	H	1
51	*Dicranopteris linearis*	Dicranopteris	GLEICHENIACEAE	V-F	2
52	*Dinochloa* sp.	Bikal	POACEAE	T	2
53	*Dioscorea* sp.	Dioscorea sp	DIOSCOREACEAE	V	2
54	*Diplazium pallidum*	Fern sp3	ATHYRIACEAE	H-F	1
55	*Dipteris conjugata*	Dipteris conjugate	DIPTERIDACEAE	H-F	1
56	*Discocalyx* sp.	Discocalyx	MYRSINACEAE	S	1

Appendix 1: General List of flora species found in Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family	Habit	Tot # Ind.
57	*Drynaria queercifolia*	Pakpak lawin/Drynaria	POLYPODIACEAE	H-F	2
58	*Dysoxylum* sp.	Meliaceae	MELIACEAE	T	1
59	*Elaeocarpus* sp.	Elaeocarpus	ELAEOCARPACEAE	T	4
60	*Elatostema lagunense*	Elatostema	URTICACEAE	H	96
61	*Elephantopus spicatus*	Elephantopus	ASTERACEAE	H	16
62	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	H	152
63	*Erythrina subumbrans*	Dapdap/tugis	FABACEAE	T	3
64	*Etlingera elatior*	Zingiber	ZINGIBERACEAE	H	3
65	*Euphorbia heterophylla*	Euphorbia sp	EUPHORBIACEAE	H	2
66	*Euphorbia hirta*	Euphorbia hirta	EUPHORBIACEAE	H	1
67	*Evodia* sp.	Evodia	RUTACEAE	T	1
68	*Ficus minahasae*		MORACEAE	T	8
69	*Ficus nota*	Ficus nota	MORACEAE	T	10
70	*Ficus odorata*	Ficus sp	MORACEAE	T	3
71	*Ficus septica*	Ficus septica	MORACEAE	T	7
72	*Ficus* sp	Ficus sp	MORACEAE	T	10
73	*Ficus* sp. 1	Ficus sp1	MORACEAE	T	1
74	*Ficus* sp. 2	Ficus sp2	MORACEAE	T	1
75	*Ficus variegata*		MORACEAE	T	2
76	*Flemingia strobilifera*	Moghania	FABACEAE	S	32
77	*Frecynetia* sp.	Frecynetia	PANDANACEAE	S	1
78	*Glochidion* sp.	Glochidion	PHYLLANTHACEAE	S	1
79	*Gmelina arborea*	Gmelina	LAMIACEAE	T	5
80	*Gomphostema javanica*		LAMIACEAE	S	1
81	*Gynura procumbens*	Gynura procumbens	ASTERACEAE	H	1
82	*Habenaria* sp.	Orchid Habenaria	ORCHIDACEAE	H	1
83	*Homalanthus macradenius*	Homalanthus/Limingi (Big tree)/Macaranga	EUPHORBIACEAE	T	21
84	*Homalomena philippinensis*	Homalomena	ARACEAE	H	12
85	*Hoya multiflora*	Hoya multiflora	ASCLEPIADACEAE	H	1
86	*Hydrangea integrifolia*	Hydrangea	HYDRANGEACEAE	S	1
87	*Hyptis capitata*	Hyptis	LAMIACEAE	H	5
88	*Impatiens platypetala*	Impatiens	BALSAMINACEAE	H	6
89	*Imperata cylindrica*	Cogon	POACEAE	H-G	851
90	*Korthalsia* sp.	Korthalsia	ARECACEAE	V-Pm	1
91	*Lasianthus* sp.	Loranthus	RUBIACEAE	S	20
92	*Leea guineensis*	Leea	VITACEAE	S	1
93	*Lepidogyne longifolia*		ORCHIDACEAE	H	1
94	*Leucaena leucocephala*	Ipil-ipil	FABACEAE: MIMOSOIDEAE	T	5
95	*Leucosyke capitellata*	Leucosyke	URTICACEAE	T	35
96	*Lithocarpus* cf. *solerianus*	Lithocarpus sp.	FAGACEAE	T	6
97	*Lithocarpus* sp.	Oak leaf fern	FAGACEAE	T	2
98	*Litsea cordata*	Litsea perrottetii	LAURACEAE	T	1
99	*Litsea* sp.	Litsea	LAURACEAE	T	1
100	*Lygodium circinatum*	Lygodium	SCHIZAEACEAE	V-F	14
101	*Lygodium japonicum*	Lygodium	SCHIZAEACEAE	V-F	4
102	*Macaranga hispida*	Macaranga hispida	EUPHORBIACEAE	T	6
103	*Macrothelypteris torresiana*	Fern sp4	THELYPTERIDACEAE	H-F	1
104	*Maoutia setosa*	Urticaceae	URTICACEAE	T	41
105	*Maoutia setosa sp1*	Urticaceae sp1	URTICACEAE	T	6
106	*Medinilla pendula*	Medinilla	MELASTOMATACEAE	S	1
107	*Melastoma malabathricum*	Melastoma	MELASTOMATACEAE	S	16
108	*Melochia umbellata*	Helictress ambilata (H. umbellata)	STERCULIACEAE	T	2
109	*Merremia peltata*	Merremia diltata	CONVOLVULACEAE	V	1
110	*Mikania cordata*	Mikania	ASTERACEAE	V	20
111	*Miscanthus floridulus*	Miscanthus	POACEAE	H	60
112	*Musa paradisiaca*	Musa sp.	MUSACEAE	H	2
113	*Musa sapientum*	Musa sp	MUSACEAE	H	26

Appendix 1: General List of flora species found in Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family	Habit	Tot # Ind.
114	*Mussaenda* sp.	Musaenda sp	RUBIACEAE	T	1
115	*Neolitsea villosa*		LAURACEAE	T	12
116	*Neonauclea formicaria*	Neonuclea	RUBIACEAE	T	4
117	*Nephrolepis biserrata*	Nephrolepis	NEPHROLEPIDACEAE	H-F	23
118	*Odontosoria chinensis*	Fern- 1784	LINDSAEACEAE	H-F	1
119	*Oleandra* sp.	Oleandra	OLEANDRACEAE	H-F	2
120	*Omalanthus macradenius*	Homalanthus	EUPHORBIACEAE	T	6
121	*Ophioglossum reticulatum*	Ophioglossum	OPHIOGLOSSACEAE	H-F	3
122	*Oplismenus compositus*	Oplisminus	POACEAE	H	2
123	*Osmoxylon sp.*	Osmoxylum	ARALIACEAE	T	1
124	*Osmunda banksiifolia*	Fern sp2	OSMUNDACEAE	H-F	3
125	*Pandanus* sp.	Pandanus sp	PANDANACEAE	T	1
126	*Pavetta* sp.	Oveta	RUBIACEAE	S	1
127	*Phyllanthus amarus*	Phyllanthus sp.	PHYLLANTHACEAE	H	1
128	*Pinanga* sp.	Pinanga	ARECACEAE	T	5
129	*Piper aduncum*	Boyo-boyo	PIPERACEAE	T	748
130	*Piper sp.*	Piper	PIPERACEAE	H	2
131	*Pipturus arborecens*	Pipturus sp. (damay)	URTICACEAE	T	11
132	*Pittosporum moluccanum*	Pittosporum	PITTOSPORACEAE	T	1
133	*Poikilospermum acuminatum*	Poikeloshermis sp	CECROPIACEAE	V	1
134	*Polyalthia* sp.	Annonaceae	ANNONACEAE	T	2
135	*Polygala venenosa*		POLYGALACEAE	S	1
136	*Pronephrium asperum*	Fern sp (1731)	THELYPTERIDACEAE	H-F	23
137	*Prunus* sp.	Prunus	ROSACEAE	T	2
138	*Pseudoelephantopus tomentosus*	Psudo espicatus	ASTERACEAE	H	21
139	*Psidium gaujava*	Bayabas	MYRTACEAE	T	2
140	*Pteridium aquilium*	Gletienia	DENNSTAEDTIACEAE	H-F	7
141	*Pterocarpus indicus*	Narra	FABACEAE: FABOIDEAE	T	3
142	*Raphidophora* sp.	Photos	ARACEAE	H	1
143	*Rhynchotechum discolor*	Gesneriaceae	GESNERIACEAE	H	37
144	*Rottboellia cochinchinensis*	Rottboellia	POACEAE	H	2
145	*Sapindus* sp.	Saponaria	SAPINDANCEAE	T	2
146	*Sarcandra glabra*	Salcandra	CHLORANTHACEAE	S	3
147	*Saurauia erythrotricha*	Sauraia	ACTINIDIACEAE	T	9
148	*Saurauia* sp.	Saurauia	ACTINIDIACEAE	T	1
149	*Schismatoglottis calyptrata*	Schismatoglottis	ARACEAE	H	76
150	*Scleria scrobiculata*	Scleria scrobiculata	CYPERACEAE	H-G	119
151	*Selaginella delicatula*	Selaginella	SELAGINELLACEAE	H-F	122
152	*Setaria palmifolia* var. *palmifolia*	Grass sp	POACEAE	H	23
153	*Shorea contorta*	White Luan	DIPTEROCARPACEAE	T	47
154	*Shorea palosapis*	Mayapis	DIPTEROCARPACEAE	T	5
155	*Shorea polysperma*	Tanguile	DIPTEROCARPACEAE	T	1
156	*Smilax leucocephylla*	Banagan/Banag	SMILACACEAE	V	1
157	*Spermacoce laevis*	Borreria libis	RUBIACEAE	H	3
158	*Sphaerostephanos* sp.	Fern sp2 1083	THELYPTERIDACEAE	H-F	43
159	*Sphaerostephanos* sp. 1	Fern sp	THELYPTERIDACEAE	H-F	7
160	*Sphaerostephanos* sp. 2	Fern sp	THELYPTERIDACEAE	H-F	18
161	*Stachytarpheta jamaicensis*	Stocytarpeta jamaecenses	VERBENACEAE	S	3
162	*Sterculia rubiginosa* var. *divaricata*	Sterculia	MALVACEAE	T	2
163	*Swietinia macrophylla*	Mahogany	MELIACEAE	T	6
164	*Syzygium* sp.	Syzygium sp	MYRTACEAE	T	2
165	*Talauma* sp.	Patangis	LAURACEAE	T	1
166	*Tarennoidea wallichii*	Mataul	RUBIACEAE	T	34
167	*Tetrastisgma* sp.	Tetrastigma	VITACEAE	V	1
168	*Trema orientalis*	Hanagdong	CELTIDACEAE	T	4
169	*Turpinia sphaerocarpa*	Turpina	STAPHYLEACEAE	T	2
170	*Viburnum luzonicum* var.	Medulla	ADOXACEAE	T	49

Appendix 1: General List of flora species found in Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family	Habit	Tot # Ind.
	apoense				
171	*Villebrunea rubescens*	Canomol/Novol	URTICACEAE	T	5
172	*Wendlandia luzoniensis* var. *luzoniensis*	Farinanta	RUBIACEAE	T	3
173	*Xanthostemon* sp.	Camptostemon	MYRTACEAE	T	1
174	*Zea mays*	Mais	POACEAE	H	1
					3753

Taxa	Total number	Habit	No. of species
Species	174	*Trees*(T)	75
Family	77	*Shrubs* (S)	18
Genera	149	*Vines* (V)	12
		Herbs(H)	69

Note:

Pn=Pandan
Pm=Palm
Bm=Bamboo (erect)
Cyd=Cycad
F= Fern
G=Grass

Appendix 2: General Flora Species Composition, Endemicity and their Economic Use

No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
1	ACERACEAE	*Acer laurinum*	Letsia (Novol)	T	Indigenous	Ornamental; Wood used for construction		Luzon, Negros Mindanao
2	ACTINIDIACEAE	*Saurauia erythrotricha*	Sauraia	T	Endemic	Wood used for construction		
3	ACTINIDIACEAE	*Saurauia* sp.	Saurauia	T	Endemic	Wood used for construction		
4	AGAVACEAE	*Dianella ensifolia*	Dianella	H	Indigenous	Ornamental		
5	AMARYLLIDACEAE	*Curculigo capitulata*	Curcolido	H	Non-Endemic	Cultivated as an ornamental		Mt. Makiling
6	ANACARDIACEAE	*Buchanania* sp.	Bucanania	T	Endemic	Wood for light construction		
7	ANNONACEAE	*Polyalthia* sp.	Annonaceae	T	Endemic	Ornamental		
8	APOCYNACEAE	*Alstonia* sp.	Batino	T	Endemic	Medicinal; wood used for construction		
9	ARACEAE	*Alocasia macrorhizos*	Alocasia sp	H	Indigenous	Edible; medicinal		Mt. Makiling
10	ARACEAE	*Arisaema polyphyllum* var. *polyphyllum*	Arosema polyphyllum	H	Indigenous	Ornamental		
11	ARACEAE	*Homalomena philippinensis*	Humalomila (Kataas)	H	Endemic	Medicinal		Isabela, La Union, Pangasinan, Pampanga, Rizal, Bataan, Laguna, and Sorsogon Provinces in Luzon; Mindoro; Palawan; Panay; Leyte; Biliran; Negros; and Mindanao
12	ARACEAE	*Raphidophora* sp.	Photos	H	Endemic			
13	ARACEAE	*Schismatoglottis calyptrata*	Schismatoglosis	H	Indigenous	Ornamental		
14	ARALIACEAE	*Aralia bipinnata*	Aralia	T	Indigenous	Ornamental; medicinal		
15	ARALIACEAE	*Osmoxylon sp.*	Osmoxylum	T	Endemic			
16	ARECACEAE	*Calamus* sp.	Calamus sp	V-Pm	Endemic	Large canes used for furniture making		
17	ARECACEAE	*Caryota cumingii*	Pugahan/Takipan	T-P	Indigenous	ornamental		Hidden Valley; Bulacan
18	ARECACEAE	*Korthalsia* sp.	Korthalsia	V-Pm	Endemic			
19	ARECACEAE	*Pinanga* sp.	Pinanga	T	Endemic	Planted as ornamental		
20	ARECACEAE	*Setaria palmifolia* var. *palmifolia*	Grass sp	H	Non-Endemic	Used as forage; sometimes cultivated as ornamental		Mt. Makiling
21	ASCLEPIADACEAE	*Hoya multiflora*	Hoya multiflora	H	Endemic	Ornamental		luzon, Mindoro, Palawan, negros, Leyte, Panay
22	ASPLENIACEAE	*Asplenium nidus*	Pakpak lawin lalake/Aspleniu m	H-F	Indigenous	Ornamental; medicinal	Vu	Tiwi, Bicol

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No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
23	ASTERACEAE	*Acmella grandiflora*	Compositae sp2-1790	H	Indigenous	Ornamental		Ilocos Sur, Ifugao, Mountain Province, Benguet
24	ASTERACEAE	*Acmella paniculata*	Compositae	H	Indigenous	Ornamental		
25	ASTERACEAE	*Ageratum conyzoides*	Bulak manok/Ageratum	S	Indigenous	Medicinal; pioneer species		Subic FR; Tiwi; Hidden Valley; Bulacan
26	ASTERACEAE	*Bidens pilosa*	Bidens pilosa	H	indigenous	Ornamental		
27	ASTERACEAE	*Chromolaena odorata*	Hagonoy/ Gonoi	S	Exotic	Medicinal		
28	ASTERACEAE	*Crassocephalum crepidioides*	Japanese weed/Gynura procumbens	H	Indigenous	Medicinal		
29	ASTERACEAE	*Elephantopus spicatus*	Elephantupus	H	Indigenous	Ornamental		
30	ASTERACEAE	*Elephantopus tomentosus*	Elephantpus	H	Exotic	Medicinal		Subic FR
31	ASTERACEAE	*Gynura procumbens*	Gynura procumbens	H	Indigenous	Ornamental		
32	ASTERACEAE	*Mikania cordata*	Uoko/Mikania	V	Exotic	cover crop; medicinal		Subic FR; Tiwi; Hidden Valley; Riviera; Didipio; Bulacan
33	ASTERACEAE	*Pseudoelephantopus tomentosus*	Psudo espicatus	H	Exotic	Medicinal		
34	ATHYRIACEAE	*Diplazium pallidum*	Fern sp3	H-F	Indigenous	Edible; medicinal		
35	BALSAMINACEAE	*Impatiens platypetala*	Impatiens	H	Exotic	Ornamental		
36	BEGONIACEAE	Begonia sp	Begonia/Begonia sp4	H	Endemic	Ornamental		
37	BURSERACEAE	*Canarium* sp.	Canarium/Sahing/Ninay	T	Endemic	Wood for light construction; resin for cooking and lighting		
38	CAPRIFOLIACEAE	*Viburnum luzonicum* var. *apoense*	Calicarpa (Midula)	T	Endemic			Didipio
39	CECROPIACEAE	*Poikilospermum acuminatum*	Poikeloshermis sp	V	Indigenous	Ornamental; medicinal; edible		Northern Luzon to Mindanao
40	CELTIDACEAE	*Celtis philippinesis*	Subang	T	Endemic	Wood for general construction; medicinal		Subic FR
41	CELTIDACEAE	*Cheilocostus speciosus*	Costus	H	Indigenous	Forage; medicinal;ornamental		
42	CELTIDACEAE	*Trema orientalis*	Anabiong/Anagdong	T	Indigenous	Temporary construction work; bark is a source of fibers		
43	CHLORANTHACEAE	*Sarcandra glabra*	Salcandra	S	Indigenous	Medicinal		
44	CLETHRACEAE	*Clethra canescens*	Clethra	T	Indigenous	Wood used for construction		Mindanao, Bukidnon

Appendix 2: General Flora Species Composition, Endemicity and their Economic Use

No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
		var. *novoguineensis*						
45	CLUSIACEAE	*Callophyllum blancoi*	Gakawan/Takas	T	Indigenous	Medicinal; wood for furniture		
46	CONVOLVULACEAE	*Merremia peltata*	Merremia diltata	V	Indigenous	Wood used for construction		SFR; Bulacan
47	COSTACEAE	*Costus speciosus*	Tubang usa/Costos	H	Indigenous	Medicinal; ornamental; species diversity		
48	CYATHEACEAE	*Cyathea contaminans*	Pakong buwaya/Cyathea	H-F	Indigenous; CITES listed	ornamental	Vu	Hidden Valley
49	CYATHEACEAE	*Cyathea* sp.	Tree fern	T-F	Endemic			
50	CYPERACEAE	*Carex alopecuroides* var. *chlorostachys*	Cyperus	H	Indigenous	Ornamental		
51	CYPERACEAE	*Scleria scrobiculata*	Sarat/Escleria	H-G	Indigenous	Soil cover, ornamental; species diversity		Subic FR
52	DENNSTAEDTIACEAE	*Pteridium aquilium*	Gletienya	H-F	Indigenous	Young stems are edible		
53	DIOSCOREACEAE	*Dioscorea* sp.	Dioscorea	H	Endemic			
54	DIPTERIDACEAE	*Cheiropleuria bicupsis*		H-F	Indigenous	Ornamental		
55	DIPTERIDACEAE	*Dipteris conjugata*	Dipteris conjugate	H-F	Indigenous	Ornamental houseplant		Mt. Makiling
56	DIPTEROCARPACEAE	*Shorea contorta*	White Lauan/Lauan Pula	T	Endemic	General construction	Vu	
57	DIPTEROCARPACEAE	*Shorea palosapis*	Mayapis/Lauan (mayapis)	T	Endemic	General construction		
58	DIPTEROCARPACEAE	*Shorea polysperma*	Tanguile/Takuban/ Tangile	T	Endemic	General construction	VU	
59	ELAEOCARPACEAE	*Elaeocarpus* sp.	Elaeocarpus	T	Endemic	Wood is used for light construction		
60	EUPHORBIACEAE	*Acalypha amentacea*	Bogus/Acalypha	S	Indigenous	Ornamental		Hidden Valley
61	EUPHORBIACEAE	*Acalypha caturus*	Acalaypha	S	Indigenous	Ornamental		Benguet, Bataan, Quezon,Cavite, Laguna, Sorsogon, Samar, Leyte, Mindanao
62	EUPHORBIACEAE	*Euphorbia heterophylla*	Euphorbia sp	H	Indigenous	Medicinal		
63	EUPHORBIACEAE	*Euphorbia hirta*	Gatas-gatas/Euphorbia hirta	H	Indigenous	Medicinal		
64	EUPHORBIACEAE	*Homalanthus macradenius*	Homalanthus	T	Endemic	Ornamental		Agusan, Surigao, Davao, Lanao

Appendix 2: General Flora Species Composition, Endemicity and their Economic Use

No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
65	EUPHORBIACEAE	*Macaranga hispida*	Langila	T	Indigenous	Ornamental		Quezon, Laguna, Mindoro, palawan, Camarines, Sorsogon, Catanduanes, Panay, Leyte, Mindanao, Camiguin, Basilan, Sulu
66	EUPHORBIACEAE	*Omalanthus macradenius*	Homalanthus	T	Indigenous	The leaves are used for wrapping and covering food.		Negros and Samar to Mindana
67	FABACEAE	*Derris* cf. *elliptica*	Derris	V	Indigenous	source of tannin; insecticide and fiscicide; medicinal value		Northern Luzon, Plawan, Mindanao
68	FABACEAE	*Desmodium triflorum*	Desmodium tryflorum	H	Indigenous	Ornamental plant		
69	FABACEAE	*Erythrina subumbrans*	Dapdap/Tugis	T	Indigenous	Shade tree; medicinal; young leaves are edible		
70	FABACEAE	*Flemingia strobilifera*	Flameňa (Leguminaceae) /Moghania	S	Indigenous	medicinal		
71	FABACEAE: FABOIDEAE	*Pterocarpus indicus*	Narra	T	Indigenous	Furniture,shade tree, reofrestation species, fuelwood		Hidden Valley; Tiwi; Bulacan
72	FABACEAE: MIMOSOIDEAE	*Albizia acle*	Akle/T-SPI	T	Endemic	Fine furniture, cabinet making;interior finish; soap substitute		SFR
73	FABACEAE: MIMOSOIDEAE	*Leucaena leucocephala*	Ipil-ipil	T	Exotic	Reforestation species; firewood and charcoal; fodder		Subic FR; Tiwi; Hidden Valley; Bulacan
74	FAGACEAE	*Lithocarpus* cf. *solerianus*	Lithocarpus sp.	T	Endemic	Wood used for construction		Luzon, also Mindoro, Mindanao
75	FAGACEAE	*Lithocarpus* sp.	Oak leaf fern	T	Endemic	Wood is used for furniture		
76	GESNERIACEAE	*Aeschynanthus sp.*	Eschycalanthus (Ailanthus (?)	H	Endemic			
77	GESNERIACEAE	*Agalmyla* sp.	Agalmyla	H	Endemic			
78	GESNERIACEAE	*Rhynchotechum discolor*	Dismeriaceae	H	Indigenous	Medicinal		
79	GLEICHENIACEAE	*Dicranopteris linearis*	Kilob/Damdam sawa/Dicranopteris	V-F	Indigenous	Ornamental		
80	HYDRANGEACEAE	*Hydrangea integrifolia*	Hydrangea	S	Indigenous	Ornamental		
81	LAMIACEAE	*Gmelina arborea*	Gmelina	T	Exotic	Reforestation species, ornamental		SFR
82	LAMIACEAE	*Gomphostema javanica*		S	Indigenous	Medicinal		

Appendix 2: General Flora Species Composition, Endemicity and their Economic Use

No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
83	LAMIACEAE	*Hyptis capitata*	Heptis	H	indigenous	medicinal		
84	LAURACEAE	*Cinnamomum* sp.	Cinnamomum	T	Endemic	bark source of cinnamon, ingredient for root beer; medicinal		
85	LAURACEAE	*Litsea cordata*	Litsea perrottetii	T	Indigenous	Wood used for general construction		
86	LAURACEAE	*Litsea* sp.	Litsea	T	Endemic	Ornamental		
87	LAURACEAE	*Neolitsea villosa*		T	indigenous	Wood used for construction		
88	LAURACEAE	*Talauma* sp.	Patangis	T	Endemic			
89	LEEACEAE	*Leea guineensis*	Mali-mali/Leea	S	Indigenous	Ornamental		Bulacan; Didipio
90	LINDSAEACEAE	*Odontosoria chinensis*	Fern- 1784	H-F	Indigenous	Medicinal		
91	LYTHRACEAE	*Cuphea carthagenensis*	Cuphea carthagenensis	H	Indigenous	Medicinal; ornamental		
92	MALVACEAE	*Melochia umbellata*	Helictress ambilata (H. umbellata ?)	T	Indigenous	Wood used for construction; shade tree		
93	MALVACEAE	*Sterculia rubiginosa* var. *divaricata*	Sterculia	T	Indigenous	Wood used for construction		
94	MELASTOMATACEAE	*Medinilla pendula*	Medinilla	S	Endemic	Cultivated as an ornamental	En	Luzon; Mindoro; Sibuyan; Cebu; Mindanao
95	MELASTOMATACEAE	*Melastoma malabathricum*	Malatungaw/Hatotngaw/ Hantotongaw/Melastoma	S	Indigenous	ornamental; young leaves edible; medicinal		Subic FR
96	MELIACEAE	*Dysoxylum* sp.	Meliaceae	T	Endemic	Wood is used for general light construction		
97	MELIACEAE	*Swietenia macrophylla*	Large leafed Mahogany	T	Exotic	Furniture, musical instruments, shade tree, fuelwood	Vu	
98	MORACEAE	*Artocarpus odoratissimus*	Marang	T	Indigenous	fruit edible		Hidden Valley; Negros Or.
99	MORACEAE	*Artocarpus* sp.		T	Endemic	Medicinal; edible		
100	MORACEAE	*Ficus minahassae*	Hagimit	T	Indigenous	Fruits for the bird, used as indicator for presence of water		Hidden Valley; Didipio
101	MORACEAE	*Ficus nota*	Tibig	T	Indigenous	Source of water for jungle survival; water indicator		Subic FR; Tiwi; Hidden Valley; Bulacan; Riviera; Didipio
102	MORACEAE	*Ficus odorata*	Pakiling/Ficus sp	T	Endemic	Rough leaves used for scouring purposes; medicinal value		
103	MORACEAE	*Ficus septica*	Hauili	T	Indigenous	Medicinal; pioneer species; water indicator		Subic FR; Tiwi; Hidden Valley; Didipio; Bulacan
104	MORACEAE	*Ficus* sp	Ficus sp	T	Endemic	Ornamental; medicinal		

Appendix 2: General Flora Species Composition, Endemicity and their Economic Use

No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
105	MORACEAE	*Ficus* sp. 1	Ficus sp1	T	Endemic	Ornamental; medicinal		
106	MORACEAE	*Ficus* sp. 2	Ficus sp2	T	Endemic	Ornamental; medicinal		
107	MORACEAE	*Ficus variegata*	Tangisang bayawak	T	Indigenous	Fruits edible; young leaves are eaten like vegetable		Subic FR; Hidden Valley; Didipio
108	MUSACEAE	*Musa paradisiaca*	Musa sp.	H	Exotic	Fruits are edible; medicinal		
109	MUSACEAE	*Musa sapientum*	Saging latundan	H	Exotic	edible fruit; cash crop		Tiwi; Hidden Valley; Bulacan; Didipio; Found throughout the Country
110	MYRSINACEAE	*Ardisia* sp.	Ardisia	T	Endemic			
111	MYRSINACEAE	*Discocalyx* sp.	Discocalyx	S	Endemic			
112	MYRTACEAE	*Psidium gaujava*	Bayabas	T	Exotic	Fruits are edible; medicinal		Tiwi, Bicol; Bulacan
113	MYRTACEAE	*Syzygium* sp.	Syzygium sp	T	Endemic	Wood is used for general construction; medicinal		
114	MYRTACEAE	*Xanthostemon* sp.	Camptostemon	T	Endemic	Wood is used for construction		
115	NEPHROLEPIDACEAE	*Nephrolepis biserrata*	Nephrolepis	H-F	Indigenous	Ornamental		Didipio
116	OLEANDRACEAE	*Oleandra* sp.	Oleandra	H-F	Endemic			
117	OPHIGLOSSACEAE	*Ophioglossum reticulatum*	Ophioglusum	H-F	Indigenous	Edible; medicinal		
118	ORCHIDACEAE	*Appendicula reflexa*	Appendecula	H	Indigenous	Ornamental		
119	ORCHIDACEAE	*Dendrobium milaniae*		H	Indigenous	Ornamental		
120	ORCHIDACEAE	*Habenaria* sp.	Orchid Habenaria	H	Endemic	Ornamental		
121	ORCHIDACEAE	*Lepidogyne longifolia*		H	Indigenous	Ornamental		
122	OSMUNDACEAE	*Osmunda banksiifolia*	Fern sp2	H-F	Indigenous	Ornamental		
123	PANDANACEAE	*Frecynetia* sp.	Frecynetia	S	Endemic			
124	PANDANACEAE	*Pandanus* sp.	Pandanus sp	S	Endemic	Leaves used for weaving baskets and mats		
125	PHYLLANTHACEAE	*Bischofia javanica*	Bischopia javanica	T	Indigenous	Wood for general construction; edible; shade tree; red dye		Didipio
126	PHYLLANTHACEAE	*Glochidion* sp.	Glochidion	S	Endemic			
127	PHYLLANTHACEAE	*Phyllanthus amarus*	Phyllanthus sp.	H	Indigenous	Pioneer species, weed		Bulacan
128	PIPERACEAE	*Piper aduncum*	Boyoboyo	T	Exotic	Edible; medicinal		
129	PIPERACEAE	*Piper sp.*	Piper	H	Endemic			
130	PITTOSPORACEAE	*Pittosporum moluccanum*	Pittosporum	T	Indigenous	Wood used for light construction; ornamental		
131	POACEAE	*Bambusa blumeana*	Kawayan (patong)	T-G	Introduced	Vegetable; culms for furniture and kitcen utensils, prevent		

Appendix 2: General Flora Species Composition, Endemicity and their Economic Use

No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
						soil erosion		
132	POACEAE	*Bambusa vulgaris*	Kawayan kiling/Kawayan tiring	H-G	Indigenous	Light construction;ornamental; furniture; edible; medicinal		Tiwi; Hidden Valley; Didipio
133	POACEAE	*Dinochloa* sp.	Bikal	T	Endemic			
134	POACEAE	*Imperata cylindrica*	Cogon	H-G	Indigenous	Thatching; pulp and paper; pasture and forage grass		Subic FR; Tiwi; Didipio; wide spread
135	POACEAE	*Miscanthus floridulus*	Miscanthis	H	Indigenous	The unopened flower spikes are edible; other uses		
136	POACEAE	*Oplismenus compositus*	Oplisminus	H	Indigenous	Forage		
137	POACEAE	*Rottboellia cochinchinensis*	Rottboellia	H	Indigenous	Edible forage		
138	POACEAE	*Zea mays*	Mais	H	Exotic	Food cereal		
139	PODOCARPACEAE	*Dacrycarpus imbricatus*	Iging	T	Indigenous	Wood used for construction		
140	POLYGALACEAE	*Polygala venenosa*		S	Indigenous	Ornamental		Mindoro, Palawan, Negros, Leyte, Mindanao, Camiguin de Misamis, Dinagat, Sulu Archipelago
141	POLYPODIACEAE	*Drynaria quercifolia*	Kabkab/Pakpak lawin/Drynaria	H-F	Indigenous	Ornamental	Vu	Tiwi; Hidden Valley; Didipio; Busuanga; Negros Or.
142	ROSACEAE	*Prunus* sp.	Prunus	T	Endemic	Wood is used for general construction		
143	RUBIACEAE	*Lasianthus* sp.	Loranthus	S	Endemic			
144	RUBIACEAE	*Mussaenda* sp.	Musaenda sp	T	Endemic			
145	RUBIACEAE	*Neonauclea formicaria*	Himbabalud/Neonuclea	T	Endemic	Ornamental		
146	RUBIACEAE	*Pavetta* sp.	Oveta	S	Endemic			
147	RUBIACEAE	*Spermacoce laevis*	Borreria libis	H	Indigenous	Medicinal		
148	RUBIACEAE	*Tarennoidea wallichii*	Meteyl	T	Indigenous	Ornamental		
149	RUBIACEAE	*Wendlandia luzoniensis* var. *luzoniensis*	Wendlandia	T	Indigenous	Ornamental		Hidden Valley
150	RUTACEAE	*Evodia* sp.	Evodia	T	Endemic	Ornamental		
151	SAPINDANCEAE	*Sapindus* sp.	Saponaria	T	Endemic	Light construction, bark for hair cleaning; stain remover		
152	SCHIZAEACEAE	*Lygodium circinnatum*	Nito puti/Lygodium	V-F	Indigenous	Stems used for handicrafts,basket weaving		
153	SCHIZAEACEAE	*Lygodium japonicum*	Lygodium	V-F	Indigenous	stems used for handicrafts,basket weaving		Hidden Valley
154	SELAGINELLACEAE	*Selaginella delicatula*	Selaginella	H-F	Indigenous	Medicinal		

Appendix 2: General Flora Species Composition, Endemicity and their Economic Use

No.	Family Name	Scientific Name	Common Name	Habit	ECOLOGICAL STATE	Ecological and Economic Importance / Uses	DAO	Distribution/ Location (Other Study Sites in the Philippines)
155	SMILACACEAE	*Smilax leucocephylla*	Banagan/Banag	V	Indigenous	Ornamental		
156	STAPHYLEACEAE	*Turpinia sphaerocarpa*	Turpina	T	Indigenous	Wood used for construction		
157	THELYPTERIDACEAE	*45*	Fern 1764	H-F	Indigenous	Medicinal		
158	THELYPTERIDACEAE	*Macrothelypteris torresiana*	Fern sp4	H-F	Indigenous	Medicinal		
159	THELYPTERIDACEAE	*Pronephrium asperum*	Fern sp (1731)	H-F				
160	THELYPTERIDACEAE	*Sphaerostephanos* sp.	Fern sp	H-F	Endemic			
161	THELYPTERIDACEAE	*Sphaerostephanos* sp. 1	Fern sp 1	H-F	Endemic			
162	THELYPTERIDACEAE	*Sphaerostephanos* sp. 2	Fern sp 2	H-F	Endemic			
163	ULMACEAE	*Celtis* sp.	Celtis	T	Endemic	Wood used for construction		
164	URTICACEAE	*Cypholophus moluccanus*	Urticaceae(Lidic)	S	Indigenous	Fibers are used to make ropes and coarse cloth		
165	URTICACEAE	*Elatostema lagunense*	Elatostema	H	Indigenous	make cloth, fishing nets , and ropes and for some industrial materials		
166	URTICACEAE	*Leucosyke capitellata*	Alagasi/Laglag/ Leocosyke	T	Indigenous	Ornamental		Sierra Madre
167	URTICACEAE	*Maoutia setosa*	Lidik	T	Indigenous	Ornamental		
168	URTICACEAE	*Pipturus arborecens*	Pipturus sp. (damay)	T	Indigenous	Bark used as cataplasm for boils; fruits are edible		Subic FR; Hidden Valley; Bulacan
169	URTICACEAE	*Villebrunea rubescens*	Novol	T		Wood used for light construction		Mindanao, Lanao del Norte
170	VERBENACEAE	*Stachytarpheta jamaicensis*	Kandi-kandilaan/Stocytarpeta jamaecenses	S	Exotic	Ornamental		
171	VITACEAE	*Tetrastisgma* sp.	Tetrastigma	V	Endemic	Medicinal		
172	ZINGIBERACEAE	*Amomum* sp.	Tagbak	H	Endemic			
173	ZINGIBERACEAE	*Curcuma domestica*	Zingiber (Curcuma domestica)	H	Indigenous	Medicinal		
174	ZINGIBERACEAE	*Etlingera elatior*	Zingiber	H	Exotic	Ornamental		Hidden Valley; Bulacan

Appendix 3. 1:List of flora species in 24 plots, Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family Name	Habit	Tot # Ind.
1	*Acalypha amentacea*	Acalaypa(Banahik)	EUPHORBIACEAE	S	36
2	*Acalypha caturus*	Acalaypha	EUPHORBIACEAE	S	5
3	*Acer laurinum*	Letsia (Novol)	ACERACEAE	T	8
4	*Albizia acle*	T-SPI	FABACEAE	T	2
5	*Amomum* sp.	Tagbak	ZINGIBERACEAE	H	52
6	*Bambusa blumeana*	Kawayan (patong)	POACEAE	T-G	5
7	*Bambusa vulgaris*	Kawayan	POACEAE	T-G	39
8	*Bischofia javanica*	Bischofia javanica	PHYLLANTHACEAE	T	8
9	*Callophyllum blancoi*	Takas	CLUSIACEAE	T	2
10	*Canarium* sp.	Ninay/Gapuga	BURSERACEAE	T	2
11	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	H	10
12	*Caryota cumingii*	Caryota/Takipan	ARECACEAE	T-P	8
13	*Celtis philippinesis*	Subang	CELTIDACEAE	T	11
14	*Cheilocostus speciosus*	Costos	COSTACEAE	H	2
15	*Chingia ferox*	Fern	THELYPTERIDACEAE	H-F	1
16	*Chromolaena odorata*	Hagonoy	ASTERACEAE	S	11
17	*Costus speciosus*	Costos	COSTACEAE	H	8
18	*Cuphea carthagenesis*	Cuphea	LYTHRACEAE	H	3
19	*Curculigo capitulata*	Curcoligo	HYPOXIDACEAE	H	21
20	*Cyathea contaminans*	Cyathea	CYATHEACEAE	H-F	1
21	*Cypholophus moluccanus*	Urticaceae(Lidic)	URTICACEAE	S	14
22	*Desmodium triflorum*	Desmodium tryflorum	FABACEAE	H	350
23	*Elatostema lagunense*	Elathostema sp.	URTICACEAE	H	88
24	*Elephantopus spicatus*	Elephantopus	ASTERACEAE	H	16
25	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	H	133
26	*Erythrina subumbrans*	Dapdap/Tugis	FABACEAE	T	2
27	*Ficus minahasae*		MORACEAE	T	8
28	*Ficus nota*	Ficus nota	MORACEAE	T	2
29	*Ficus odorata*	Ficus sp	MORACEAE	T	3
30	*Ficus septica*	Ficus septica	MORACEAE	T	1
31	*Ficus sp.*	Ficus sp.	MORACEAE	T	9
32	*Ficus variegata*		MORACEAE	T	1
33	*Flemingia strobilifera*	Flameña (Leguminaceae)	FABACEAE	S	28
34	*Gmelina arborea*	Gmelina	LAMIACEAE	T	4
35	*Homalomena philippinensis*	Homalomena	ARACEAE	H	6
36	*Hyptis capitata*	Heptis	LAMIACEAE	H	2
37	*Imperata cylindrica*	Cogon	POACEAE	H-G	845
38	*Lasianthus* sp.	Loranthus	RUBIACEAE	S	18
39	*Leucaena leucocephala*	Ipilipil	FABACEAE: MIMOSOIDEAE	T	3
40	*Leucosyke capitellata*	Leocosyke/Magilom	URTICACEAE	T	23
41	*Lithocarpus* cf. *solerianus*	Lithocarpus sp.	FAGACEAE	T	6
42	*Lygodium circinatum*	Lygodium	SCHIZAEACEAE	V-F	9
43	*Lygodium japonicum*	Lygodium	SCHIZAEACEAE	V-F	4
44	*Macaranga hispida*	Langila/Kinida	EUPHORBIACEAE	T	2
45	*Maoutia setosa*	Urticaceae	URTICACEAE	T	41
46	*Melastoma malabathricum*	Melastoma (5)	MELASTOMATACEAE	S	2
47	*Merremia peltata*	Merremia diltata	CONVOLVULACEAE	V	1
48	*Mikania cordata*	Mikaña	ASTERACEAE	V	17
49	*Miscanthus floridulus*	Miscanthis	POACEAE	H	52
50	*Musa paradisiaca*	Musa sp.	MUSACEAE	H	2
51	*Musa sapientum*	Saging latundan	MUSACEAE	H	25
52	*Mussaenda* sp.	Musaenda sp	RUBIACEAE	T	1
53	*Neolitsea villosa*		LAURACEAE	T	12

Appendix 3. 1:List of flora species in 24 plots, Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family Name	Habit	Tot # Ind.
54	*Neonauclea formicaria*		RUBIACEAE	T	1
55	*Nephrolepis biserrata*	Fern(Neprolepes sp)	.OLEANDRACEAE	H-F	19
56	*Homalanthus macradenius*	Homalanthus/Limingi (Big tree)/Macaranga	EUPHORBIACEAE	T	21
57	*Ophioglossum reticulatum*	Ophioglusum	OPHIGLOSSACEAE	H-F	1
58	*Osmoxylon sp.*	Osmoxylum	ARALIACEAE	T	1
59	*Phronephrium asperum*	Fern Sp.	THELYPTERIDACEAE	H-F	22
60	*Piper aduncum*	Boyoboyo	PIPERACEAE	T	723
61	*Pipturus arborecens*	Pipturus sp. (damay)	URTICACEAE	T	11
62	*Polyalthia* sp.	Annonaceae	ANNONACEAE	T	2
63	*Pseudoelephantopus tomentosus*	Psudo espicatus	ASTERACEAE	H	21
64	*Psidium guajava*	Bayabas	MYRTACEAE	T	1
65	*Rhynchotechum discolor*	Dismeriaceae	GESNERIACEAE	H	31
66	*Rottboellia cochinchinensis*		POACEAE	H	1
67	*Saurauia erythrotricha*	Sauralla	ACTINIDIACEAE	T	7
68	*Schismatoglottis calyptrata*	Chismatoglosis	ARACEAE	H	62
69	*Scleria scrobiculata*	Scleria scrobiculata	CYPERACEAE	H-G	107
70	*Selaginella delicatula*	Celagenela	SELAGINELLACEAE	H-F	115
71	*Setaria palmifolia* var. *palmifolia*	Grass sp	POACEAE	H	19
72	*Shorea contorta*	Lauan/White luauan	DIPTEROCARPACEAE	T	44
73	*Sphaerostephanos* sp.	Fern	THELYPTERIDACEAE	H-F	41
74	*Stachytarpheta jamaicensis*	Stocytarpeta jamaecenses	VERBENACEAE	S	3
75	*Sterculia rubiginosa* var. *divaricata*	Sterculia	MALVACEAE	T	1
76	*Tarennoidea wallichii*	Mataul	RUBIACEAE	T	33
77	*Tetrastisgma* sp.	Tetrastigma	VITACEAE	V	1
78	*Trema orientalis*	Anagdong	CELTIDACEAE	T	2
79	*Turpinia sphaerocarpa*	Turpina	STAPHYLEACEAE	T	1
80	*Viburnum luzonicum* var. *apoense*	Calicarpa (Midula)	ADOXACEAE	T	31
81	*Villebrunea rubescens*	Novol	URTICACEAE	T	1
82	*Wendlandia luzoniensis* var. *luzoniensis*	Wendlandia	RUBIACEAE	T	1
					3289

Taxa	Total number	Habit	No. of species
Species	82	*Trees*(T)	40
Family	43	*Shrubs* (S)	8
Genera	72	*Vines* (V)	5
		Herbs(H)	29

Note:

Pn=Pandan
Pm=Palm
Bm=Bamboo (erect)
Cyd=Cycad
F= Fern
G=Grass

Appendix 3.1a :List of flora species in 24 plots (1x1) Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family Name	Habit	Tot # Ind.
1	*Acalypha amentacea*	Acalaypa(Banahik)	EUPHORBIACEAE	S	7
2	*Amomum* sp.	Tagbag	ZINGIBERACEAE	H	3
3	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	H	10
4	*Caryota cumingii*	Caryota	ARECACEAE	T-P	1
5	*Cheilocostus speciosus*	Costos	COSTACEAE	H	2
6	*Chingia ferox*	Fern	THELYPTERIDACEAE	H-F	1
7	*Chromolaena odorata*	Hagonoy	ASTERACEAE	S	11
8	*Costus speciosus*	Costos	COSTACEAE	H	8
9	*Cuphea carthagenesis*	Cuphea	LYTHRACEAE	H	3
10	*Curculigo capitulata*	Curcoligo	HYPOXIDACEAE	H	21
11	*Desmodium triflorum*	Desmodium tryflorum	FABACEAE	H	350
12	*Elatostema lagunense*	Elathostema sp.	URTICACEAE	H	88
13	*Elephantopus spicatus*	Elephantopus	ASTERACEAE	H	16
14	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	H	133
15	*Erythrina subumbrans*	Dapdap	FABACEAE	T	1
16	*Ficus minahasae*		MORACEAE	T	8
17	*Ficus nota*	Ficus nota	MORACEAE	T	2
18	*Ficus odorata*	Ficus sp	MORACEAE	T	3
19	*Ficus septica*	Ficus septica	MORACEAE	T	1
20	*Ficus sp.*	Ficus sp.	MORACEAE	T	1
21	*Ficus variegata*		MORACEAE	T	1
22	*Homalomena philippinensis*	Homalomena	ARACEAE	H	6
23	*Hyptis capitata*	Heptis	LAMIACEAE	H	2
24	*Imperata cylindrica*	Cogon	POACEAE	H-G	845
25	*Lasianthus* sp.	Loranthus	RUBIACEAE	S	18
26	*Leucosyke capitellata*	Leocosyke	URTICACEAE	T	6
27	*Lygodium circinatum*	Lygodium	SCHIZAEACEAE	V-F	9
28	*Lygodium japonicum*	Lygodium	SCHIZAEACEAE	V-F	4
29	*Maoutia setosa*	Urticaceae	URTICACEAE	T	1
30	*Merremia peltata*	Merremia diltata	CONVOLVULACEAE	V	1
31	*Mikania cordata*	Mikaña	ASTERACEAE	V	17
32	*Miscanthus floridulus*	Miscanthis	POACEAE	H	52
33	*Mussaenda* sp.	Musaenda sp	RUBIACEAE	T	1
34	*Nephrolepis biserrata*	Fern(Neprolepes sp)	.OLEANDRACEAE	H-F	19
35	*Ophioglossum reticulatum*	Ophioglusum	OPHIGLOSSACEAE	H-F	1
36	*Osmoxylon sp.*	Osmoxylum	ARALIACEAE	T	1
37	*Phronephrium asperum*	Fern Sp.	THELYPTERIDACEAE	H-F	22
38	*Piper aduncum*	Boyoboyo	PIPERACEAE	T	6
39	*Polyalthia* sp.	Annonaceae	ANNONACEAE	T	2
40	*Pseudoelephantopus tomentosus*	Psudo espicatus	ASTERACEAE	H	21
41	*Rhynchotechum discolor*	Dismeriaceae	GESNERIACEAE	H	31
42	*Rottboellia cochinchinensis*		POACEAE	H	1
43	*Schismatoglottis calyptrata*	Chismatoglosis	ARACEAE	H	58
44	*Scleria scrobiculata*	Scleria scrobiculata	CYPERACEAE	H-G	107
45	*Selaginella delicatula*	Celagenela	SELAGINELLACEAE	H-F	115
46	*Setaria palmifolia* var. *palmifolia*	Grass sp	ARECACEAE	H	19
47	*Sphaerostephanos* sp.	Fern	THELYPTERIDACEAE	H-F	41
48	*Stachytarpheta jamaicensis*	Stocytarpeta jamaecenses	VERBENACEAE	S	3
49	*Tarennoidea wallichii*	Mataul	RUBIACEAE	T	31
50	*Tetrastisgma* sp.	Tetrastigma	VITACEAE	V	1
51	*Viburnum luzonicum* var. *apoense*	Calicarpa (Midula)	ADOXACEAE	T	5
					2117

Taxa	Total number	Habit	No. of species
Species	51	*Trees*(T)	16
Family	28	*Shrubs* (S)	4
Genera	44	*Vines* (V)	5
		Herbs(H)	26
			51

Note:

Pn=Pandan
Pm=Palm
Bm=Bamboo (erect)
Cyd=Cycad
F= Fern
G=Grass

Appendix 3.1b: List of flora species in 24 plots (5x5) Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Species	Family Name	Habit	Tot # Ind.
1	*Acalypha amentacea*	Acalypha	EUPHORBIACEAE	S	29
2	*Acalypha caturus*	Acalaypha	EUPHORBIACEAE	S	5
3	*Acer laurinum*	Letsia (Novol)	ACERACEAE	T	7
4	*Amomum* sp.	Tagbak	ZINGIBERACEAE	H	49
5	*Bambusa blumeana*	Kawayan (patong)	POACEAE	T-G	5
6	*Bambusa vulgaris*	Kawayan	POACEAE	T-G	26
7	*Bischofia javanica*	Bischofia javanica	PHYLLANTHACEAE	T	8
8	*Callophyllum blancoi*	Takas	CLUSIACEAE	T	2
9	*Canarium* sp.	Ninay	BURSERACEAE	T	1
10	*Caryota cumingii*	Takipan	ARECACEAE	T-P	7
11	*Celtis philippinesis*	Subang	CELTIDACEAE	T	11
12	*Cyathea contaminans*	Cyathea	CYATHEACEAE	H-F	1
13	*Cypholophus moluccanus*	Urticaceae(Lidic)	URTICACEAE	S	14
14	*Ficus* sp.	Ficus sp.	MORACEAE	T	6
15	*Flemingia strobilifera*	Flameña (Leguminaceae)	FABACEAE	S	28
16	*Leucaena leucocephala*	Ipilipil	FABACEAE: MIMOSOIDEAE	T	3
17	*Leucosyke capitellata*	Leocosyke	URTICACEAE	T	16
18	*Lithocarpus* cf. *solerianus*	Lithocarpus sp.	FAGACEAE	T	5
19	*Macaranga hispida*	Langila	EUPHORBIACEAE	T	1
20	*Maoutia setosa*	Lidik	URTICACEAE	T	40
21	*Melastoma malabathricum*	Melastuma (5)	MELASTOMATACEAE	S	2
22	*Musa paradisiaca*	Musa sp.	MUSACEAE	H	2
23	*Musa sapientum*	Saging latundan	MUSACEAE	H	25
24	*Neolitsea villosa*		LAURACEAE	T	12
25	*Neonauclea formicaria*		RUBIACEAE	T	1
26	*Omalanthus macradenius*	Homalanthus/Limingi (Big tree)	EUPHORBIACEAE	T	14
27	*Piper aduncum*	Boyoboyo	PIPERACEAE	T	402
28	*Pipturus arborecens*	Pipturus sp. (damay)	URTICACEAE	T	11
29	*Psidium gaujava*	Bayabas	MYRTACEAE	T	1
30	*Saurauia erythrotricha*		ACTINIDIACEAE	T	4
31	*Shorea contorta*	Lauan	DIPTEROCARPACEAE	T	40
32	*Sterculia rubiginosa* var. *divaricata*		MALVACEAE	T	1
33	*Tarennoidea wallichii*		RUBIACEAE	T	1
34	*Turpinia sphaerocarpa*		STAPHYLEACEAE	T	1
35	*Viburnum luzonicum* var. *apoense*	Calicarpa (Midula)	ADOXACEAE	T	26
36	*Villebrunea rubescens*	Novol	URTICACEAE	T	1

Appendix 3.1b: List of flora species in 24 plots (5x5) Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Species	Family Name	Habit	Tot # Ind.
37	*Wendlandia luzoniensis* var. *luzoniensis*	Wendlandia	RUBIACEAE	T	1
					809

Taxa	Total number	Habit	No. of species
Species	37	*Trees*(T)	28
Family	25	*Shrubs* (S)	5
Genera	34	*Vines* (V)	0
		Herbs(H)	4

Note:

Pn=Pandan
Pm=Palm
F= Fern
G=Grass

Appendix 3. 1c:List of flora species in 24 plots (10x10) Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Species	Family Name	Habit	Tot # Ind.
1	*Acer laurinum*	Lauraceae	ACERACEAE	T	1
2	*Albizia acle*	T-SPI	FABACEAE	T	2
3	*Bambusa vulgaris*	Kawayan tiring	POACEAE	T	13
4	*Canarium* sp.	Gapuga	BURSERACEAE	T	1
5	*Erythrina subumbrans*	Tugis	FABACEAE	T	1
6	*Ficus* sp.	Ficus sp.	MORACEAE	T	2
7	*Gmelina arborea*	Gmelina	LAMIACEAE	T	4
8	*Leucosyke capitellata*	Magilom	URTICACEAE	T	1
9	*Lithocarpus* cf. *solerianus*	Lithocarpus	FAGACEAE	T	1
10	*Macaranga hispida*	Kinida	EUPHORBIACEAE	T	1
11	*Omalanthus macradenius*	Macaranga	EUPHORBIACEAE	T	7
12	*Piper aduncum*	Boyoboyo	PIPERACEAE	T	315
13	*Saurauia erythrotricha*	Sauralla	ACTINIDIACEAE	T	3
14	*Shore contorta*	Lauan Acle	DIPTEROCARPACEAE	T	4
15	*Tarennoidea wallichii*	Meteyl	RUBIACEAE	T	1
16	*Trema orientalis*	Anagdong	CELTIDACEAE	T	2
					359

Taxa	Total number	Habit	No. of species
Species	16	*Trees*(T)	16
Family	14	*Shrubs* (S)	0
Genera	16	*Vines* (V)	0
		Herbs(H)	0

Note:

Pn=Pandan
Pm=Palm
F= Fern
G=Grass

Appendix 3.2: List of flora species in Transect Line (Intercept), Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family	Habit	Tot # Ind.
1	*Acalypha amentacea*	Acalypha	EUPHORBIACEAE	S	8
2	*Acmella grandiflora*	Compositae sp2-1790	ASTERACEAE	H	2
3	*Acmella paniculata*	Compositae	ASTERACEAE	H	1
4	*Ageratum conyzoides*	Ageratum	ASTERACEAE	H	1
5	*Alocasia macrorhizos*	Alocasia sp	ARACEAE	H	1
6	*Amomum* sp.	Tagbak	ZINGIBERACEAE	H	1
7	*Artocarpus odoratissimus*	Marang	MORACEAE	T	1
8	*Asplenium nidus*	Asplenium	ASPLENIACEAE	H-F	1
9	*Bambusa blumeana*	Kawayan	POACEAE	T-G	1
10	*Bambusa vulgaris*	Kawayan	POACEAE	T-G	1
11	*Begonia* sp.	Begonia sp4	BEGONIACEAE	H	1
12	*Bidens pilosa*	Bidens pilosa	ASTERACEAE	H	1
13	*Bischofia javanica*	Bischopia javanica	PHYLLANTHACEAE	T	3
14	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	H	3
15	*Caryota cumingii*	Caryota	ARECACEAE	T-P	1
16	*Cheilocostus speciosus*	Costus	COSTACEAE	H	4
17	*Chingia ferox*	Fern 1764	THELYPTERIDACEAE	H-F	3
18	*Chromolaena odorata*	Hagonoy	ASTERACEAE	S	5
19	*Crassocephalum crepidioides*	Gynura procumbens	ASTERACEAE	H	5
20	*Cuphea carthagenensis*	Cuphea carthagenensis	LYTHRACEAE	H	1
21	*Curculigo capitulata*	Curculigo	HYPOXIDACEAE	H	7
22	*Curcuma domestica*	Zingiber (Curcuma domestica)	ZINGIBERACEAE	H	1
23	*Cyathea contaminans*	Cyathea	CYATHEACEAE	H-F	1
24	*Cyathea* sp.	Cyathea/Tree fern	CYATHEACEAE	T-F	1
25	*Cypholophus moluccanus*	Urticaceae	URTICACEAE	S	2
26	*Derris* cf. *elliptica*	Derris	FABACEAE	V	3
27	*Dioscorea* sp.	Dioscorea sp	DIOSCOREACEAE	V	1
28	*Diplazium pallidum*	Fern sp3	ATHYRIACEAE	H-F	1
29	*Elatostema lagunense*	Elatostema	URTICACEAE	H	8
30	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	H	19
31	*Erythrina subumbrans*	Dapdap	FABACEAE	T	1
32	*Etlingera elatior*	Zingiber	ZINGIBERACEAE	H	3
33	*Euphorbia heterophylla*	Euphorbia sp	EUPHORBIACEAE	H	2
34	*Euphorbia hirta*	Euphorbia hirta	EUPHORBIACEAE	H	1
35	*Ficus nota*	Ficus nota	MORACEAE	T	8
36	*Ficus septica*	Ficus septica	MORACEAE	T	6
37	*Ficus* sp	Ficus sp	MORACEAE	T	1
38	*Ficus* sp. 1	Ficus sp1	MORACEAE	T	1
39	*Ficus* sp. 2	Ficus sp2	MORACEAE	T	1
40	*Flemingia strobilifera*	Moghania	FABACEAE	S	4
41	*Glochidion* sp.	Glochidion	PHYLLANTHACEAE	S	1
42	*Gmelina arborea*	Gmelina	VERBENACEAE	T	1
43	*Gynura procumbens*	Gynura procumbens	ASTERACEAE	H	1
44	*Habenaria* sp.	Orchid Habenaria	ORCHIDACEAE	H	1
45	*Homalomena philippinensis*	Homalomena	ARACEAE	H	6
46	*Hoya multiflora*	Hoya multiflora	ASCLEPIADACEAE	H	1
47	*Hyptis capitata*	Hyptis	LAMIACEAE	H	3
48	*Impatiens platypetala*	Impatiens	BALSAMINACEAE	H	5
49	*Imperata cylindrica*	Cogon	POACEAE	H	6
50	*Lasianthus* sp.	Loranthus	RUBIACEAE	S	1

Appendix 3.2: List of flora species in Transect Line (Intercept), Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family	Habit	Tot # Ind.
51	*Leea guineensis*	Leea	LEEACEAE	S	1
52	*Leucaena leucocephala*	Ipil-ipil	FABACEAE: MIMOSOIDEAE	T	2
53	*Leucosyke capitellata*	Leucosyke	URTICACEAE	T	12
54	*Litsea cordata*	Litsea perrottetii	LAURACEAE	T	1
55	*Lygodium circinatum*	Lygodium	SCHIZAEACEAE	v-F	5
56	*Macaranga hispida*	Macaranga hispida	EUPHORBIACEAE	T	4
57	*Macrothelypteris torresiana*	Fern sp4	THELYPTERIDACEAE	H-F	1
58	*Maoutia setosa sp1*	Urticaceae sp1	URTICACEAE	T	6
59	*Melastoma malabathricum*	Melastoma	MELASTOMATACEAE	S	13
60	*Melochia umbellata*	Helictress ambilata (H. umbellata)	STERCULIACEAE	T	2
61	*Mikania cordata*	Mikania	ASTERACEAE	V	3
62	*Miscanthus floridulus*	Miscanthus	POACEAE	H	8
63	*Musa sapientum*	Musa sp	MUSACEAE	H	1
64	*Neonauclea formicaria*	Neonuclea	RUBIACEAE	T	3
65	*Nephrolepis biserrata*	Nephrolepis	NEPHROLEPIDACEAE	H-F	3
66	*Odontosoria chinensis*	Fern- 1784	LINDSAEACEAE	H-F	1
67	*Omalanthus macradenius*	Homalanthus	EUPHORBIACEAE	T	5
68	*Ophioglossum reticulatum*	Ophioglossum	OPHIOGLOSSACEAE	H-F	2
69	*Oplismenus compositus*	Oplisminus	POACEAE	H	2
70	*Osmunda banksiifolia*	Fern sp2	OSMUNDACEAE	H-F	2
71	*Phyllanthus amarus*	Phyllanthus sp.	PHYLLANTHACEAE	H	1
72	*Piper aduncum*	Boyo-boyo	PIPERACEAE	T	25
73	*Poikilospermum acuminatum*	Poikeloshermis sp	CECROPIACEAE	V	1
74	*Pronephrium asperum*	Fern sp (1731)	THELYPTERIDACEAE	H-F	1
75	*Psidium gaujava*	Bayabas	MYRTACEAE	T	1
76	*Pteridium aquilium*	Gletienia	DENNSTAEDTIACEAE	H-F	6
77	*Pterocarpus indicus*	Narra	FABACEAE: FABOIDEAE	T	3
78	*Raphidophora* sp.	Photos	ARACEAE	H	1
79	*Rhynchotechum discolor*	Gesneriaceae	GESNERIACEAE	H	6
80	*Rottboellia cochinchinensis*	Rottboellia	POACEAE	H	1
81	*Saurauia erythrotricha*	Sauraia	ACTINIDIACEAE	T	2
82	*Schismatoglottis calyptrata*	Schismatoglottis	ARACEAE	H	14
83	*Scleria scrobiculata* ssp. *scrobiculata*	Scleria	CYPERACEAE	H-G	11
84	*Selaginella delicatula*	Selaginella	SELAGINELLACEAE	H-F	7
85	*Setaria palmifolia* var. *palmifolia*	Setaria palmifolia	POACEAE	H	4
86	*Shorea contorta*	White Luan	DIPTEROCARPACEAE	T	3
87	*Shorea palosapis*	Mayapis	DIPTEROCARPACEAE	T	5
88	*Shorea polysperma*	Tanguile	DIPTEROCARPACEAE	T	1
89	*Spermacoce laevis*	Borreria libis	RUBIACEAE	H	3
90	*Sphaerostephanos* sp. 1	Fern sp	THELYPTERIDACEAE	H-F	7
91	*Sphaerostephanos* sp. 2	Fern sp	THELYPTERIDACEAE	H-F	18
92	*Sphaerostephanos* sp.	Fern sp2 1083	THELYPTERIDACEAE	H-F	2
93	*Sterculia rubiginosa* var. *divaricata*	Sterculia	MALVACEAE	T	1
94	*Swietinia macrophylla*	Mahogany	MELIACEAE	T	6
95	*Trema orientalis*	Hanagdong	CELTIDACEAE	T	2
96	*Viburnum luzonicum* var. *apoense*	Medulla	ADOXACEAE	T	17
97	*Villebrunea rubescens*	Canomol	URTICACEAE	T	4

Appendix 3.2: List of flora species in Transect Line (Intercept), Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific Name	Common Name	Family	Habit	Tot # Ind.
98	*Wendlandia luzoniensis* var. *luzoniensis*	Farinanta	RUBIACEAE	T	2
99	*Zea mays*	Mais	POACEAE	H	1
					376

Taxa	Total number	Habit	No. of species
Species	99	*Trees*(T)	34
Family	47	*Shrubs* (S)	8
Genera	87	*Vines* (V)	5
		Herbs(H)	52

Note:

Pn=Pandan
Pm=Palm
Bm=Bamboo (erect)
Cyd=Cycad
F= Fern
G=Grass

Appendix 3.3: List of flora species in Tawolon, Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific name	Common Name	Family	Habit	Tot # Ind.
1	*Aeschynanthus sp.*	Eschycalanthus (Ailanthus)	GESNERIACEAE	H	1
2	*Agalmyla* sp.	Agalmyla	GESNERIACEAE	H	1
3	*Alstonia* sp.	Batino	APOCYNACEAE	T	2
4	*Appendicula reflexa*	Appendecula	ORCHIDACEAE	H	1
5	*Aralia bipinnata*	Aralia	ARALIACEAE	T	2
6	*Ardisia* sp.	Ardisia	MYRSINACEAE	T	2
7	*Arisaema polyphyllum* var. *polyphyllum*	Arosema polyphyllum	ARACEAE	H	1
8	*Buchanania* sp.	Bucanania	ANACARDIACEAE	T	1
9	*Calamus* sp.	Calamus sp	ARECACEAE	V-Pm	1
10	*Canarium* sp.	Canarium/Sahing	BURSERACEAE	T	2
11	*Celtis* sp.	Celtis	ULMACEAE	T	1
12	*Cheiropleuria bicupsis*		DIPTERIDACEAE	H-F	1
13	*Cinnamomum* sp.	Cinnamomum	LAURACEAE	T	2
14	*Clethra canescens* var. *novoguineensis*	Clethra	CLETHRACEAE	T	2
15	*Cyathea* sp.	Tree fern	CYATHEACEAE	T-F	3
16	*Dacrycarpus imbricatus*	Iging	PODOCARPACEAE	T	1
17	*Dendrobium milaniae*		ORCHIDACEAE	H	1
18	*Dianella ensifolia*	Dianella	LILIACEAE	H	1
19	*Dicranopteris linearis*	Dicranopteris	GLEICHENIACEAE	V-F	2
20	*Dinochloa* sp.	Bikal	POACEAE	T	2
21	*Dioscorea* sp.	Dioscorea	DIOSCOREACEAE	V	1
22	*Dipteris conjugata*	Dipteris conjugate	DIPTERIDACEAE	H-F	1
23	*Discocalyx* sp.	Discocalyx	MYRSINACEAE	S	1
24	*Drynaria queercifolia*	Pakpak lawin/Drynaria	POLYPODIACEAE	H-F	2
25	*Dysoxylum* sp.	Meliaceae	MELIACEAE	T	1
26	*Elaeocarpus* sp.	Elaeocarpus	ELAEOCARPACEAE	T	4
27	*Evodia* sp.	Evodia	RUTACEAE	T	1
28	*Ficus variegata*	Ficus variegata	MORACEAE	T	1

Appendix 3.3: List of flora species in Tawolon, Lamlahak Sub-watershed, Lake Sebu, SC

No.	Scientific name	Common Name	Family	Habit	Tot # Ind.
29	*Frecynetia* sp.	Frecynetia	PANDANACEAE	S	1
30	*Gomphostema javanica*		LAMIACEAE	S	1
31	*Hydrangea integrifolia*	Hydrangea	HYDRANGEACEAE	S	1
32	*Impatiens platypetala*	Impatiens	BALSAMINACEAE	H	1
33	*Korthalsia* sp.	Korthalsia	ARECACEAE	V-Pm	1
34	*Lasianthus* sp.	Lasianthus	RUBIACEAE	S	1
35	*Lepidogyne longifolia*		ORCHIDACEAE	H	1
36	*Lithocarpus* sp.	Oak leaf fern	FAGACEAE	T	2
37	*Litsea* sp.	Litsea	LAURACEAE	T	1
38	*Medinilla pendula*	Medinilla	MELASTOMATACEAE	S	1
39	*Melastoma malabathricum*	Melastoma	MELASTOMATACEAE	S	1
40	*Nephrolepis biserrata*	Nephrolepis	NEPHROLEPIDACEAE	H-F	1
41	*Oleandra* sp.	Oleandra	OLEANDRACEAE	H-F	2
42	*Omalanthus macradenius*	Homalanthus	EUPHORBIACEAE	T	1
43	*Osmunda banksiifolia*		OSMUNDACEAE	H-F	1
44	*Pandanus* sp.	Pandanus sp	PANDANACEAE	T	1
45	*Pavetta* sp.	Oveta	RUBIACEAE	S	1
46	*Pinanga* sp.	Pinanga	ARECACEAE	T	5
47	*Piper sp.*	Piper	PIPERACEAE	H	2
48	*Pittosporum moluccanum*	Pittosporum	PITTOSPORACEAE	T	1
49	*Polygala venenosa*		POLYGALACEAE	S	1
50	*Prunus* sp.	Prunus	ROSACEAE	T	2
51	*Pteridium aquilium*	Gletienya	DENNSTAEDTIACEAE	H-F	1
52	*Sapindus* sp.	Saponaria	SAPINDANCEAE	T	2
53	*Sarcandra glabra*	Salcandra	CHLORANTHACEAE	S	3
54	*Saurauia* sp.	Saurauia	ACTINIDIACEAE	T	1
55	*Scleria scrobiculata* var. *scrobiculata*	Scleria	CYPERACEAE	H-G	1
56	*Smilax leucocephylla*	Banagan/Banag	SMILACACEAE	V	1
57	*Syzygium* sp.	Syzygium sp	MYRTACEAE	T	2
58	*Talauma* sp.	Patangis	LAURACEAE	T	1
59	*Tarennoidea wallichii*	Tarenna	RUBIACEAE	T	1
60	*Turpinia sphaerocarpa*	Turpina	STAPHYLEACEAE	T	1
61	*Viburnum luzonicum* var. *apoense*	Medulla	ADOXACEAE	T	1
62	*Xanthostemon* sp.	Camptostemon	MYRTACEAE	T	1

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Taxa	Total number	Habit	No. of species
Species	62	*Trees*(T)	30
Family	48	*Shrubs* (S)	10
Genera	62	*Vines* (V)	4
		Herbs(H)	18

Note:

Pn=Pandan
Pm=Palm
Bm=Bamboo (erect)
Cyd=Cycad
F= Fern
G=Grass

Appendix 4: General List of Flora Species Importance Value

No.	Scientific Name	Common Name	Family	Tot # Ind.	SIV
1	*Imperata cylindrica*	Cogon	POACEAE	851	23.5
2	*Piper aduncum*	Boyo-boyo	PIPERACEAE	748	20.75
3	*Desmodium triflorum*	Desmodium tryflorum	FABACEAE	350	9.74
4	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	152	4.87
5	*Scleria scrobiculata*	Scleria scrobiculata	CYPERACEAE	119	4.41
6	*Selaginella delicatula*	Selaginella	SELAGINELLACEAE	122	4.07
7	*Elatostema lagunense*	Elatostema	URTICACEAE	96	3.38
8	*Schismatoglottis calyptrata*	Schismatoglottis	ARACEAE	76	2.85
9	*Viburnum luzonicum* var. *apoense*	Medulla	ADOXACEAE	49	2.54
10	*Miscanthus floridulus*	Miscanthus	POACEAE	60	2.42
11	*Amomum* sp.	Tagbak	ZINGIBERACEAE	53	2.24
12	*Shorea contorta*	White Luan	DIPTEROCARPACEAE	47	2.08
13	*Acalypha amentacea*	Acalypha	EUPHORBIACEAE	44	2
14	*Sphaerostephanos* sp.	Fern sp2 1083	THELYPTERIDACEAE	43	1.97
15	*Bambusa vulgaris*	Kawayan	POACEAE	40	1.89
16	*Nephrolepis biserrata*	Nephrolepis	NEPHROLEPIDACEAE	23	1.85
17	*Rhynchotechum discolor*	Gesneriaceae	GESNERIACEAE	37	1.81
18	*Lasianthus* sp.	Loranthus	RUBIACEAE	20	1.77
19	*Leucosyke capitellata*	Leucosyke	URTICACEAE	35	1.76
20	*Tarennoidea wallichii*	Mataul	RUBIACEAE	34	1.73
21	*Flemingia strobilifera*	Moghania	FABACEAE	32	1.68
22	*Melastoma malabathricum*	Melastoma	MELASTOMATACEAE	16	1.66
23	*Curculigo capitulata*	Curculigo	HYPOXIDACEAE	28	1.57
24	*Musa sapientum*	Musa sp	MUSACEAE	26	1.52
25	*Maoutia setosa*	Urticaceae	URTICACEAE	41	1.5
26	*Pronephrium asperum*	Fern sp (1731)	THELYPTERIDACEAE	23	1.44
27	*Setaria palmifolia* var. *palmifolia*	Grass sp	POACEAE	23	1.44
28	*Mikania cordata*	Mikania	ASTERACEAE	20	1.36
29	*Chromolaena odorata*	Hagonoy	ASTERACEAE	16	1.25
30	*Cypholophus moluccanus*	Urticaceae	URTICACEAE	16	1.25
31	*Lygodium circinatum*	Lygodium	SCHIZAEACEAE	14	1.2
32	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	13	1.17
33	*Homalomena philippinensis*	Homalomena	ARACEAE	12	1.14
34	*Bischofia javanica*	Bischopia javanica	PHYLLANTHACEAE	11	1.12
35	*Ficus nota*	Ficus nota	MORACEAE	10	1.09
36	*Ficus* sp	Ficus sp	MORACEAE	10	1.09
37	*Caryota cumingii*	Caryota/takipan	ARECACEAE	9	1.06
38	*Saurauia erythrotricha*	Sauraia	ACTINIDIACEAE	9	1.06
39	*Ficus septica*	Ficus septica	MORACEAE	7	1.01
40	*Pteridium aquilium*	Gletienia	DENNSTAEDTIACEAE	7	1.01
41	*Bambusa blumeana*	Kawayan	POACEAE	6	0.98
42	*Cheilocostus speciosus*	Costus	COSTACEAE	6	0.98
43	*Impatiens platypetala*	Impatiens	BALSAMINACEAE	6	0.98
44	*Macaranga hispida*	Macaranga hispida	EUPHORBIACEAE	6	0.98
45	*Omalanthus macradenius*	Homalanthus	EUPHORBIACEAE	6	0.98
46	*Homalanthus macradenius*	Homalanthus/Limingi (Big tree)/Macaranga	EUPHORBIACEAE	21	0.97
47	*Pseudoelephantopus tomentosus*	Psudo espicatus	ASTERACEAE	21	0.97

Appendix 4: General List of Flora Species Importance Value

No.	Scientific Name	Common Name	Family	Tot # Ind.	SIV
48	*Gmelina arborea*	Gmelina	LAMIACEAE	5	0.96
49	*Hyptis capitata*	Hyptis	LAMIACEAE	5	0.96
50	*Leucaena leucocephala*	Ipil-ipil	FABACEAE: MIMOSOIDEAE	5	0.96
51	*Villebrunea rubescens*	Canomol/Novol	URTICACEAE	5	0.96
52	*Canarium* sp.	Ninay/Gapuga/Sahing	BURSERACEAE	4	0.93
53	*Chingia ferox*	Fern 1764	THELYPTERIDACEAE	4	0.93
54	*Cuphea carthagenensis*	Cuphea carthagenensis	LYTHRACEAE	4	0.93
55	*Cyathea* sp.	Cyathea/Tree fern	CYATHEACEAE	4	0.93
56	*Neonauclea formicaria*	Neonuclea	RUBIACEAE	4	0.93
57	*Trema orientalis*	Hanagdong	CELTIDACEAE	4	0.93
58	*Erythrina subumbrans*	Dapdap/tugis	FABACEAE	3	0.9
59	*Ophioglossum reticulatum*	Ophioglossum	OPHIOGLOSSACEAE	3	0.9
60	*Osmunda banksiifolia*	Fern sp2	OSMUNDACEAE	3	0.9
61	*Wendlandia luzoniensis* var. *luzoniensis*	Farinanta	RUBIACEAE	3	0.9
62	*Sphaerostephanos* sp. 2	Fern sp	THELYPTERIDACEAE	18	0.89
63	*Cyathea contaminans*	Cyathea	CYATHEACEAE	2	0.88
64	*Dioscorea* sp.	Dioscorea sp	DIOSCOREACEAE	2	0.88
65	*Ficus variegata*		MORACEAE	2	0.88
66	*Psidium gaujava*	Bayabas	MYRTACEAE	2	0.88
67	*Rottboellia cochinchinensis*	Rottboellia	POACEAE	2	0.88
68	*Sterculia rubiginosa* var. *divaricata*	Sterculia	MALVACEAE	2	0.88
69	*Turpinia sphaerocarpa*	Turpina	STAPHYLEACEAE	2	0.88
70	*Elephantopus spicatus*	Elephantopus	ASTERACEAE	16	0.84
71	*Neolitsea villosa*		LAURACEAE	12	0.73
72	*Celtis philippinesis*	Subang	CELTIDACEAE	11	0.7
73	*Pipturus arborecens*	Pipturus sp. (damay)	URTICACEAE	11	0.7
74	*Acer laurinum*	Letsia (Novol)	ACERACEAE	8	0.62
75	*Costus speciosus*	Costos	COSTACEAE	8	0.62
76	*Ficus minahasae*		MORACEAE	8	0.62
77	*Sphaerostephanos* sp. 1	Fern sp	THELYPTERIDACEAE	7	0.6
78	*Lithocarpus* cf. *solerianus*	Lithocarpus sp.	FAGACEAE	6	0.57
79	*Maoutia setosa sp1*	Urticaceae sp1	URTICACEAE	6	0.57
80	*Swietinia macrophylla*	Mahogany	MELIACEAE	6	0.57
81	*Acalypha caturus*	Acalaypha	EUPHORBIACEAE	5	0.54
82	*Crassocephalum crepidioides*	Gynura procumbens	ASTERACEAE	5	0.54
83	*Pinanga* sp.	Pinanga	ARECACEAE	5	0.54
84	*Shorea palosapis*	Mayapis	DIPTEROCARPACEAE	5	0.54
85	*Elaeocarpus* sp.	Elaeocarpus	ELAEOCARPACEAE	4	0.52
86	*Lygodium japonicum*	Lygodium	SCHIZAEACEAE	4	0.52
87	*Derris* cf. *elliptica*	Derris	FABACEAE	3	0.49
88	*Etlingera elatior*	Zingiber	ZINGIBERACEAE	3	0.49
89	*Ficus odorata*	Ficus sp	MORACEAE	3	0.49
90	*Pterocarpus indicus*	Narra	FABACEAE: FABOIDEAE	3	0.49
91	*Sarcandra glabra*	Salcandra	CHLORANTHACEAE	3	0.49
92	*Spermacoce laevis*	Borreria libis	RUBIACEAE	3	0.49
93	*Stachytarpheta jamaicensis*	Stocytarpeta jamaecenses	VERBENACEAE	3	0.49
94	*Acmella grandiflora*	Compositae sp2-1790	ASTERACEAE	2	0.46
95	*Albizia acle*	T-SPI	FABACEAE	2	0.46
96	*Alstonia* sp.	Batino	APOCYNACEAE	2	0.46

Appendix 4: General List of Flora Species Importance Value

No.	Scientific Name	Common Name	Family	Tot # Ind.	SIV
97	*Aralia bipinnata*	Aralia	ARALIACEAE	2	0.46
98	*Ardisia* sp.	Ardisia	MYRSINACEAE	2	0.46
99	*Callophyllum blancoi*	Takas	CLUSIACEAE	2	0.46
100	*Cinnamomum* sp.	Cinnamomum	LAURACEAE	2	0.46
101	*Clethra canescens* var. *novoguineensis*	Clethra	CLETHRACEAE	2	0.46
102	*Dicranopteris linearis*	Dicranopteris	GLEICHENIACEAE	2	0.46
103	*Dinochloa* sp.	Bikal	POACEAE	2	0.46
104	*Drynaria queercifolia*	Pakpak lawin/Drynaria	POLYPODIACEAE	2	0.46
105	*Euphorbia heterophylla*	Euphorbia sp	EUPHORBIACEAE	2	0.46
106	*Lithocarpus* sp.	Oak leaf fern	FAGACEAE	2	0.46
107	*Melochia umbellata*	Helictress ambilata (H. umbellata ?)	STERCULIACEAE	2	0.46
108	*Musa paradisiaca*	Musa sp.	MUSACEAE	2	0.46
109	*Oleandra* sp.	Oleandra	OLEANDRACEAE	2	0.46
110	*Oplismenus compositus*	Oplisminus	POACEAE	2	0.46
111	*Piper sp.*	Piper	PIPERACEAE	2	0.46
112	*Polyalthia* sp.	Annonaceae	ANNONACEAE	2	0.46
113	*Prunus* sp.	Prunus	ROSACEAE	2	0.46
114	*Sapindus* sp.	Saponaria	SAPINDANCEAE	2	0.46
115	*Syzygium* sp.	Syzygium sp	MYRTACEAE	2	0.46
116	*Acmella paniculata*	Compositae	ASTERACEAE	1	0.44
117	*Aeschynanthus sp.*	Eschycalanthus (Ailanthus (?)	GESNERIACEAE	1	0.44
118	*Agalmyla* sp.	Agalmyla	GESNERIACEAE	1	0.44
119	*Ageratum conyzoides*	Ageratum	ASTERACEAE	1	0.44
120	*Alocasia macrorhizos*	Alocasia sp	ARACEAE	1	0.44
121	*Appendicula reflexa*	Appendecula	ORCHIDACEAE	1	0.44
122	*Arisaema polyphyllum* var. *polyphyllum*	Arosema polyphyllum	ARACEAE	1	0.44
123	*Artocarpus odoratissimus*	Marang	MORACEAE	1	0.44
124	*Asplenium nidus*	Asplenium	ASPLENIACEAE	1	0.44
125	*Begonia* sp.	Begonia sp4	BEGONIACEAE	1	0.44
126	*Bidens pilosa*	Bidens pilosa	ASTERACEAE	1	0.44
127	*Buchanania* sp.	Bucanania	ANACARDIACEAE	1	0.44
128	*Calamus* sp.	Calamus sp	ARECACEAE	1	0.44
129	*Celtis* sp.	Celtis	ULMACEAE	1	0.44
130	*Cheiropleuria bicupsis*		DIPTERIDACEAE	1	0.44
131	*Curcuma domestica*	Zingiber (Curcuma domestica)	ZINGIBERACEAE	1	0.44
132	*Dacrycarpus imbricatus*	Iging	PODOCARPACEAE	1	0.44
133	*Dendrobium milaniae*		ORCHIDACEAE	1	0.44
134	*Dianella ensifolia*	Dianella	LILIACEAE	1	0.44
135	*Diplazium pallidum*	Fern sp3	ATHYRIACEAE	1	0.44
136	*Dipteris conjugata*	Dipteris conjugate	DIPTERIDACEAE	1	0.44
137	*Discocalyx* sp.	Discocalyx	MYRSINACEAE	1	0.44
138	*Dysoxylum* sp.	Meliaceae	MELIACEAE	1	0.44
139	*Euphorbia hirta*	Euphorbia hirta	EUPHORBIACEAE	1	0.44
140	*Evodia* sp.	Evodia	RUTACEAE	1	0.44
141	*Ficus* sp. 1	Ficus sp1	MORACEAE	1	0.44
142	*Ficus* sp. 2	Ficus sp2	MORACEAE	1	0.44
143	*Frecynetia* sp.	Frecynetia	PANDANACEAE	1	0.44
144	*Glochidion* sp.	Glochidion	PHYLLANTHACEAE	1	0.44
145	*Gomphostema javanica*		LAMIACEAE	1	0.44
146	*Gynura procumbens*	Gynura procumbens	ASTERACEAE	1	0.44

Appendix 4: General List of Flora Species Importance Value

No.	Scientific Name	Common Name	Family	Tot # Ind.	SIV
147	*Habenaria* sp.	Orchid Habenaria	ORCHIDACEAE	1	0.44
148	*Hoya multiflora*	Hoya multiflora	ASCLEPIADACEAE	1	0.44
149	*Hydrangea integrifolia*	Hydrangea	HYDRANGEACEAE	1	0.44
150	*Korthalsia* sp.	Korthalsia	ARECACEAE	1	0.44
151	*Leea guineensis*	Leea	VITACEAE	1	0.44
152	*Lepidogyne longifolia*		ORCHIDACEAE	1	0.44
153	*Litsea cordata*	Litsea perrottetii	LAURACEAE	1	0.44
154	*Litsea* sp.	Litsea	LAURACEAE	1	0.44
155	*Macrothelypteris torresiana*	Fern sp4	THELYPTERIDACEAE	1	0.44
156	*Medinilla pendula*	Medinilla	MELASTOMATACEAE	1	0.44
157	*Merremia peltata*	Merremia diltata	CONVOLVULACEAE	1	0.44
158	*Mussaenda* sp.	Musaenda sp	RUBIACEAE	1	0.44
159	*Odontosoria chinensis*	Fern- 1784	LINDSAEACEAE	1	0.44
160	*Osmoxylon sp.*	Osmoxylum	ARALIACEAE	1	0.44
161	*Pandanus* sp.	Pandanus sp	PANDANACEAE	1	0.44
162	*Pavetta* sp.	Oveta	RUBIACEAE	1	0.44
163	*Phyllanthus amarus*	Phyllanthus sp.	PHYLLANTHACEAE	1	0.44
164	*Pittosporum moluccanum*	Pittosporum	PITTOSPORACEAE	1	0.44
165	*Poikilospermum acuminatum*	Poikeloshermis sp	CECROPIACEAE	1	0.44
166	*Polygala venenosa*		POLYGALACEAE	1	0.44
167	*Raphidophora* sp.	Photos	ARACEAE	1	0.44
168	*Saurauia* sp.	Saurauia	ACTINIDIACEAE	1	0.44
169	*Shorea polysperma*	Tanguile	DIPTEROCARPACEAE	1	0.44
170	*Smilax leucocephylla*	Banagan/Banag	SMILACACEAE	1	0.44
171	*Talauma* sp.	Patangis	LAURACEAE	1	0.44
172	*Tetrastisgma* sp.	Tetrastigma	VITACEAE	1	0.44
173	*Xanthostemon* sp.	Camptostemon	MYRTACEAE	1	0.44
174	*Zea mays*	Mais	POACEAE	1	0.44

Appendix 4. 1: List of Flora Species Importance Value (24 plots)

No.	Scientific Name	Common Name	Family Name	SIV	Rank
1	*Piper aduncum*	Boyoboyo	PIPERACEAE	32.34	1
2	*Imperata cylindrica*	Cogon	POACEAE	27.94	2
3	*Desmodium triflorum*	Desmodium tryflorum	FABACEAE	11.09	3
4	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	8.10	4
5	*Selaginella delicatula*	Celagenela	SELAGINELLACEAE	7.10	5
6	*Scleria scrobiculata*	Scleria scrobiculata	CYPERACEAE	5.96	6
7	*Schismatoglottis calyptrata*	Chismatoglosis	ARACEAE	5.94	7
8	*Leucosyke capitellata*	Leocosyke/Magilom	URTICACEAE	4.75	8
9	*Acalypha amentacea*	Acalaypa(Banahik)	EUPHORBIACEAE	4.70	9
10	*Viburnum luzonicum* var. *apoense*	Calicarpa (Midula)	ADOXACEAE	4.55	10
11	*Elatostema lagunense*	Elathostema sp.	URTICACEAE	4.48	11
12	*Sphaerostephanos* sp.	Fern	THELYPTERIDACEAE	3.95	12
13	*Amomum* sp.	Tagbak	ZINGIBERACEAE	3.83	13
14	*Shorea contorta*	Lauan/White luauan	DIPTEROCARPACEAE	3.59	14
15	*Curculigo capitulata*	Curcoligo	HYPOXIDACEAE	2.89	15
16	*Homalomena philippinensis*	Homalomena	ARACEAE	2.89	16
17	*Miscanthus floridulus*	Miscanthis	POACEAE	2.48	17
18	*Nephrolepis biserrata*	Fern(Neprolepes sp)	.OLEANDRACEAE	2.38	18
19	*Tarennoidea wallichii*	Mataul	RUBIACEAE	2.35	19
20	*Mikania cordata*	Mikaňa	ASTERACEAE	2.32	20

Appendix 4. 1: List of Flora Species Importance Value (24 plots)

No.	Scientific Name	Common Name	Family Name	SIV	Rank
21	*Rhynchotechum discolor*	Dismeriaceae	GESNERIACEAE	2.29	21
22	*Maoutia setosa*	Urticaceae	URTICACEAE	2.15	22
23	*Bambusa vulgaris*	Kawayan	POACEAE	2.09	23
24	*Acer laurinum*	Letsia (Novol)	ACERACEAE	2.05	24
25	*Caryota cumingii*	Caryota/Takipan	ARECACEAE	2.05	25
26	*Phronephrium asperum*	Fern Sp.	THELYPTERIDACEAE	2.02	26
27	*Pseudoelephantopus tomentosus*	Psudo espicatus	ASTERACEAE	1.99	27
28	*Musa sapientum*	Saging latundan	MUSACEAE	1.66	28
29	*Costus speciosus*	Costos	COSTACEAE	1.59	29
30	*Homalanthus macradenius*	Homalanthus/Limingi (Big tree)/Macaranga	EUPHORBIACEAE	1.54	30
31	*Elephantopus spicatus*	Elephantopus	ASTERACEAE	1.39	31
32	*Flemingia strobilifera*	Flameña (Leguminaceae)	FABACEAE	1.30	32
33	*Neolitsea villosa*		LAURACEAE	1.27	33
34	*Pipturus arborecens*	Pipturus sp. (damay)	URTICACEAE	1.24	34
35	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	1.20	35
36	*Ficus sp.*	Ficus sp.	MORACEAE	1.17	36
37	*Lygodium circinatum*	Lygodium	SCHIZAEACEAE	1.17	37
38	*Lithocarpus* cf. *solerianus*	Lithocarpus sp.	FAGACEAE	1.08	38
39	*Setaria palmifolia* var. *palmifolia*	Grass sp	POACEAE	1.03	39
40	*Lygodium japonicum*	Lygodium	SCHIZAEACEAE	1.02	40
41	*Lasianthus* sp.	Loranthus	RUBIACEAE	1.00	41
42	*Albizia acle*	T-SPI	FABACEAE	0.96	42
43	*Canarium* sp.	Ninay/Gapuga	BURSERACEAE	0.96	43
44	*Macaranga hispida*	Langila/Kinida	EUPHORBIACEAE	0.96	44
45	*Trema orientalis*	Anagdong	CELTIDACEAE	0.96	45
46	*Cypholophus moluccanus*	Urticaceae(Lidic)	URTICACEAE	0.88	46
47	*Celtis philippinesis*	Subang	CELTIDACEAE	0.78	47
48	*Chromolaena odorata*	Hagonoy	ASTERACEAE	0.78	48
49	*Bischofia javanica*	Bischofia javanica	PHYLLANTHACEAE	0.69	49
50	*Ficus minahasae*		MORACEAE	0.69	50
51	*Saurauia erythrotricha*	Sauralla	ACTINIDIACEAE	0.66	51
52	*Acalypha caturus*	Acalaypha	EUPHORBIACEAE	0.60	52
53	*Bambusa blumeana*	Kawayan (patong)	POACEAE	0.60	53
54	*Gmelina arborea*	Gmelina	LAMIACEAE	0.57	54
55	*Cuphea carthagenesis*	Cuphea	LYTHRACEAE	0.54	55
56	*Ficus odorata*	Ficus sp	MORACEAE	0.54	56
57	*Leucaena leucocephala*	Ipilipil	FABACEAE: MIMOSOIDEAE	0.54	57
58	*Stachytarpheta jamaicensis*	Stocytarpeta jamaecenses	VERBENACEAE	0.54	58
59	*Callophyllum blancoi*	Takas	CLUSIACEAE	0.51	59
60	*Cheilocostus speciosus*	Costos	COSTACEAE	0.51	60
61	*Erythrina subumbrans*	Dapdap/Tugis	FABACEAE	0.51	61
62	*Ficus nota*	Ficus nota	MORACEAE	0.51	62
63	*Hyptis capitata*	Heptis	LAMIACEAE	0.51	63
64	*Melastoma malabathricum*	Melastuma (5)	MELASTOMATACEAE	0.51	64
65	*Musa paradisiaca*	Musa sp.	MUSACEAE	0.51	65
66	*Polyalthia* sp.	Annonaceae	ANNONACEAE	0.51	66
67	*Chingia ferox*	Fern	THELYPTERIDACEAE	0.48	67
68	*Cyathea contaminans*	Cyathea	CYATHEACEAE	0.48	68
69	*Ficus septica*	Ficus septica	MORACEAE	0.48	69
70	*Ficus variegata*		MORACEAE	0.48	70
71	*Merremia peltata*	Merremia diltata	CONVOLVULACEAE	0.48	71

Appendix 4. 1: List of Flora Species Importance Value (24 plots)

No.	Scientific Name	Common Name	Family Name	SIV	Rank
72	*Mussaenda* sp.	Musaenda sp	RUBIACEAE	0.48	72
73	*Neonauclea formicaria*		RUBIACEAE	0.48	73
74	*Ophioglossum reticulatum*	Ophioglusum	OPHIGLOSSACEAE	0.48	74
75	*Osmoxylon sp.*	Osmoxylum	ARALIACEAE	0.48	75
76	*Psidium guajava*	Bayabas	MYRTACEAE	0.48	76
77	*Rottboellia cochinchinensis*		POACEAE	0.48	77
78	*Sterculia rubiginosa* var. *divaricata*	Sterculia	MALVACEAE	0.48	78
79	*Tetrastisgma* sp.	Tetrastigma	VITACEAE	0.48	79
80	*Turpinia sphaerocarpa*	Turpina	STAPHYLEACEAE	0.48	80
81	*Villebrunea rubescens*	Novol	URTICACEAE	0.48	81
82	*Wendlandia luzoniensis* var. *luzoniensis*	Wendlandia	RUBIACEAE	0.48	82

Appendix 4. 1a: List of Flora Species Importance Value (1x1)

No.	Scientific Name	Species	Family Name	SIV	Rank
1	*Imperata cylindrica*	Cogon	POACEAE	43.75	1
2	*Desmodium triflorum*	Desmodium tryflorum	FABACEAE	17.28	2
3	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	13.30	3
4	*Selaginella delicatula*	Celagenela	SELAGINELLACEAE	11.67	4
5	*Schismatoglottis calyptrata*	Chismatoglosis	ARACEAE	9.95	5
6	*Scleria scrobiculata*	Scleria scrobiculata	CYPERACEAE	9.73	6
7	*Elatostema lagunense*	Elathostema sp.	URTICACEAE	7.27	7
8	*Sphaerostephanos* sp.	Fern	THELYPTERIDACEAE	6.62	8
9	*Homalomena philippinensis*	Homalomena	ARACEAE	4.97	9
10	*Curculigo capitulata*	Curcoligo	HYPOXIDACEAE	4.90	10
11	*Nephrolepis biserrata*	Fern(Neprolepes sp)	NEPHROLEPIDACEAE	4.02	11
12	*Miscanthus floridulus*	Miscanthis	POACEAE	4.01	12
13	*Mikania cordata*	Mikaña	ASTERACEAE	3.93	13
14	*Rhynchotechum discolor*	Dismeriaceae	GESNERIACEAE	3.81	14
15	*Leucosyke capitellata*	Leocosyke	URTICACEAE	3.41	15
16	*Piper aduncum*	Boyoboyo	PIPERACEAE	3.41	16
17	*Phronephrium asperum*	Fern Sp.	THELYPTERIDACEAE	3.38	17
18	*Pseudoelephantopus tomentosus*	Psudo espicatus	ASTERACEAE	3.33	18
19	*Tarennoidea wallichii*	Mataul	RUBIACEAE	3.02	19
20	*Costus speciosus*	Costos	ZINGIBERACEAE-COSTACEAE	2.72	20
21	*Acalypha amentacea*	Acalaypa(Banahik)	EUPHORBIACEAE	2.67	21
22	*Elephantopus spicatus*	Elephantopus	ASTERACEAE	2.32	22
23	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	2.03	23
24	*Lygodium circinatum*	Lygodium	LYGODIACEAE-SCHIZAEACEAE	1.99	24
25	*Lygodium japonicum*	Lygodium	LYGODIACEAE-SCHIZAEACEAE	1.75	25
26	*Setaria palmifolia* var. *palmifolia*	Grass sp	ARECACEAE	1.68	26
27	*Lasianthus* sp.	Loranthus	RUBIACEAE	1.63	27
28	*Chromolaena odorata*	Hagonoy	ASTERACEAE	1.30	28
29	*Ficus minahasae*		MORACEAE	1.16	29
30	*Viburnum luzonicum* var. *apoense*	Calicarpa (Midula)	ADOXACEAE	1.02	30
31	*Amomum* sp.	Tagbag	ZINGIBERACEAE/MORACEAE	0.92	31
32	*Cuphea carthagenesis*	Cuphea	LYTHRACEAE	0.92	32
33	*Ficus odorata*	Ficus sp	MORACEAE	0.92	33
34	*Stachytarpheta jamaicensis*	Stocytarpeta	VERBENACEAE	0.92	34

Appendix 4. 1a: List of Flora Species Importance Value (1x1)

No.	Scientific Name	Species	Family Name	SIV	Rank
		jamaecenses			
35	*Cheilocostus speciosus*	Costos	COSTACEAE	0.88	35
36	*Ficus nota*	Ficus nota	MORACEAE	0.88	36
37	*Hyptis capitata*	Heptis	LAMIACEAE	0.88	37
38	*Polyalthia* sp.	Annonaceae	ANNONACEAE	0.88	38
39	*Caryota cumingii*	Caryota	ARECACEAE	0.83	39
40	*Chingia ferox*	Fern	THELYPTERIDACEAE	0.83	40
41	*Erythrina subumbrans*	Dapdap	FABACEAE	0.83	41
42	*Ficus septica*	Ficus septica	MORACEAE	0.83	42
43	*Ficus sp.*	Ficus sp.	MORACEAE	0.83	43
44	*Ficus variegata*		MORACEAE	0.83	44
45	*Maoutia setosa*	Urticaceae	URTICACEAE	0.83	45
46	*Merremia peltata*	Merremia diltata	CONVOLVULACEAE	0.83	46
47	*Mussaenda* sp.	Musaenda sp	RUBIACEAE	0.83	47
48	*Ophioglossum reticulatum*	Ophioglusum	OPHIGLOSSACEAE	0.83	48
49	*Osmoxylon sp.*	Osmoxylum	ARALIACEAE	0.83	49
50	*Rottboellia cochinchinensis*		GRAMINEAE	0.83	50
51	*Tetrastisgma* sp.	Tetrastigma	VITACEAE	0.83	51

Appendix 4. 1b : List of Flora Species Importance Value (5x5)

No.	Scientific Name	Species	Family Name	SIV	Rank
1	*Piper aduncum*	Boyoboyo	PIPERACEAE	71.53	1
2	*Viburnum luzonicum* var. *apoense*	Calicarpa (Midula)	ADOXACEAE	11.26	2
3	*Amomum* sp.	Tagbak	ZINGIBERACEAE	10.65	3
4	*Acalypha amentacea*	Acalypha	EUPHORBIACEAE	9.33	4
5	*Leucosyke capitellata*	Leocosyke	URTICACEAE	8.87	5
6	*Shorea contorta*	Lauan	DIPTEROCARPACEAE	8.39	6
7	*Maoutia setosa*	Lidik	URTICACEAE	6.09	7
8	*Musa sapientum*	Saging latundan	MUSACEAE	5.39	8
9	*Saurauia erythrotricha*		ACTINIDIACEAE	5.09	9
10	*Flemingia strobilifera*	Flameña (Leguminaceae)	FABACEAE	4.61	10
11	*Bambusa vulgaris*	Kawayan	POACEAE	4.36	11
12	*Acer laurinum*	Letsia (Novol)	ACERACEAE	4.31	12
13	*Caryota cumingii*	Takipan	ARECACEAE	4.31	13
14	*Omalanthus macradenius*	Homalanthus/Limingi (Big tree)	EUPHORBIACEAE	4.03	14
15	*Neolitsea villosa*		LAURACEAE	3.78	15
16	*Pipturus arborecens*	Pipturus sp. (damay)	URTICACEAE	3.66	16
17	*Lithocarpus* cf. *solerianus*	Lithocarpus sp.	FAGACEAE	2.92	17
18	*Cypholophus moluccanus*	Urticaceae(Lidic)	URTICACEAE	2.88	18
19	*Celtis philippinesis*	Subang	CELTIDACEAE	2.51	19
20	*Bischofia javanica*	Bischofia javanica	PHYLLANTHACEAE	2.14	20
21	*Ficus* sp.	Ficus sp.	MORACEAE	1.89	21
22	*Acalypha caturus*	Acalaypha	EUPHORBIACEAE	1.77	22
23	*Bambusa blumeana*	Kawayan (patong)	POACEAE	1.77	23
24	*Leucaena leucocephala*	Ipilipil	FABACEAE: MIMOSOIDEAE	1.52	24
25	*Callophyllum blancoi*	Takas	CLUSIACEAE	1.40	25
26	*Melastoma malabathricum*	Melastuma (5)	MELASTOMATACEAE	1.40	26
27	*Musa paradisiaca*	Musa sp.	MUSACEAE	1.40	27
28	*Canarium* sp.	Ninay	BURSERACEAE	1.27	28
29	*Cyathea contaminans*	Cyathea	CYATHEACEAE	1.27	29
30	*Macaranga hispida*	Langila	EUPHORBIACEAE	1.27	30

Appendix 4. 1b : List of Flora Species Importance Value (5x5)

No.	Scientific Name	Species	Family Name	SIV	Rank
31	*Neonauclea formicaria*		RUBIACEAE	1.27	31
32	*Psidium gaujava*	Bayabas	MYRTACEAE	1.27	32
33	*Sterculia rubiginosa* var. *divaricata*		MALVACEAE	1.27	33
34	*Tarennoidea wallichii*		RUBIACEAE	1.27	34
35	*Turpinia sphaerocarpa*		STAPHYLEACEAE	1.27	35
36	*Villebrunea rubescens*	Novol	URTICACEAE	1.27	36
37	*Wendlandia luzoniensis* var. *luzoniensis*	Wendlandia	RUBIACEAE	1.27	37

Appendix 4. 1c: List of Flora Species Importance Value (10x10)

No.	Scientific Name	Species	Family Name	SIV	Rank
1	*Piper aduncum*	Boyoboyo	PIPERACEAE	250.00	1
2	*Shore contorta*	Lauan Acle	DIPTEROCARPACEAE	17.32	2
3	*Omalanthus macradenius*	Macaranga	EUPHORBIACEAE	4.71	3
4	*Bambusa vulgaris*	Kawayan tiring	POACEAE	4.11	4
5	*Erythrina subumbrans*	Tugis	FABACEAE	3.78	5
6	*Tarennoidea wallichii*	Meteyl	RUBIACEAE	3.78	6
7	*Gmelina arborea*	Gmelina	LAMIACEAE	3.00	7
8	*Albizia acle*	T-SPI	FABACEAE	2.37	8
9	*Saurauia erythrotricha*	Sauralla	ACTINIDIACEAE	2.14	9
10	*Acer laurinum*	Lauraceae	ACERACEAE	1.89	10
11	*Trema orientalis*	Anagdong	CELTIDACEAE	1.52	11
12	*Ficus* sp.	Ficus sp.	MORACEAE	1.39	12
13	*Lithocarpus* cf. *solerianus*	Lithocarpus	FAGACEAE	1.31	13
14	*Macaranga hispida*	Kinida	EUPHORBIACEAE	1.00	14
15	*Leucosyke capitellata*	Magilom	URTICACEAE	0.75	15
16	*Canarium* sp.	Gapuga	BURSERACEAE	0.70	16

Appendix 4. 2: List of Flora Species Importance Value Line Intercept

No.	Scientific Name	Common Name	Family	SIV	Rank
1	*Piper aduncum*	Boyo-boyo	PIPERACEAE	9.95	1
2	*Elephantopus tomentosus*	Elephantopus	ASTERACEAE	8.36	2
3	*Viburnum luzonicum* var. *apoense*	Medulla	ADOXACEAE	7.41	3
4	*Leucosyke capitellata*	Leucosyke	URTICACEAE	6.50	4
5	*Sphaerostephanos* sp. 2	Fern sp	THELYPTERIDACEAE	6.44	5
6	*Melastoma malabathricum*	Melastoma	MELASTOMATACEAE	6.35	6
7	*Schismatoglottis calyptrata*	Schismatoglottis	ARACEAE	5.79	7
8	*Scleria scrobiculata* ssp. *scrobiculata*	Scleria	CYPERACEAE	5.40	8
9	*Curculigo capitulata*	Curculigo	HYPOXIDACEAE	4.75	9
10	*Elatostema lagunense*	Elatostema	URTICACEAE	4.61	10
11	*Selaginella delicatula*	Selaginella	SELAGINELLACEAE	3.93	11
12	*Acalypha amentacea*	Acalypha	EUPHORBIACEAE	3.78	12
13	*Ficus nota*	Ficus nota	MORACEAE	3.78	13
14	*Miscanthus floridulus*	Miscanthus	POACEAE	3.78	14
15	*Homalomena philippinensis*	Homalomena	ARACEAE	3.66	15
16	*Maoutia setosa sp1*	Urticaceae sp1	URTICACEAE	3.66	16
17	*Rhynchotechum discolor*	Gesneriaceae	GESNERIACEAE	3.66	17
18	*Ficus septica*	Ficus septica	MORACEAE	3.25	18
19	*Imperata cylindrica*	Cogon	POACEAE	3.25	19
20	*Chromolaena odorata*	Hagonoy	ASTERACEAE	2.98	20
21	*Crassocephalum crepidioides*	Gynura procumbens	ASTERACEAE	2.98	21
22	*Lygodium circinatum*	Lygodium	SCHIZAEACEAE	2.98	22

Appendix 4. 2: List of Flora Species Importance Value Line Intercept

No.	Scientific Name	Common Name	Family	SIV	Rank
23	*Cheilocostus speciosus*	Costus	COSTACEAE	2.72	23
24	*Flemingia strobilifera*	Moghania	FABACEAE	2.72	24
25	*Sphaerostephanos* sp. 1	Fern sp	THELYPTERIDACEAE	2.69	25
26	*Omalanthus macradenius*	Homalanthus	EUPHORBIACEAE	2.57	26
27	*Shorea palosapis*	Mayapis	DIPTEROCARPACEAE	2.57	27
28	*Pteridium aquilium*	Gletienia	DENNSTAEDTIACEAE	2.42	28
29	*Swietinia macrophylla*	Mahogany	MELIACEAE	2.42	29
30	*Macaranga hispida*	Macaranga hispida	EUPHORBIACEAE	2.30	30
31	*Setaria palmifolia* var. *palmifolia*	Setaria palmifolia	POACEAE	2.30	31
32	*Bischofia javanica*	Bischopia javanica	PHYLLANTHACEAE	2.04	32
33	*Hyptis capitata*	Hyptis	LAMIACEAE	2.04	33
34	*Mikania cordata*	Mikania	ASTERACEAE	2.04	34
35	*Neonauclea formicaria*	Neonuclea	RUBIACEAE	2.04	35
36	*Nephrolepis biserrata*	Nephrolepis	NEPHROLEPIDACEAE	2.04	36
37	*Pterocarpus indicus*	Narra	FABACEAE: FABOIDEAE	2.04	37
38	*Shorea contorta*	White Luan	DIPTEROCARPACEAE	2.04	38
39	*Spermacoce laevis*	Borreria libis	RUBIACEAE	2.04	39
40	*Villebrunea rubescens*	Canomol	URTICACEAE	1.89	40
41	*Impatiens platypetala*	Impatiens	BALSAMINACEAE	1.74	41
42	*Carex alopecuroides* var. *chlorostachys*	Cyperus	CYPERACEAE	1.62	42
43	*Chingia ferox*	Fern 1764	THELYPTERIDACEAE	1.62	43
44	*Derris* cf. *elliptica*	Derris	FABACEAE	1.62	44
45	*Etlingera elatior*	Zingiber	ZINGIBERACEAE	1.62	45
46	*Acmella grandiflora*	Compositae sp2-1790	ASTERACEAE	1.36	46
47	*Cypholophus moluccanus*	Urticaceae	URTICACEAE	1.36	47
48	*Leucaena leucocephala*	Ipil-ipil	FABACEAE: MIMOSOIDEAE	1.36	48
49	*Melochia umbellata*	Helictress ambilata (H. umbellata ?)	STERCULIACEAE	1.36	49
50	*Ophioglossum reticulatum*	Ophioglossum	OPHIOGLOSSACEAE	1.36	50
51	*Oplismenus compositus*	Oplisminus	POACEAE	1.36	51
52	*Osmunda banksiifolia*	Fern sp2	OSMUNDACEAE	1.36	52
53	*Saurauia erythrotricha*	Sauraia	ACTINIDIACEAE	1.36	53
54	*Trema orientalis*	Hanagdong	ULMACEAE	1.36	54
55	*Euphorbia heterophylla*	Euphorbia sp	EUPHORBIACEAE	0.95	55
56	*Sphaerostephanos* sp.	Fern sp2 1083	THELYPTERIDACEAE	0.95	56
57	*Wendlandia luzoniensis* var. *luzoniensis*	Farinanta	RUBIACEAE	0.95	57
58	*Acmella paniculata*	Compositae	ASTERACEAE	0.68	58
59	*Ageratum conyzoides*	Ageratum	ASTERACEAE	0.68	59
60	*Alocasia macrorhizos*	Alocasia sp	ARACEAE	0.68	60
61	*Amomum* sp.	Tagbak	ZINGIBERACEAE	0.68	61
62	*Artocarpus odoratissimus*	Marang	MORACEAE	0.68	62
63	*Asplenium nidus*	Asplenium	ASPLENIACEAE	0.68	63
64	*Bambusa blumeana*	Kawayan	POACEAE	0.68	64
65	*Bambusa vulgaris*	Kawayan	POACEAE	0.68	65
66	*Begonia* sp.	Begonia sp4	BEGONIACEAE	0.68	66
67	*Bidens pilosa*	Bidens pilosa	ASTERACEAE	0.68	67
68	*Caryota cumingii*	Caryota	ARECACEAE	0.68	68
69	*Cuphea carthagenensis*	Cuphea carthagenensis	LYTHRACEAE	0.68	69
70	*Curcuma domestica*	Zingiber (Curcuma domestica)	ZINGIBERACEAE	0.68	70
71	*Cyathea contaminans*	Cyathea	CYATHEACEAE	0.68	71
72	*Cyathea* sp.	Cyathea/tree fern	CYATHEACEAE	0.68	72
73	*Dioscorea* sp.	Dioscorea sp	DIOSCOREACEAE	0.68	73

Appendix 4. 2: List of Flora Species Importance Value Line Intercept

No.	Scientific Name	Common Name	Family	SIV	Rank
74	*Diplazium pallidum*	Fern sp3	ATHYRIACEAE	0.68	74
75	*Erythrina subumbrans*	Dapdap	FABACEAE	0.68	75
76	*Euphorbia hirta*	Euphorbia hirta	EUPHORBIACEAE	0.68	76
77	*Ficus* sp	Ficus sp	MORACEAE	0.68	77
78	*Ficus* sp. 1	Ficus sp1	MORACEAE	0.68	78
79	*Ficus* sp. 2	Ficus sp2	MORACEAE	0.68	79
80	*Glochidion* sp.	Glochidion	PHYLLANTHACEAE	0.68	80
81	*Gmelina arborea*	Gmelina	LAMIACEAE	0.68	81
82	*Gynura procumbens*	Gynura procumbens	ASTERACEAE	0.68	82
83	*Habenaria* sp.	Orchid Habenaria	ORCHIDACEAE	0.68	83
84	*Hoya multiflora*	Hoya multiflora	ASCLEPIADACEAE	0.68	84
85	*Lasianthus* sp.	Loranthus	RUBIACEAE	0.68	85
86	*Leea guineensis*	Leea	LEEACEAE	0.68	86
87	*Litsea cordata*	Litsea perrottetii	LAURACEAE	0.68	87
88	*Macrothelypteris torresiana*	Fern sp4	THELYPTERIDACEAE	0.68	88
89	*Musa sapientum*	Musa sp	MUSACEAE	0.68	89
90	*Odontosoria chinensis*	Fern- 1784	LINDSAEACEAE	0.68	90
91	*Phyllanthus amarus*	Phyllanthus sp.	PHYLLANTHACEAE	0.68	91
92	*Poikilospermum acuminatum*	Poikeloshermis sp	CECROPIACEAE	0.68	92
93	*Pronephrium asperum*	Fern sp (1731)	THELYPTERIDACEAE	0.68	93
94	*Psidium gaujava*	Bayabas	MYRTACEAE	0.68	94
95	*Raphidophora* sp.	Photos	ARACEAE	0.68	95
96	*Rottboellia cochinchinensis*	Rottboellia	POACEAE	0.68	96
97	*Shorea polysperma*	Tanguile	DIPTEROCARPACEAE	0.68	97
98	*Sterculia rubiginosa* var. *divaricata*	Sterculia	MALVACEAE	0.68	98
99	*Zea mays*	Mais	POACEAE	0.68	99

Appendix 4. 3: List of Flora Species Importance Value (Tawolon)

No.	Scientific name	Common Name	Family	Habit	SIV	Rank
1	*Pinanga* sp.	Pinanga	ARECACEAE	T	8.46	1
2	*Elaeocarpus* sp.	Elaeocarpus	ELAEOCARPACEAE	T	7.32	2
3	*Alstonia* sp.	Batino	APOCYNACEAE	T	5.05	3
4	*Aralia bipinnata*	Aralia	ARALIACEAE	T	5.05	4
5	*Ardisia* sp.	Ardisia	MYRSINACEAE	T	5.05	5
6	*Canarium* sp.	Canarium/Sahing	BURSERACEAE	T	5.05	6
7	*Cinnamomum* sp.	Cinnamomum	LAURACEAE	T	5.05	7
8	*Clethra canescens* var. *novoguineensis*	Clethra	CLETHRACEAE	T	5.05	8
9	*Dinochloa* sp.	Bikal	POACEAE	T	5.05	9
10	*Prunus* sp.	Prunus	ROSACEAE	T	5.05	10
11	*Cyathea* sp.	Tree fern	CYATHEACEAE	T-F	4.80	11
12	*Sarcandra glabra*	Salcandra	CHLORANTHACEAE	S	4.80	12
13	*Dicranopteris linearis*	Dicranopteris	GLEICHENIACEAE	V-F	3.66	13
14	*Drynaria queercifolia*	Pakpak lawin/Drynaria	POLYPODIACEAE	H-F	3.66	14
15	*Lithocarpus* sp.	Oak leaf fern	FAGACEAE	T	3.66	15
16	*Oleandra* sp.	Oleandra	OLEANDRACEAE	H-F	3.66	16
17	*Piper sp.*	Piper	PIPERACEAE	H	3.66	17
18	*Sapindus* sp.	Saponaria	SAPINDANCEAE	T	3.66	18
19	*Syzygium* sp.	Syzygium sp	MYRTACEAE	T	3.66	19
20	*Aeschynanthus sp.*	Eschycalanthus (Ailanthus (?)	GESNERIACEAE	H	2.53	20
21	*Agalmyla* sp.	Agalmyla	GESNERIACEAE	H	2.53	21
22	*Appendicula reflexa*	Appendecula	ORCHIDACEAE	H	2.53	22
23	*Arisaema polyphyllum* var.	Arosema polyphyllum	ARACEAE	H	2.53	23

Appendix 4. 3: List of Flora Species Importance Value (Tawolon)

No.	Scientific name	Common Name	Family	Habit	SIV	Rank
	polyphyllum					
24	*Buchanania* sp.	Bucanania	ANACARDIACEAE	T	2.53	24
25	*Calamus* sp.	Calamus sp	ARECACEAE	V-Pm	2.53	25
26	*Celtis* sp.	Celtis	ULMACEAE	T	2.53	26
27	*Cheiropleuria bicupsis*		DIPTERIDACEAE	H-F	2.53	27
28	*Dacrycarpus imbricatus*	Iging	PODOCARPACEAE	T	2.53	28
29	*Dendrobium milaniae*		ORCHIDACEAE	H	2.53	29
30	*Dianella ensifolia*	Dianella	LILIACEAE	H	2.53	30
31	*Dioscorea* sp.	Dioscorea	DIOSCOREACEAE	V	2.53	31
32	*Dipteris conjugata*	Dipteris conjugate	DIPTERIDACEAE	H-F	2.53	32
33	*Discocalyx* sp.	Discocalyx	MYRSINACEAE	S	2.53	33
34	*Dysoxylum* sp.	Meliaceae	MELIACEAE	T	2.53	34
35	*Evodia* sp.	Evodia	RUTACEAE	T	2.53	35
36	*Ficus variegata*	Ficus variegata	MORACEAE	T	2.53	36
37	*Frecynetia* sp.	Frecynetia	PANDANACEAE	S	2.53	37
38	*Gomphostema javanica*		LAMIACEAE	S	2.53	38
39	*Hydrangea integrifolia*	Hydrangea	HYDRANGEACEAE	S	2.53	39
40	*Impatiens platypetala*	Impatiens	BALSAMINACEAE	H	2.53	40
41	*Korthalsia* sp.	Korthalsia	ARECACEAE	V-Pm	2.53	41
42	*Lasianthus* sp.	Lasianthus	RUBIACEAE	S	2.53	42
43	*Lepidogyne longifolia*		ORCHIDACEAE	H	2.53	43
44	*Litsea* sp.	Litsea	LAURACEAE	T	2.53	44
45	*Medinilla pendula*	Medinilla	MELASTOMATACEAE	S	2.53	45
46	*Melastoma malabathricum*	Melastoma	MELASTOMATACEAE	S	2.53	46
47	*Nephrolepis biserrata*	Nephrolepis	NEPHROLEPIDACEAE	H-F	2.53	47
48	*Omalanthus macradenius*	Homalanthus	EUPHORBIACEAE	T	2.53	48
49	*Osmunda banksiifolia*		OSMUNDACEAE	H-F	2.53	49
50	*Pandanus* sp.	Pandanus sp	PANDANACEAE	T	2.53	50
51	*Pavetta* sp.	Oveta	RUBIACEAE	S	2.53	51
52	*Pittosporum moluccanum*	Pittosporum	PITTOSPORACEAE	T	2.53	52
53	*Polygala venenosa*		POLYGALACEAE	S	2.53	53
54	*Pteridium aquilium*	Gletienya	DENNSTAEDTIACEAE	H-F	2.53	54
55	*Saurauia* sp.	Saurauia	ACTINIDIACEAE	T	2.53	55
56	*Scleria scrobiculata* var. *scrobiculata*	Scleria	CYPERACEAE	H-G	2.53	56
57	*Smilax leucocephylla*	Banagan/Banag	SMILACACEAE	V	2.53	57
58	*Talauma* sp.	Patangis	LAURACEAE	T	2.53	58
59	*Tarennoidea wallichii*	Tarenna	RUBIACEAE	T	2.53	59
60	*Turpinia sphaerocarpa*	Turpina	STAPHYLEACEAE	T	2.53	60
61	*Viburnum luzonicum* var. *apoense*	Medulla	ADOXACEAE	T	2.53	61
62	*Xanthostemon* sp.	Camptostemon	MYRTACEAE	T	2.53	62

Appendix 5: List of Dominant Families

No.	Family	# of Species	Rank
1	ASTERACEAE	11	1
2	MORACEAE	9	2
3	POACEAE	9	3
4	EUPHORBIACEAE	7	4
5	FABACEAE: MIMOSOIDEAE	7	5
6	RUBIACEAE	7	6
7	URTICACEAE	7	7
8	THELYPTERIDACEAE	6	8
9	ARACEAE	5	9
10	LAURACEAE	5	10
11	ARECACEAE	4	11
12	ORCHIDACEAE	4	12
13	DIPTEROCARPACEAE	3	13
14	GESNERIACEAE	3	14
15	LAMIACEAE	3	15
16	MYRTACEAE	3	16
17	PHYLLANTHACEAE	3	17
18	ZINGIBERACEAE	3	18
19	ACTINIDIACEAE	2	19
20	ARALIACEAE	2	20
21	CELTIDACEAE	2	21
22	COSTACEAE	2	22
23	CYATHEACEAE	2	23
24	CYPERACEAE	2	24
25	DIPTERIDACEAE	2	25
26	FAGACEAE	2	26
27	MELASTOMATACEAE	2	27
28	MELIACEAE	2	28
29	MUSACEAE	2	29
30	MYRSINACEAE	2	30
31	PANDANACEAE	2	31
32	PIPERACEAE	2	32
33	SCHIZAEACEAE	2	33
34	VITACEAE	2	34
35	ACERACEAE	1	35
36	ADOXACEAE	1	36
37	ANACARDIACEAE	1	37
38	ANNONACEAE	1	38
39	APOCYNACEAE	1	39
40	ASCLEPIADACEAE	1	40
41	ASPLENIACEAE	1	41
42	ATHYRIACEAE	1	42
43	BALSAMINACEAE	1	43
44	BEGONIACEAE	1	44
45	BURSERACEAE	1	45
46	CECROPIACEAE	1	46
47	CHLORANTHACEAE	1	47
48	CLETHRACEAE	1	48
49	CLUSIACEAE	1	49
50	CONVOLVULACEAE	1	50
51	DENNSTAEDTIACEAE	1	51
53	ELAEOCARPACEAE	1	53
54	GLEICHENIACEAE	1	54

Appendix 5: List of Dominant Families

No.	Family	# of Species	Rank
55	HYDRANGEACEAE	1	55
56	HYPOXIDACEAE	1	56
57	LILIACEAE	1	57
58	LINDSAEACEAE	1	58
59	LYTHRACEAE	1	59
60	MALVACEAE	1	60
61	NEPHROLEPIDACEAE	1	61
62	OLEANDRACEAE	1	62
63	OPHIOGLOSSACEAE	1	63
64	OSMUNDACEAE	1	64
65	PITTOSPORACEAE	1	65
66	PODOCARPACEAE	1	66
67	POLYGALACEAE	1	67
68	POLYPODIACEAE	1	68
69	ROSACEAE	1	69
70	RUTACEAE	1	70
71	SAPINDANCEAE	1	71
72	SELAGINELLACEAE	1	72
73	SMILACACEAE	1	73
74	STAPHYLEACEAE	1	74
75	STERCULIACEAE	1	75
76	ULMACEAE	1	76
77	VERBENACEAE	1	77

Appendix 5.1: List of Dominant Families in 24 plots

No.	Family Name	No. of Species	Rank
1	MORACEAE	6	1
2	POACEAE	6	2
3	URTICACEAE	6	3
4	ASTERACEAE	5	4
5	FABACEAE: MIMOSOIDEAE	5	5
6	RUBIACEAE	5	6
7	EUPHORBIACEAE	4	7
8	THELYPTERIDACEAE	3	8
9	ARACEAE	2	9
10	CELTIDACEAE	2	10
11	COSTACEAE	2	11
12	CYPERACEAE	2	12
13	LAMIACEAE	2	13
14	MUSACEAE	2	14
15	SCHIZAEACEAE	2	15
16	ACERACEAE	1	16
17	ACTINIDIACEAE	1	17
18	ADOXACEAE	1	18
19	ANNONACEAE	1	19
20	ARALIACEAE	1	20
21	ARECACEAE	1	21
22	BURSERACEAE	1	22
23	CLUSIACEAE	1	23
24	CONVOLVULACEAE	1	24
25	CYATHEACEAE	1	25
26	DIPTEROCARPACEAE	1	26

Appendix 5.1: List of Dominant Families in 24 plots

No.	Family Name	No. of Species	Rank
27	FAGACEAE	1	27
28	GESNERIACEAE	1	28
29	HYPOXIDACEAE	1	29
30	LAURACEAE	1	30
31	LYTHRACEAE	1	31
32	MALVACEAE	1	32
33	MELASTOMATACEAE	1	33
34	MYRTACEAE	1	34
35	.OLEANDRACEAE	1	35
36	OPHIGLOSSACEAE	1	36
37	PHYLLANTHACEAE	1	37
38	PIPERACEAE	1	38
39	SELAGINELLACEAE	1	39
40	STAPHYLEACEAE	1	40
41	VERBENACEAE	1	41
42	VITACEAE	1	42
43	ZINGIBERACEAE	1	43

Appendix 5. 2: List of Dominant Families in Transect Line (Intercept)

No.	Family	No. of Species	Rank
32	LYTHRACEAE	1	32
33	MALVACEAE	1	33
34	MELASTOMATACEAE	1	34
35	MELIACEAE	1	35
36	MUSACEAE	1	36
37	MYRTACEAE	1	37
38	NEPHROLEPIDACEAE	1	38
39	OPHIOGLOSSACEAE	1	39
40	ORCHIDACEAE	1	40
41	OSMUNDACEAE	1	41
42	PIPERACEAE	1	42
43	SCHIZAEACEAE	1	43
44	SELAGINELLACEAE	1	44
45	STERCULIACEAE	1	45
46	CELTIDACEAE	1	46
47	LEEACEAE	1	47

Appendix 5. 2: List of Dominant Families in Transect Line (Intercept)

No.	Family	No. of Species	Rank
1	ASTERACEAE	9	1
2	POACEAE	8	2
3	MORACEAE	6	3
4	THELYPTERIDACEAE	6	4
5	EUPHORBIACEAE	5	5
6	FABACEAE: MIMOSOIDEAE	5	6
7	URTICACEAE	5	7
8	ARACEAE	4	8
9	RUBIACEAE	4	9
10	DIPTEROCARPACEAE	3	10
11	PHYLLANTHACEAE	3	11
12	ZINGIBERACEAE	3	12
13	CYATHEACEAE	2	13
14	CYPERACEAE	2	14
15	LAMIACEAE	2	15
16	ACTINIDIACEAE	1	16
17	ADOXACEAE	1	17
18	ARECACEAE	1	18
19	ASCLEPIADACEAE	1	19
20	ASPLENIACEAE	1	20
21	ATHYRIACEAE	1	21
22	BALSAMINACEAE	1	22
23	BEGONIACEAE	1	23
24	CECROPIACEAE	1	24
25	COSTACEAE	1	25
26	DENNSTAEDTIACEAE	1	26
27	DIOSCOREACEAE	1	27
28	GESNERIACEAE	1	28
29	HYPOXIDACEAE	1	29
30	LAURACEAE	1	30
31	LINDSAEACEAE	1	31

Appendix 5.3: List of Dominant Families (Tawolon)

No.	Family	No. of Species	Rank
1	ARECACEAE	3	1
2	LAURACEAE	3	2
3	ORCHIDACEAE	3	3
4	RUBIACEAE	3	4
5	DIPTERIDACEAE	2	5
6	GESNERIACEAE	2	6
7	MELASTOMATACEAE	2	7
8	MYRSINACEAE	2	8
9	MYRTACEAE	2	9
10	PANDANACEAE	2	10
11	ACTINIDIACEAE	1	11
12	ANACARDIACEAE	1	12
13	APOCYNACEAE	1	13
14	ARACEAE	1	14
15	ARALIACEAE	1	15
16	BALSAMINACEAE	1	16
17	BURSERACEAE	1	17
18	ADOXACEAE	1	18
19	CHLORANTHACEAE	1	19
20	CLETHRACEAE	1	20
21	CYATHEACEAE	1	21
22	CYPERACEAE	1	22
23	DENNSTAEDTIACEAE	1	23
24	DIOSCOREACEAE	1	24
25	ELAEOCARPACEAE	1	25
26	EUPHORBIACEAE	1	26
27	FAGACEAE	1	27
28	GLEICHENIACEAE	1	28

Appendix 5.3: List of Dominant Families (Tawolon)

No.	Family	No. of Species	Rank
29	HYDRANGEACEAE	1	29
30	LAMIACEAE	1	30
31	LILIACEAE	1	31
32	MELIACEAE	1	32
33	MORACEAE	1	33
34	NEPHROLEPIDACEAE	1	34
35	OLEANDRACEAE	1	35
36	OSMUNDACEAE	1	36
37	PIPERACEAE	1	37
38	PITTOSPORACEAE	1	38
39	POACEAE	1	39
40	PODOCARPACEAE	1	40
41	POLYGALACEAE	1	41
42	POLYPODIACEAE	1	42
43	ROSACEAE	1	43
44	RUTACEAE	1	44
45	SAPINDANCEAE	1	45
46	SMILACACEAE	1	46
47	STAPHYLEACEAE	1	47
48	ULMACEAE	1	48

Appendix 6: Diversity and Evenness Values

No.	Species	No.of Individuals
1	*Imperata cylindrica*	851
2	*Piper aduncum*	748
3	*Desmodium triflorum*	350
4	*Elephantopus tomentosus*	152
5	*Selaginella delicatula*	122
6	*Scleria scrobiculata*	119
7	*Elatostema lagunense*	96
8	*Schismatoglottis calyptrata*	76
9	*Miscanthus floridulus*	60
10	*Amomum* sp.	53
11	*Viburnum luzonicum* var. *apoense*	49
12	*Shorea contorta*	47
13	*Acalypha amentacea*	44
14	*Sphaerostephanos* sp.	43
15	*Maoutia setosa*	41
16	*Bambusa vulgaris*	40
17	*Rhynchotechum discolor*	37
18	*Leucosyke capitellata*	35
19	*Tarennoidea wallichii*	34
20	*Flemingia strobilifera*	32
21	*Curculigo capitulata*	28
22	*Musa sapientum*	26
23	*Nephrolepis biserrata*	23
24	*Pronephrium asperum*	23
25	*Setaria palmifolia* var. *palmifolia*	23
26	*Homalanthus macradenius*	21
27	*Pseudoelephantopus tomentosus*	21
28	*Lasianthus* sp.	20
29	*Mikania cordata*	20
30	*Sphaerostephanos* sp. 2	18
31	*Chromolaena odorata*	16
32	*Cypholophus moluccanus*	16
33	*Elephantopus spicatus*	16
34	*Melastoma malabathricum*	16
35	*Lygodium circinatum*	14
36	*Carex alopecuroides* var. *chlorostachys*	13
37	*Homalomena philippinensis*	12
38	*Neolitsea villosa*	12
39	*Bischofia javanica*	11
40	*Celtis philippinesis*	11
41	*Pipturus arborecens*	11
42	*Ficus nota*	10
43	*Ficus* sp	10
44	*Caryota cumingii*	9
45	*Saurauia erythrotricha*	9
46	*Acer laurinum*	8
47	*Costus speciosus*	8

Appendix 6: Diversity and Evenness Values

No.	Species	No.of Individuals
48	*Ficus minahasae*	8
49	*Ficus septica*	7
50	*Pteridium aquilium*	7
51	*Sphaerostephanos* sp. 1	7
52	*Bambusa blumeana*	6
53	*Cheilocostus speciosus*	6
54	*Impatiens platypetala*	6
55	*Lithocarpus* cf. *solerianus*	6
56	*Macaranga hispida*	6
57	*Maoutia setosa sp1*	6
58	*Omalanthus macradenius*	6
59	*Swietinia macrophylla*	6
60	*Acalypha caturus*	5
61	*Crassocephalum crepidioides*	5
62	*Gmelina arborea*	5
63	*Hyptis capitata*	5
64	*Leucaena leucocephala*	5
65	*Pinanga* sp.	5
66	*Shorea palosapis*	5
67	*Villebrunea rubescens*	5
68	*Canarium* sp.	4
69	*Chingia ferox*	4
70	*Cuphea carthagenensis*	4
71	*Cyathea* sp.	4
72	*Elaeocarpus* sp.	4
73	*Lygodium japonicum*	4
74	*Neonauclea formicaria*	4
75	*Trema orientalis*	4
76	*Derris* cf. *elliptica*	3
77	*Erythrina subumbrans*	3
78	*Etlingera elatior*	3
79	*Ficus odorata*	3
80	*Ophioglossum reticulatum*	3
81	*Osmunda banksiifolia*	3
82	*Pterocarpus indicus*	3
83	*Sarcandra glabra*	3
84	*Spermacoce laevis*	3
85	*Stachytarpheta jamaicensis*	3
86	*Wendlandia luzoniensis* var. *luzoniensis*	3
87	*Acmella grandiflora*	2
88	*Albizia acle*	2
89	*Alstonia* sp.	2
90	*Aralia bipinnata*	2
91	*Ardisia* sp.	2
92	*Callophyllum blancoi*	2
93	*Cinnamomum* sp.	2
94	*Clethra canescens* var. *novoguineensis*	2
95	*Cyathea contaminans*	2
96	*Dicranopteris linearis*	2

Appendix 6: Diversity and Evenness Values

No.	Species	No.of Individuals
97	*Dinochloa* sp.	2
98	*Dioscorea* sp.	2
99	*Drynaria queercifolia*	2
100	*Euphorbia heterophylla*	2
101	*Ficus variegata*	2
102	*Lithocarpus* sp.	2
103	*Melochia umbellata*	2
104	*Musa paradisiaca*	2
105	*Oleandra* sp.	2
106	*Oplismenus compositus*	2
107	*Piper* sp.	2
108	*Polyalthia* sp.	2
109	*Prunus* sp.	2
110	*Psidium gaujava*	2
111	*Rottboellia cochinchinensis*	2
112	*Sapindus* sp.	2
113	*Sterculia rubiginosa* var. *divaricata*	2
114	*Syzygium* sp.	2
115	*Turpinia sphaerocarpa*	2
116	*Acmella paniculata*	1
117	*Aeschynanthus sp.*	1
118	*Agalmyla* sp.	1
119	*Ageratum conyzoides*	1
120	*Alocasia macrorhizos*	1
121	*Appendicula reflexa*	1
122	*Arisaema polyphyllum* var. *polyphyllum*	1
123	*Artocarpus odoratissimus*	1
124	*Asplenium nidus*	1
125	*Begonia* sp.	1
126	*Bidens pilosa*	1
127	*Buchanania* sp.	1
128	*Calamus* sp.	1
129	*Celtis* sp.	1
130	*Cheiropleuria bicupsis*	1
131	*Curcuma domestica*	1
132	*Dacrycarpus imbricatus*	1
133	*Dendrobium milaniae*	1
134	*Dianella ensifolia*	1
135	*Diplazium pallidum*	1
136	*Dipteris conjugata*	1
137	*Discocalyx* sp.	1
138	*Dysoxylum* sp.	1
139	*Euphorbia hirta*	1
140	*Evodia* sp.	1
141	*Ficus* sp. 1	1
142	*Ficus* sp. 2	1
143	*Frecynetia* sp.	1
144	*Glochidion* sp.	1
145	*Gomphostema javanica*	1
146	*Gynura procumbens*	1

Appendix 6: Diversity and Evenness Values

No.	Species	No.of Individuals
147	*Habenaria* sp.	1
148	*Hoya multiflora*	1
149	*Hydrangea integrifolia*	1
150	*Korthalsia* sp.	1
151	*Leea guineensis*	1
152	*Lepidogyne longifolia*	1
153	*Litsea cordata*	1
154	*Litsea* sp.	1
155	*Macrothelypteris torresiana*	1
156	*Medinilla pendula*	1
157	*Merremia peltata*	1
158	*Mussaenda* sp.	1
159	*Odontosoria chinensis*	1
160	*Osmoxylon sp.*	1
161	*Pandanus* sp.	1
162	*Pavetta* sp.	1
163	*Phyllanthus amarus*	1
164	*Pittosporum moluccanum*	1
165	*Poikilospermum acuminatum*	1
166	*Polygala venenosa*	1
167	*Raphidophora* sp.	1
168	*Saurauia* sp.	1
169	*Shorea polysperma*	1
170	*Smilax leucocephylla*	1
171	*Talauma* sp.	1
172	*Tetrastisgma* sp.	1
173	*Xanthostemon* sp.	1
174	*Zea mays*	1

Diversity and Evenness of all Flora	
H`	3.19
E	0.62
No. of Individuals (N)	3753
No. of Species (S)	174

Appendix 6.1: Diversity and Evenness Values, 24 plots

No.	Species	No.of Individuals
1	*Imperata cylindrica*	845
2	*Piper aduncum*	723
3	*Desmodium triflorum*	350
4	*Elephantopus tomentosus*	133
5	*Selaginella delicatula*	115
6	*Scleria scrobiculata*	107
7	*Elatostema lagunense*	88
8	*Schismatoglottis calyptrata*	62
9	*Amomum* sp.	52
10	*Miscanthus floridulus*	52
11	*Shorea contorta*	44

Appendix 6.1: Diversity and Evenness Values, 24 plots

No.	Species	No.of Individuals
12	*Maoutia setosa*	41
13	*Sphaerostephanos* sp.	41
14	*Bambusa vulgaris*	39
15	*Acalypha amentacea*	36
16	*Tarennoidea wallichii*	33
17	*Rhynchotechum discolor*	31
18	*Viburnum luzonicum* var. *apoense*	31
19	*Flemingia strobilifera*	28
20	*Musa sapientum*	25
21	*Leucosyke capitellata*	23
22	*Phronephrium asperum*	22
23	*Curculigo capitulata*	21
24	*Homalanthus macradenius*	21
25	*Pseudoelephantopus tomentosus*	21
26	*Nephrolepis biserrata*	19
27	*Setaria palmifolia* var. *palmifolia*	19
28	*Lasianthus* sp.	18
29	*Mikania cordata*	17
30	*Elephantopus spicatus*	16
31	*Cypholophus moluccanus*	14
32	*Neolitsea villosa*	12
33	*Celtis philippinesis*	11
34	*Chromolaena odorata*	11
35	*Pipturus arborecens*	11
36	*Carex alopecuroides* var. *chlorostachys*	10
37	*Ficus* sp.	9
38	*Lygodium circinatum*	9
39	*Acer laurinum*	8
40	*Bischofia javanica*	8
41	*Caryota cumingii*	8
42	*Costus speciosus*	8
43	*Ficus minahasae*	8
44	*Saurauia erythrotricha*	7
45	*Homalomena philippinensis*	6
46	*Lithocarpus* cf. *solerianus*	6
47	*Acalypha caturus*	5
48	*Bambusa blumeana*	5
49	*Gmelina arborea*	4
50	*Lygodium japonicum*	4
51	*Cuphea carthagenesis*	3
52	*Ficus odorata*	3
53	*Leucaena leucocephala*	3
54	*Stachytarpheta jamaicensis*	3
55	*Albizia acle*	2
56	*Callophyllum blancoi*	2
57	*Canarium* sp.	2
58	*Cheilocostus speciosus*	2
59	*Erythrina subumbrans*	2
60	*Ficus nota*	2
61	*Hyptis capitata*	2
62	*Macaranga hispida*	2
63	*Melastoma malabathricum*	2

Appendix 6.1: Diversity and Evenness Values, 24 plots

No.	Species	No.of Individuals
64	*Musa paradisiaca*	2
65	*Polyalthia* sp.	2
66	*Trema orientalis*	2
67	*Chingia ferox*	1
68	*Cyathea contaminans*	1
69	*Ficus septica*	1
70	*Ficus variegata*	1
71	*Merremia peltata*	1
72	*Mussaenda* sp.	1
73	*Neonauclea formicaria*	1
74	*Ophioglossum reticulatum*	1
75	*Osmoxylon sp.*	1
76	*Psidium guajava*	1
77	*Rottboellia cochinchinensis*	1
78	*Sterculia rubiginosa* var. *divaricata*	1
79	*Tetrastisgma* sp.	1
80	*Turpinia sphaerocarpa*	1
81	*Villebrunea rubescens*	1
82	*Wendlandia luzoniensis* var. *luzoniensis*	1
		3289

Diversity and Evenness 24 Plots, Lamlahak, Lake Sebu	
H`	2.78
E	0.63
No. of Individuals (N)	3289
No. of Species (S)	82

Appendix 6.2: Diversity and Evenness values, Line Intercept

No.	Species	No.of Ind.
1	*Piper aduncum*	25
2	*Elephantopus tomentosus*	19
3	*Sphaerostephanos* sp. 2	18
4	*Viburnum luzonicum* var. *apoense*	17
5	*Schismatoglottis calyptrata*	14
6	*Melastoma malabathricum*	13
7	*Leucosyke capitellata*	12
8	*Scleria scrobiculata* ssp. *scrobiculata*	11
9	*Acalypha amentacea*	8
10	*Elatostema lagunense*	8
11	*Ficus nota*	8
12	*Miscanthus floridulus*	8
13	*Curculigo capitulata*	7
14	*Selaginella delicatula*	7
15	*Sphaerostephanos* sp. 1	7
16	*Ficus septica*	6
17	*Homalomena philippinensis*	6
18	*Imperata cylindrica*	6
19	*Maoutia setosa sp1*	6
20	*Pteridium aquilium*	6

Appendix 6.2: Diversity and Evenness values, Line Intercept

No.	Species	No.of Ind.
21	*Rhynchotechum discolor*	6
22	*Swietinia macrophylla*	6
23	*Chromolaena odorata*	5
24	*Crassocephalum crepidioides*	5
25	*Impatiens platypetala*	5
26	*Lygodium circinatum*	5
27	*Omalanthus macradenius*	5
28	*Shorea palosapis*	5
29	*Cheilocostus speciosus*	4
30	*Flemingia strobilifera*	4
31	*Macaranga hispida*	4
32	*Setaria palmifolia* var. *palmifolia*	4
33	*Villebrunea rubescens*	4
34	*Bischofia javanica*	3
35	*Carex alopecuroides* var. *chlorostachys*	3
36	*Chingia ferox*	3
37	*Derris* cf. *elliptica*	3
38	*Etlingera elatior*	3
39	*Hyptis capitata*	3
40	*Mikania cordata*	3
41	*Neonauclea formicaria*	3
42	*Nephrolepis biserrata*	3
43	*Pterocarpus indicus*	3
44	*Shorea contorta*	3
45	*Spermacoce laevis*	3
46	*Acmella grandiflora*	2
47	*Cypholophus moluccanus*	2
48	*Euphorbia heterophylla*	2
49	*Leucaena leucocephala*	2
50	*Melochia umbellata*	2
51	*Ophioglossum reticulatum*	2
52	*Oplismenus compositus*	2
53	*Osmunda banksiifolia*	2
54	*Saurauia erythrotricha*	2
55	*Sphaerostephanos* sp.	2
56	*Trema orientalis*	2
57	*Wendlandia luzoniensis* var. *luzoniensis*	2
58	*Acmella paniculata*	1
59	*Ageratum conyzoides*	1
60	*Alocasia macrorhizos*	1
61	*Amomum* sp.	1
62	*Artocarpus odoratissimus*	1
63	*Asplenium nidus*	1
64	*Bambusa blumeana*	1
65	*Bambusa vulgaris*	1
66	*Begonia* sp.	1
67	*Bidens pilosa*	1
68	*Caryota cumingii*	1
69	*Cuphea carthagenensis*	1
70	*Curcuma domestica*	1
71	*Cyathea contaminans*	1
72	*Cyathea* sp.	1

Appendix 6.2: Diversity and Evenness values, Line Intercept

No.	Species	No.of Ind.
73	*Dioscorea* sp.	1
74	*Diplazium pallidum*	1
75	*Erythrina subumbrans*	1
76	*Euphorbia hirta*	1
77	*Ficus* sp	1
78	*Ficus* sp. 1	1
79	*Ficus* sp. 2	1
80	*Glochidion* sp.	1
81	*Gmelina arborea*	1
82	*Gynura procumbens*	1
83	*Habenaria* sp.	1
84	*Hoya multiflora*	1
85	*Lasianthus* sp.	1
86	*Leea guineensis*	1
87	*Litsea cordata*	1
88	*Macrothelypteris torresiana*	1
89	*Musa sapientum*	1
90	*Odontosoria chinensis*	1
91	*Phyllanthus amarus*	1
92	*Poikilospermum acuminatum*	1
93	*Pronephrium asperum*	1
94	*Psidium gaujava*	1
95	*Raphidophora* sp.	1
96	*Rottboellia cochinchinensis*	1
97	*Shorea polysperma*	1
98	*Sterculia rubiginosa* var. *divaricata*	1
99	*Zea mays*	1

Diversity and Evenness - Line intercept, Lamlahak, Lake Sebu	
H`	4.13
E	0.9
No. of Individuals (N)	376
No. of Species (S)	99

Appendix 6.3: Diversity and Evenness Values, Tawolon

No.	Species	No.of Ind.
1	*Aeschynanthus sp.*	1
2	*Pinanga* sp.	5
3	*Elaeocarpus* sp.	4
4	*Cyathea* sp.	3
5	*Sarcandra glabra*	3
6	*Alstonia* sp.	2
7	*Aralia bipinnata*	2
8	*Ardisia* sp.	2
9	*Canarium* sp.	2
10	*Cinnamomum* sp.	2
11	*Clethra canescens* var. *novoguineensis*	2
12	*Dicranopteris linearis*	2

Appendix 6.3: Diversity and Evenness Values, Tawolon

No.	Species	No.of Ind.
13	*Dinochloa* sp.	2
14	*Drynaria queercifolia*	2
15	*Lithocarpus* sp.	2
16	*Oleandra* sp.	2
17	*Piper sp.*	2
18	*Prunus* sp.	2
19	*Sapindus* sp.	2
20	*Syzygium* sp.	2
21	*Agalmyla* sp.	1
22	*Appendicula reflexa*	1
23	*Arisaema polyphyllum* var. *polyphyllum*	1
24	*Buchanania* sp.	1
25	*Calamus* sp.	1
26	*Celtis* sp.	1
27	*Cheiropleuria bicupsis*	1
28	*Dacrycarpus imbricatus*	1
29	*Dendrobium milaniae*	1
30	*Dianella ensifolia*	1
31	*Dioscorea* sp.	1
32	*Dipteris conjugata*	1
33	*Discocalyx* sp.	1
34	*Dysoxylum* sp.	1
35	*Evodia* sp.	1
36	*Ficus variegata*	1
37	*Frecynetia* sp.	1
38	*Gomphostema javanica*	1
39	*Hydrangea integrifolia*	1
40	*Impatiens platypetala*	1
41	*Korthalsia* sp.	1
42	*Lasianthus* sp.	1
43	*Lepidogyne longifolia*	1
44	*Litsea* sp.	1
45	*Medinilla pendula*	1
46	*Melastoma malabathricum*	1
47	*Nephrolepis biserrata*	1
48	*Omalanthus macradenius*	1
49	*Osmunda banksiifolia*	1
50	*Pandanus* sp.	1
51	*Pavetta* sp.	1
52	*Pittosporum moluccanum*	1
53	*Polygala venenosa*	1
54	*Pteridium aquilium*	1
55	*Saurauia* sp.	1
56	*Scleria scrobiculata* var. *scrobiculata*	1
57	*Smilax leucocephylla*	1
58	*Talauma* sp.	1
59	*Tarennoidea wallichii*	1
60	*Turpinia sphaerocarpa*	1
61	*Viburnum luzonicum* var. *apoense*	1
62	*Xanthostemon* sp.	1

Diversity Evenness Transect - Lamlahak, Lake Sebu	
H`	4.01
E	0.97
No. of Individuals (N)	88
No. of Species (S)	62

Appendix 7: General list of Fauna Species at Lamlahak Subwatershed, Lake Sebu SC

No.	Scientific Name	Family Name	Common Name	Class
1	*Bufo marinus*	BUFONIDAE	Giant Marine Toad	A
2	*Pelophryne brevipes*	BUFONIDAE	Southeast Asian Toadlet	A
3	*Polypedates leucomystax*	RHACOPHORIDAE	Common Tree Frog	A
4	*Rana magna*	RANIDAE	Giant Philippine Frog	A
5	*Platymantis dorsalis*	RANIDAE	Common Forest Frog	A
6	*Platymantis corrugatus*	RANIDAE	Rough backed Forest Frog	A
7	*Occidozyga laevis*	RANIDAE	Puddle Frog	A
8	*Kaloula picta*	MICROHYLIDAE	Slender-digit Chorus Frog	A
9	Draco fimbriatus	AGAMIDAE	Mindanao Flying Lizard	R
10	*Calotes cristatellus*	AGAMIDAE	Indonesian Calotes	R
11	*Mabuya multifaciata*	SCINCIDAE	Common Mabouya	R
12	*Mabuya multicarinata*	SCINCIDAE	Two Striped Mabouya	R
13	*Lygosoma quadrupes*	SCINCIDAE	Oriental Slender Skink	R
14	*Dasia grisea*	SCINCIDAE	Northern Keel-scaled Tree Skink	R
15	*Dasia sp.*	SCINCIDAE		R
16	*Lamprolepis smaragdina*	SCINCIDAE	Spotted Green Tree Skink	R
17	*Cosymbotus platyurus*	GEKKONIDAE	Flat Bodied House Gecko	R
18	*Gekko gecko*	GEKKONIDAE	Tokay Gecko	R
19	*Gekko monarchus*	GEKKONIDAE	Variable-back Narrow-disked Gecko	R
20	*Hemidactylus frenatus*	GEKKONIDAE	Common House Gecko	R
21	*Varanus salvator*	VARANIDAE	Monitor Lizard	R
22	*Ophiophagus hannah*	ELAPIDAE	King Cobra	R
23	*Naja samarensis*	ELAPIDAE	Samar Cobra/Peter's Cobra	R
24	*Ahaetulla prassina prassina*	COLUBRIDAE	Elongate-headed Tree Snake	R
25	*Elaphe erythrura*	COLUBRIDAE	Common Rat Snake	R
26	*Dendrelaphis pictus*	COLUBRIDAE	Common Bronze-backed Snake	R
27	*Chrysopelea paradisi*	COLUBRIDAE	Paradise Tree Snake	R
28	*Boiga cynodon*	COLUBRIDAE	Large Blunt-headed Tree Snake	R
29	*Phyton reticulatus*	PHYTONIDAE	Reticulated Phyton	R
30	*Accipiter trivirgatus*	ACCIPITRIDAE	Crested Goshawk	B
31	*Aceros leucocephalus*	BUCEROTIDAE	Writhed Hornbill	B
32	*Aceros waldeni*	BUCEROTIDAE	Walden's Hornbill	B
33	*Actenoides hombroni*	ALCEDINIDAE	Blue-capped Wood-Kingfisher	B
34	*Aethopyga boltoni*	NECTARINIIDAE	Apo Sunbird	B
35	*Aethopyga linaraborae*	NECTARINIIDAE	Lina's Sunbird	B
36	*Aethopyga primigenius*	NECTARINIIDAE	Grey-hooded Sunbird	B
37	*Aethopyga pulcherrima*	NECTARINIIDAE	Metallic Winged Sunbird	B
38	*Alcedo argentata*	ALCEDINIDAE	Silvery Kingfisher	B
39	*Amaurornis phoenicurus*	RALLIDAE	White Breasted Waterhen	B
40	*Anthus novaeseelandiae*	MOTACILLIDAE	Richard's Pipit	B
41	*Aplonis minor*	STURNIDAE	Short-tailed Glossy Starling	B
42	*Aplonis panayensis*	STURNIDAE	Asian Glossy Starling	B
43	*Basilornis miranda*	STURNIDAE	Apo Myna	B
44	*Batrachostomus septimus*	PODARGIDAE	Philippine Frogmouth	B
45	*Bradypterus caudatus*	SYLVIIDAE	Long-tailed Ground-Warbler	B
46	*Bubulcus ibis*	ARDEIDAE	Cattle Egret	B
47	*Centropus bengalensis*	CUCULIDAE	Lesser Coucal	B
48	*Centropus melanops*	CUCULIDAE	Black Faced Coucal	B
49	*Centropus viridis*	CUCULIDAE	Philippine Coucal	B
50	*Ceyx lepidus*	ALCEDINIDAE	Variable Dwarf Kingfisher	B
51	*Chalcophaps indica*	COLUMBIDAE	Common Emerald Dove	B
52	*Chloropsis flavipennis*	CHLOROPSEIDAE	Philippine Leafbird	B

Appendix 7: General list of Fauna Species at Lamlahak Subwatershed, Lake Sebu SC

No.	Scientific Name	Family Name	Common Name	Class
53	*Collocalia esculenta*	APODIDAE	Glossy Swiftlet	B
54	*Collocalia mearnsi*	APODIDAE	Philippine Swiftlet	B
55	*Coracina mcgregori*	CAMPEPHAGIDAE	McGregor's Cuckoo-shrike	B
56	*Coracina striata*	CAMPEPHAGIDAE	Bar-Bellied Cuckoo-Shrike	B
57	*Corvus enca*	CORVIDAE	Slender-Billed Crow	B
58	*Coturnix chinensis*	PHASIANIDAE	Blue-breasted Quail	B
59	*Culicicapa helianthea*	STERINIDAE	Citrine-Canary Flycatcher	B
60	*Cyornis rufigastra*	MUSCICAPIDAE	Mangrove Blue Flycatcher	B
61	*Cypsiurus balasiensis*	APODIDAE	Asian Palm Swift	B
62	*Dicaeum ignipectus*	DICAEIDAE	Fire Breasted Flowerpecker	B
63	*Dicaeum trigonostigma*	DICAEIDAE	Orange-Bellied Flowerpecker	B
64	*Dicrurus hottentottus*	DICRURIDAE	Spangled Drongo	B
65	*Ficedula basilanica*	MUSCICAPIDAE	Little Slaty Flycatcher	B
66	*Ficedula parva*	MUSCICAPIDAE	Red-Breasted Flycatcher	B
67	*Gallicolumba criniger*	COLUMBIDAE	Mindanao Bleeding Heart	B
68	*Gallicrex cinerea*	RALLIDAE	Watercock	B
69	*Gallirallus torquatus*	RALLIDAE	Barred Rail	B
70	*Gallus gallus*	PHASIANIDAE	Red Junglefowl	B
71	*Geopelia striata*	COLUMBIDAE	Zebra Dove	B
72	*Gerygone sulphurea*	ACANTHIZIDAE	Golden-Bellied Flyeater	B
73	*Halcyon smyrnensis*	HALCYONIDAE	White-throated Kingfisher	B
74	*Halcyon winchelli*	ALCEDINIDAE	Rufous-lored Kingfisher	B
75	*Haliastur indus*	ACCIPITRIDAE	Bhraminy Kite	B
76	*Hirundapus celebensis*	APODIDAE	Purple Needletail	B
77	*Hirundo rustica*	HIRUNDINIDAE	Barn Swallow	B
78	*Hirundo tahitica*	HIRUNDINIDAE	Pacific Swallow	B
79	*Hypsipetes philippinus*	PYCNONOTIDAE	Philippine Bulbul	B
80	*Hypsipetes rufigularis*	PYCNONOTIDAE	Zamboanga Bulbul	B
81	*Lonchura malacca*	ESTRILDIDAE	Chesnut Munia	B
82	*Lophozosterops goodfellowi*	ZOSTEROPIDAE	Black-masked White-eye	B
83	*Loriculus philippensis*	PSITTACIDAE	Colasisi	B
84	*Macronous striaticeps*	TIMALIIDAE	Brown Tit-Babbler	B
85	*Macropygia phasianella*	COLUMBIDAE	Reddish Cuckoo-Dove	B
86	*Mearnsia picina*	APODIDAE	Philippine Needletail	B
87	*Megalurus palustris*	LOCUSTELLIDAE	Striated Grassbird	B
88	*Megalurus timoriensis*	SYLVIIDAE	Tawny Grassbird	B
89	*Microhierax erythrogenys*	FALCONIDAE	Philippine Falconet	B
90	*Motacilla cinerea*	MOTACILLIDAE	Grey Wagtail	B
91	*Mulleripicus funebris*	PICIDAE	Sooty Woodpecker	B
92	*Muscicapa dauurica*	MUSCICAPIDAE	Asian Brown Flycatcher	B
93	*Muscicapa griseisticta*	MUSCICAPIDAE	Grey-Streaked Flycatcher	B
94	*Muscicapa sibirica*	MUSCICAPIDAE	Dark Sided Flycatcher	B
95	*Nectarinia jugularis*	NECTARINIIDAE	Olive-backed Sunbird	B
96	*Nectarinia sperata*	NECTARINIIDAE	Purple Throated Sunbird	B
97	*Oriolus chinensis*	ORIOLIDAE	Black-Naped Oriole	B
98	*Passer montanus*	PLOCEIDAE	Eurasian Tree Sparrow	B
99	*Pericrocotus flammeus*	CAMPEPHAGIDAE	Scarlet Minivet	B
100	*Phapitreron cinereiceps*	COLUMBIDAE	Dark-Eared Brown Dove	B
101	*Phylloscopus borealis*	SYLVIIDAE	Arctic Warbler	B
102	*Phylloscopus olivaceus*	SYLVIIDAE	Philippine Leaf-Warbler	B
103	*Pitta steerii*	PITTIDAE	Steere's Pitta	B
104	*Prioniturus montanus*	PSITTACIDAE	Montane Racquet Tail	B

Appendix 7: General list of Fauna Species at Lamlahak Subwatershed, Lake Sebu SC

No.	Scientific Name	Family Name	Common Name	Class
105	*Pycnonotus goiavier*	PYCNONOTIDAE	Yellow Vented Bulbul	B
106	*Pycnonotus urostictus*	PYCNONOTIDAE	Yellow-Wattled Bulbul	B
107	*Rhabdornis inornatus*	RHABDORNITHIDAE	Stripe-Breasted Rhabdornis	B
108	*Rhipidura javanica*	RHIPIDURIDAE	Pied Fantail	B
109	*Rhipidura superciliaris*	MUSCICAPIDAE	Blue Fantail	B
110	*Saxicola caprata*	MUSCICAPIDAE	Pied Bushchat	B
111	*Sitta frontalis*	SITTIDAE	Velvet-Fronted Nuthatch	B
112	*Stachyris capitalis*	TIMALIIDAE	Rusty-crowned Babbler	B
113	*Turnix sylvatica*	TURNICIDAE	Small Bottonquail	B
114	*Anas luzonica*	ANATIDAE	Philippine Duck*	B
115	*Ardeola speciosa*	ARDEIDAE	Javan Pond-Heron*	B
116	*Bubo philippensis*	STRIGIDAE	Philippine Eagle- Owl*	B
117	*Cacatua haematuropygia*	PSITTACIDAE	Philippine Cockatoo*	B
118	*Ceyx melanurus*	ALCEDINIDAE	Philippine- Dwarf Kingfisher*	B
119	*Collocalia whiteheadi*	APODIDAE	Whitehead's Mountain Swiftlet*	B
120	*Dicaeum anthonyi*	DICAEIDAE	Flame-crowned Flowerpecker*	B
121	*Dicaeum nigrilore*	DICAEIDAE	Olive-capped Flowerpecker*	B
122	*Dicaeum proprium*	DICAEIDAE	Whiskered Flowerpecker*	B
123	*Ducula carola*	COLUMBIDAE	Spotted Imperial- Pigeon*	B
124	*Erythrura coloria*	ESTRILDIDAE	Red-eared Parrotfinch*	B
125	*Eurylaimus steerii*	EURYLAIMIDAE	Wattled Broadbill*	B
126	*Ficedula crypta*	MUSCICAPIDAE	Cryptic Flycatcher*	B
127	*Ficedula disposita*	MUSCICAPIDAE	Furtive Flycatcher*	B
128	*Gorsachius goisagi*	ARDEIDAE	Japanese Night-Heron*	B
129	*Hypocryptadius cinnamomeus*	ZOSTEROPIDAE	Cinnamon Ibon*	B
130	*Hypothymis coelestis*	MUSCICAPIDAE	Celestial Monarch*	B
131	*Hypothymis helenae*	MUSCICAPIDAE	Short-crested Monarch*	B
132	*Irediparra gallinacea*	JACANIDAE	Comb-crested Jacana*	B
133	*Lanius validirostris*	LANIIDAE	Mountain Shrike*	B
134	*Leonardina woodi*	TIMALIIDAE	Bagobo Babbler*	B
135	*Micromacronus leytensis*	TIMALIIDAE	Miniature Tit-Babbler*	B
136	*Mimizuku gurneyi*	STRIGIDAE	Lesser Eagle- Owl/Giant Scops-Owl*	B
137	*Oriolus albiloris*	ORIOLIDAE	White-lored Oriole*	B
138	*Orthotomus cinereiceps*	SYLVIIDAE	White-eared Tailorbird*	B
139	*Orthotomus heterolaemus*	SYLVIIDAE	Rufous-headed Tailorbird*	B
140	*Orthotomus nigriceps*	SYLVIIDAE	White-browed / Black-headed Tailorbird*	B
141	*Otus mirus*	STRIGIDAE	Mindanao Scops-Owl*	B
142	*Parus semilarvatus*	PARIDAE	White-fronted Tit*	B
143	*Pelecanus philippensis*	PELECANIDAE	Spot-billed Pelican*	B
144	*Penelopides affinis*	BUCEROTIDAE	Mindanao Hornbill*	B
145	*Penelopides manillae*	BUCEROTIDAE	Luzon Hornbill*	B
146	*Phapitreron brunneiceps*	COLUMBIDAE	Mindanao Brown-dove*	B
147	*Pithecophaga jefferyi*	ACCIPITRIDAE	Philippine Eagle*	B
148	*Porzana fusca*	RALLIDAE	Ruddy Breasted Crake*	B
149	*Prioniturus waterstradti*	PSITTACIDAE	Mindanao Racquet-tail*	B
150	*Ptilocichla mindanensis*	TIMALIIDAE	Streaked- Ground Babbler*	B
151	*Pyrrhula leucogenis*	FRINGILLIDAE	White-cheeked Bullfinch*	B
152	*Rhinomyias goodfellowi*	MUSCICAPIDAE	Goodfellow's Jungle-Flycatcher*	B
153	*Scolopax rusticola*	SCOLOPACIDAE	Eurasian Woodcock*	B
154	*Scolopax sp.*	SCOLOPACIDAE	Bukidnon Woodcock*	B
155	*Serinus estherae*	FRINGILLIDAE	Mountain Serin*	B
156	*Spilornis cheela*	ACCIPITRIDAE	Crested Serpent Eagle*	B

Appendix 7: General list of Fauna Species at Lamlahak Subwatershed, Lake Sebu SC

No.	Scientific Name	Family Name	Common Name	Class
157	*Spizaetus philippensis*	ACCIPITRIDAE	Philippine Hawk-Eagle*	B
158	*Stachyris plateni*	TIMALIIDAE	Pygmy Babbler*	B
159	*Tachybaptus ruficollis*	PODICIPEDIDAE	Little Grebe*	B
160	*Trichoglossus johnstoniae*	PSITTACIDAE	Mindanao Lorikeet*	B
161	*Macaca fascicularis*	CERCOPITHECIDAE	Long-tailed macaque	M
162	*Apomys insignis*	MURIDAE	Mindanao montane forest mouse	M
163	*Apomys littoralis*	MURIDAE	Mindanao lowland forest mouse	M
164	*Crocidura beatus*	SORICIDAE	Common Mindanao shrew	M
165	*Cynocephalus volans*	CYNOCEPHALIDAE	Kagwang, Philippine flying lemur	M
166	*Mus musculus*	MURIDAE	House Mouse	M
167	*Paradoxurus hermaphroditus*	VIVERRIDAE	Common palm civet	M
168	*Rattus argentiventer*	MURIDAE	Rice-field rat	M
169	*Rattus everetti*	MURIDAE	Common Philippine forest rat	M
170	*Rattus exulans*	MURIDAE	Polynesian Rat	M
171	*Rattus tanezumi*	MURIDAE	Asian Black Rat	M
172	*Sundasciurus philippinensis*	SCIURIDAE	Philippine tree squirrel	M
173	*Sus philippensis mindanensis*	SUIDAE	Philippine Warty Pig	M
174	*Urogale everetti*	TUPAIIDAE	Mindanao tree shrew	M
175	*Viverra tangalunga*	VIVERRIDAE	Malay civet, *tangalung*	M
176	*Acerodon jubatus*	PTEROPODIDAE	Golden-crowned flying fox*	M
177	*Batomys salomonseni*	MURIDAE	Mindanao hairy-tailed rat*	M
178	*Bullimus bagobus*	MURIDAE	Large Mindanao forest rat*	M
179	*Cervus mariannus*	CERVIDAE	Philippine brown deer*	M
180	*Crunomys melanius*	MURIDAE	Southern Philippine shrew-mouse*	M
181	*Eonycteris robusta*	PTEROPODIDAE	Philippine nectar bat/Philippine dawn bat*	M
182	*Exilisciurus concinnus*	SCIURIDAE	Philippine pygmy squirrel*	M
183	*Haplonycteris fischeri*	PTEROPODIDAE	Philippine pygmy fruit bat*	M
184	*Hipposideros diadema*	RHINOLOPHIDAE	Diadem roundleaf bat*	M
185	*Megaderma spasma*	MEGADERMATIDAE	Common Asian ghost bat, lesser false vampire*	M
186	*Miniopterus australis*	VESPERTILIONIDAE	Little bent-winged bat*	M
187	*Miniopterus schreibersi*	VESPERTILIONIDAE	Common bent-winged bat*	M
188	*Ptenochirus minor*	PTEROPODIDAE	Lesser musky fruit bat*	M
189	*Pteropus vampyrus*	PTEROPODIDAE	Large flying fox*	M
190	*Rhinolophus virgo*	RHINOLOPHIDAE	Yellow-faced horseshoe bat*	M
191	*Rousettus amplexicaudatus*	PTEROPODIDAE	Common Rousette*	M
192	*Scotophilus kuhlii*	VESPERTILIONIDAE	Lesser Asian house bat*	M
193	*Tarsius syrichta*	TARSIIDAE	Philippine tarsier*	M
194	*Cynopterus brachyotis*	PTEROPODIDAE	Short-nosed Fruit Bat**	M
195	*Macroglossus minimus*	PTEROPODIDAE	Dagger-toothed Flower Bat**	M
196	*Ptenochirus jagori*	PTEROPODIDAE	Greater Musky Fruit Bat**	M

Note: ** Present in PRBA* *** Collected from netting and trapping*

Class	No. of Families	No. of Genera	No. of Species
Amphibians	4	7	8
Reptiles	7	18	21
Birds	49	94	131
Mammals	14	30	36
TOTAL	**74**	**149**	**196**

Appendix 8.1: General list of Fauna Vertebrates Observed (SCM) ,Lamlahak Subwatershed, Lake Sebu, SC- TRANSECT 1-7

No.	Family	Scientific Name	Common Name	Class	No. of Ind.
1	BUFONIDAE	*Bufo marinus*	Giant Marine Toad	A	22
2	BUFONIDAE	*Pelophryne brevipes*	Southeast Asian Toadlet	A	11
3	RHACOPHORIDAE	*Polypedates leucomystax*	Common Tree Frog	A	10
4	RANIDAE	*Rana magna*	Giant Philippine Frog	A	5
5	RANIDAE	*Platymantis dorsalis*	Common Forest Frog	A	7
6	RANIDAE	*Platymantis corrugatus*	Rough backed Forest Frog	A	4
7	RANIDAE	*Occidozyga laevis*	Puddle Frog	A	4
8	MICROHYLIDAE	*Kaloula picta*	Slender-digit Chorus Frog	A	8
9	AGAMIDAE	Draco fimbriatus	Mindanao Flying Lizard	R	3
10	AGAMIDAE	*Calotes cristatellus*	Indonesian Calotes	R	5
11	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	R	9
12	SCINCIDAE	*Mabuya multicarinata*	Two Striped Mabouya	R	4
13	SCINCIDAE	*Lygosoma quadrupes*	Oriental Slender Skink	R	9
14	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	R	11
15	SCINCIDAE	*Dasia sp.*		R	1
16	SCINCIDAE	*Lamprolepis smaragdina*	Spotted Green Tree Skink	R	6
17	GEKKONIDAE	*Cosymbotus platyurus*	Flat Bodied House Gecko	R	5
18	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	R	18
19	GEKKONIDAE	*Gekko monarchus*	Variable-back Narrow-disked Gecko	R	6
20	GEKKONIDAE	*Hemidactylus frenatus*	Common House Gecko	R	13
21	VARANIDAE	*Varanus salvator*	Monitor Lizard	R	6
22	ELAPIDAE	*Ophiophagus hannah*	King Cobra	R	3
23	ELAPIDAE	*Naja samarensis*	Samar Cobra/Peter's Cobra	R	1
24	COLUBRIDAE	*Ahaetulla prassina prassina*	Elongate-headed Tree Snake	R	4
25	COLUBRIDAE	*Elaphe erythrura*	Common Rat Snake	R	2
26	COLUBRIDAE	*Dendrelaphis pictus*	Common Bronze-backed Snake	R	4
27	COLUBRIDAE	*Chrysopelea paradisi*	Paradise Tree Snake	R	2
28	COLUBRIDAE	*Boiga cynodon*	Large Blunt-headed Tree Snake	R	2
29	PHYTONIDAE	*Phyton reticulatus*	Reticulated Phyton	R	1
30	ACCIPITRIDAE	*Accipiter trivirgatus*	Crested Goshawk	B	5
31	BUCEROTIDAE	*Aceros leucocephalus*	Writhed Hornbill	B	2
32	BUCEROTIDAE	*Aceros waldeni*	Walden's Hornbill	B	1
33	ALCEDINIDAE	*Actenoides hombroni*	Blue-capped Wood-Kingfisher	B	4
34	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	B	16
35	NECTARINIIDAE	*Aethopyga linaraborae*	Lina's Sunbird	B	5
36	NECTARINIIDAE	*Aethopyga primigenius*	Grey-hooded Sunbird	B	16
37	NECTARINIIDAE	*Aethopyga pulcherrima*	Metallic Winged Sunbird	B	16
38	ALCEDINIDAE	*Alcedo argentata*	Silvery Kingfisher	B	6
39	RALLIDAE	*Amaurornis phoenicurus*	White Breasted Waterhen	B	5
40	MOTACILLIDAE	*Anthus novaeseelandiae*	Richard's Pipit	B	3
41	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	17
42	STURNIDAE	*Aplonis panayensis*	Asian Glossy Starling	B	7
43	STURNIDAE	*Basilornis miranda*	Apo Myna	B	4
44	PODARGIDAE	*Batrachostomus septimus*	Philippine Frogmouth	B	1
45	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	20
46	ARDEIDAE	*Bubulcus ibis*	Cattle Egret	B	11
47	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	18
48	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	20
49	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	13
50	ALCEDINIDAE	*Ceyx lepidus*	Variable Dwarf Kingfisher	B	6
51	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	25
52	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	29
53	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	25
54	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	15
55	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	10

Appendix 8.1: General list of Fauna Vertebrates Observed (SCM) ,Lamlahak Subwatershed, Lake Sebu, SC- TRANSECT 1-7

No.	Family	Scientific Name	Common Name	Class	No. of Ind.
56	CAMPEPHAGIDAE	*Coracina striata*	Bar-Bellied Cuckoo-Shrike	B	13
57	CORVIDAE	*Corvus enca*	Slender-Billed Crow	B	9
58	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	24
59	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	20
60	MUSCICAPIDAE	*Cyornis rufigastra*	Mangrove Blue Flycatcher	B	4
61	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	B	13
62	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	16
63	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	18
64	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	B	16
65	MUSCICAPIDAE	*Ficedula basilanica*	Little Slaty Flycatcher	B	7
66	MUSCICAPIDAE	*Ficedula parva*	Red-Breasted Flycatcher	B	3
67	COLUMBIDAE	*Gallicolumba criniger*	Mindanao Bleeding Heart	B	5
68	RALLIDAE	*Gallicrex cinerea*	Watercock	B	3
69	RALLIDAE	*Gallirallus torquatus*	Barred Rail	B	4
70	PHASIANIDAE	*Gallus gallus*	Red Junglefowl	B	12
71	COLUMBIDAE	*Geopelia striata*	Zebra Dove	B	13
72	ACANTHIZIDAE	*Gerygone sulphurea*	Golden-Bellied Flyeater	B	9
73	HALCYONIDAE	*Halcyon smyrnensis*	White-throated Kingfisher	B	13
74	ALCEDINIDAE	*Halcyon winchelli*	Rufous-lored Kingfisher	B	2
75	ACCIPITRIDAE	*Haliastur indus*	Bhraminy Kite	B	2
76	APODIDAE	*Hirundapus celebensis*	Purple Needletail	B	14
77	HIRUNDINIDAE	*Hirundo rustica*	Barn Swallow	B	17
78	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	32
79	PYCNONOTIDAE	*Hypsipetes philippinus*	Philippine Bulbul	B	5
80	PYCNONOTIDAE	*Hypsipetes rufigularis*	Zamboanga Bulbul	B	5
81	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	46
82	ZOSTEROPIDAE	*Lophozosterops goodfellowi*	Black-masked White-eye	B	11
83	PSITTACIDAE	*Loriculus philippensis*	Colasisi	B	3
84	TIMALIIDAE	*Macronous striaticeps*	Brown Tit-Babbler	B	7
85	COLUMBIDAE	*Macropygia phasianella*	Reddish Cuckoo-Dove	B	5
86	APODIDAE	*Mearnsia picina*	Philippine Needletail	B	6
87	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	B	14
88	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	B	16
89	FALCONIDAE	*Microhierax erythrogenys*	Philippine Falconet	B	4
90	MOTACILLIDAE	*Motacilla cinerea*	Grey Wagtail	B	10
91	PICIDAE	*Mulleripicus funebris*	Sooty Woodpecker	B	6
92	MUSCICAPIDAE	*Muscicapa dauurica*	Asian Brown Flycatcher	B	9
93	MUSCICAPIDAE	*Muscicapa griseisticta*	Grey-Streaked Flycatcher	B	9
94	MUSCICAPIDAE	*Muscicapa sibirica*	Dark Sided Flycatcher	B	11
95	NECTARINIIDAE	*Nectarinia jugularis*	Olive-backed Sunbird	B	16
96	NECTARINIIDAE	*Nectarinia sperata*	Purple Throated Sunbird	B	15
97	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	B	10
98	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	50
99	CAMPEPHAGIDAE	*Pericrocotus flammeus*	Scarlet Minivet	B	4
100	COLUMBIDAE	*Phapitreron cinereiceps*	Dark-Eared Brown Dove	B	12
101	SYLVIIDAE	*Phylloscopus borealis*	Arctic Warbler	B	11
102	SYLVIIDAE	*Phylloscopus olivaceus*	Philippine Leaf-Warbler	B	6
103	PITTIDAE	*Pitta steerii*	Steere's Pitta	B	6
104	PSITTACIDAE	*Prioniturus montanus*	Montane Racquet Tail	B	9
105	PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow Vented Bulbul	B	18
106	PYCNONOTIDAE	*Pycnonotus urostictus*	Yellow-Wattled Bulbul	B	12
107	RHABDORNITHIDAE	*Rhabdornis inornatus*	Stripe-Breasted Rhabdornis	B	10
108	RHIPIDURIDAE	*Rhipidura javanica*	Pied Fantail	B	7
109	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	B	13

Appendix 8.1: General list of Fauna Vertebrates Observed (SCM) ,Lamlahak Subwatershed, Lake Sebu, SC- TRANSECT 1-7

No.	Family	Scientific Name	Common Name	Class	No. of Ind.
110	MUSCICAPIDAE	*Saxicola caprata*	Pied Bushchat	B	11
111	SITTIDAE	*Sitta frontalis*	Velvet-Fronted Nuthatch	B	6
112	TIMALIIDAE	*Stachyris capitalis*	Rusty-crowned Babbler	B	4
113	TURNICIDAE	*Turnix sylvatica*	Small Bottonquail	B	7
114	CERCOPITHECIDAE	*Macaca fascicularis*	Long-tailed macaque	M	7
115	CYNOCEPHALIDAE	*Cynocephalus volans*	Philippine flying lemur, Kagwang	M	7
116	MURIDAE	*Rattus exulans*	Polynesian Rat	M	37
117	MURIDAE	*Mus musculus*	House Mouse	M	9
118	MURIDAE	*Rattus tanezumi*	Asian Black Rat	M	11
119	MURIDAE	*Apomys insignis*	Mindanao montane forest mouse	M	6
120	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse	M	10
121	MURIDAE	*Rattus argentiventer*	Rice-field rat	M	19
122	MURIDAE	*Rattus everetti*	Common Philippine forest rat	M	7
123	SCIURIDAE	*Sundasciurus philippinensis*	Philippine tree squirrel	M	4
124	SORICIDAE	*Crocidura beatus*	Common Mindanao shrew	M	3
125	SUIDAE	*Sus philippensismindanensis*	Philippine Warty Pig	M	8
126	TUPAIIDAE	*Urogale everetti*	Mindanao tree shrew	M	1
127	VIVERRIDAE	*Paradoxurus hermaphroditus*	Common palm civet	M	3
128	VIVERRIDAE	*Viverra tangalunga*	Malay civet, *tangalung*	M	2

Class	No. of Families	No. of Genera	No. of Species
Amphibians	4	7	8
Reptiles	7	18	21
Birds	39	63	84
Mammals	8	11	15
TOTAL	**58**	**99**	**128**

Appendix 8.2: General list of Fauna Vertebrates during PRBA

No.	Family Name	Scientific Name	Common Name	Class
1	*Anas luzonica*	Philippine Duck*	ANATIDAE	B
2	*Ardeola speciosa*	Javan Pond-Heron*	ARDEIDAE	B
3	*Bubo philippensis*	Philippine Eagle- Owl*	STRIGIDAE	B
4	*Cacatua haematuropygia*	Philippine Cockatoo*	PSITTACIDAE	B
5	*Ceyx melanurus*	Philippine- Dwarf Kingfisher*	ALCEDINIDAE	B
6	*Collocalia whiteheadi*	Whitehead's Mountain Swiftlet*	APODIDAE	B
7	*Dicaeum anthonyi*	Flame-crowned Flowerpecker*	DICAEIDAE	B
8	*Dicaeum nigrilore*	Olive-capped Flowerpecker*	DICAEIDAE	B
9	*Dicaeum proprium*	Whiskered Flowerpecker*	DICAEIDAE	B
10	*Ducula carola*	Spotted Imperial- Pigeon*	COLUMBIDAE	B
11	*Erythrura coloria*	Red-eared Parrotfinch*	ESTRILDIDAE	B
12	*Eurylaimus steerii*	Wattled Broadbill*	EURYLAIMIDAE	B
13	*Ficedula crypta*	Cryptic Flycatcher*	MUSCICAPIDAE	B
14	*Ficedula disposita*	Furtive Flycatcher*	MUSCICAPIDAE	B
15	*Gorsachius goisagi*	Japanese Night-Heron*	ARDEIDAE	B
16	*Hypocryptadius cinnamomeus*	Cinnamon Ibon*	ZOSTEROPIDAE	B
17	*Hypothymis coelestis*	Celestial Monarch*	MUSCICAPIDAE	B
18	*Hypothymis helenae*	Short-crested Monarch*	MUSCICAPIDAE	B
19	*Irediparra gallinacea*	Comb-crested Jacana*	JACANIDAE	B
20	*Lanius validirostris*	Mountain Shrike*	LANIIDAE	B
21	*Leonardina woodi*	Bagobo Babbler*	TIMALIIDAE	B
22	*Micromacronus leytensis*	Miniature Tit-Babbler*	TIMALIIDAE	B

Appendix 8.2: General list of Fauna Vertebrates during PRBA

No.	Family Name	Scientific Name	Common Name	Class
23	*Mimizuku gurneyi*	Lesser Eagle- Owl*/Giant Scops-Owl*	STRIGIDAE	B
24	*Oriolus albiloris*	White-lored Oriole*	ORIOLIDAE	B
25	*Orthotomus cinereiceps*	White-eared Tailorbird*	SYLVIIDAE	B
26	*Orthotomus heterolaemus*	Rufous-headed Tailorbird*	SYLVIIDAE	B
27	*Orthotomus nigriceps*	White-browed / Black-headed Tailorbird*	SYLVIIDAE	B
28	*Otus mirus*	Mindanao Scops-Owl*	STRIGIDAE	B
29	*Parus semilarvatus*	White-fronted Tit*	PARIDAE	B
30	*Pelecanus philippensis*	Spot-billed Pelican	PELECANIDAE	B
31	*Penelopides affinis*	Mindanao Hornbill*	BUCEROTIDAE	B
32	*Penelopides manillae*	Luzon Hornbill*	BUCEROTIDAE	B
33	*Phapitreron brunneiceps*	Mindanao Brown-dove*	COLUMBIDAE	B
34	*Pithecophaga jefferyi*	Philippine Eagle*	ACCIPITRIDAE	B
35	*Porzana fusca*	Ruddy Breasted Crake*	RALLIDAE	B
36	*Prioniturus waterstradti*	Mindanao Racquet-tail*	PSITTACIDAE	B
37	*Ptilocichla mindanensis*	Streaked- Ground Babbler*	TIMALIIDAE	B
38	*Pyrrhula leucogenis*	White-cheeked Bullfinch*	FRINGILLIDAE	B
39	*Rhinomyias goodfellowi*	Slaty backed/Goodfellow's Jungle-Flycatcher*	MUSCICAPIDAE	B
40	*Scolopax rusticola*	Eurasian Woodcock*	SCOLOPACIDAE	B
41	*Scolopax sp.*	Bukidnon Woodcock*	SCOLOPACIDAE	B
42	*Serinus estherae*	Mountain Serin*	FRINGILLIDAE	B
43	*Spilornis cheela*	Crested Serpent Eagle*	ACCIPITRIDAE	B
44	*Spizaetus philippensis*	Philippine Hawk-Eagle*	ACCIPITRIDAE	B
45	*Stachyris plateni*	Pygmy Babbler*	TIMALIIDAE	B
46	*Tachybaptus ruficollis*	Little Grebe*	PODICIPEDIDAE	B
47	*Trichoglossus johnstoniae*	Mindanao Lorikeet*	PSITTACIDAE	B
48	*Apomys littoralis*	Mindanao lowland forest mouse*	MURIDAE	M
49	*Acerodon jubatus*	Golden-crowned flying fox*	PTEROPODIDAE	M
50	*Apomys insignis*	Mindanao montane forest mouse*	MURIDAE	M
51	*Batomys salomonseni*	Mindanao hairy-tailed rat*	MURIDAE	M
52	*Bullimus bagobus*	Large Mindanao forest rat*	MURIDAE	M
53	*Cervus mariannus*	Philippine brown deer*	CERVIDAE	M
54	*Crocidura beatus*	Common Mindanao shrew*	SORICIDAE	M
55	*Crunomys melanius*	Southern Philippine shrew-mouse*	MURIDAE	M
56	*Cynocephalus volans*	Kagwang, Philippine flying lemur*	CYNOCEPHALIDAE	M
57	*Eonycteris robusta*	Philippine nectar bat, Philippine dawn bat*	PTEROPODIDAE	M
58	*Exilisciurus concinnus*	Philippine pygmy squirrel*	SCIURIDAE	M
59	*Haplonycteris fischeri*	Philippine pygmy fruit bat*	PTEROPODIDAE	M
60	*Hipposideros diadema*	Diadem roundleaf bat*	RHINOLOPHIDAE	M
61	*Macaca fascicularis*	Long-tailed macaque*	CERCOPITHECIDAE	M
62	*Megaderma spasma*	Common Asian ghost bat, lesser false vampire*	MEGADERMATIDAE	M
63	*Miniopterus australis*	Little bent-winged bat*	VESPERTILIONIDAE	M
64	*Miniopterus schreibersi*	Common bent-winged bat*	VESPERTILIONIDAE	M
65	*Paradoxurus hermaphroditus*	Common palm civet*	VIVERRIDAE	M
66	*Ptenochirus minor*	Lesser musky fruit bat*	PTEROPODIDAE	M
67	*Pteropus vampyrus*	Large flying fox*	PTEROPODIDAE	M
68	*Rhinolophus virgo*	Yellow-faced horseshoe bat*	RHINOLOPHIDAE	M
69	*Rousettus amplexicaudatus*	Common Rousette*	PTEROPODIDAE	M
70	*Scotophilus kuhlii*	Lesser Asian house bat*	VESPERTILIONIDAE	M
71	*Sundasciurus philippinensis*	Philippine tree squirrel*	SCIURIDAE	M
72	*Tarsius syrichta*	Philippine tarsier*	TARSIIDAE	M
73	*Urogale everetti*	Mindanao tree shrew*	TUPAIIDAE	M
74	*Viverra tangalunga*	Malay civet, *tangalung**	VIVERRIDAE	M

PRBA	No. of Family	No. of Genera	No. of Species
Birds	24	39	47
Mammals	13	25	27
Total	**38**	**64**	**74**

Appendix 9: List of Fauna Species (SCM), their Endemicity, Trophic Guilds and Conservation Status

CLASS AMPHIBIA								
No.	**Family**	**Scientific Name**	**Common Name**	**Endemicity**	**Trophic Guilds**	**IUCN Status**	**CITES**	**DAO 2004-15**
1	BUFONIDAE	*Bufo marinus*	Giant Marine Toad	Introduced	Insectivore	Least concern		
2	BUFONIDAE	*Pelophryne brevipes*	Southeast Asian Toadlet	Non-Endemic	Insectivore			
3	RHACOPHORIDAE	*Polypedates leucomystax*	Common Tree Frog	Non-Endemic	Insectivore	Least concern		
4	RANIDAE	*Rana magna*	Giant Philippine Frog	Endemic	Insectivore	Least concern		
5	RANIDAE	*Platymantis dorsalis*	Common Forest Frog	Endemic	Insectivore			
6	RANIDAE	*Platymantis corrugatus*	Rough backed Forest Frog	Endemic	Insectivore			
7	RANIDAE	*Occidozyga laevis*	Puddle Frog	Non-Endemic	Insectivore	Least concern		
8	MICROHYLIDAE	*Kaloula picta*	Slender-digit Chorus Frog	Endemic	Insectivore			
CLASS REPTILIA								
No.	**Family**	**Scientific Name**	**Common Name**	**Endemicity**	**Trophic Guilds**	**IUCN Status**	**CITES**	**DAO 2004-15**
1	AGAMIDAE	Draco fimbriatus	Mindanao Flying Lizard	Endemic	Insectivore			
2	AGAMIDAE	*Calotes cristatellus*	Indonesian Calotes	Non-Endemic	Insectivore			
3	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	Non-Endemic	Insectivore			
4	SCINCIDAE	*Mabuya multicarinata*	Two Striped Mabouya	Non-Endemic	Insectivore			
5	SCINCIDAE	*Lygosoma quadrupes*	Oriental Slender Skink	Non-Endemic	Insectivore			
6	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	Non-Endemic	Insectivore			
7	SCINCIDAE	*Dasia sp.*		Endemic	Insectivore			
8	SCINCIDAE	*Lamprolepis smaragdina*	Spotted Green Tree Skink	Non-Endemic	Insectivore			
9	GEKKONIDAE	*Cosymbotus platyurus*	Flat Bodied House Gecko	Non-Endemic	Insectivore			
10	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	Non-Endemic	Insectivore			
11	GEKKONIDAE	*Gekko monarchus*	Variable-back Narrow-disked Gecko	Non-Endemic	Insectivore			
12	GEKKONIDAE	*Hemidactylus frenatus*	Common House Gecko	Non-Endemic	Insectivore			

13	VARANIDAE	*Varanus salvator*	Monitor Lizard	Endemic	Insectivore/Carnivore			
14	ELAPIDAE	*Ophiophagus hannah*	King Cobra	Non-Endemic	Carnivore	Vulnerable	Appendix 2	
15	ELAPIDAE	*Naja samarensis*	Samar Cobra/Peter's Cobra	Endemic	Carnivore			
16	COLUBRIDAE	*Ahaetulla prassina prassina*	Elongate-headed Tree Snake	Non-Endemic	insectivore-Carnivore			
17	COLUBRIDAE	*Elaphe erythrura*	Common Rat Snake	Non-Endemic	insectivore-Carnivore		Appendix 3	
18	COLUBRIDAE	*Dendrelaphis pictus*	Common Bronze-backed Snake	Non-Endemic	insectivore-Carnivore			
19	COLUBRIDAE	*Chrysopelea paradisi*	Paradise Tree Snake	Non-Endemic	insectivore-Carnivore	Least Concern		
20	COLUBRIDAE	*Boiga cynodon*	Large Blunt-headed Tree Snake	Non-Endemic	insectivore-Carnivore			
21	PHYTONIDAE	*Phyton reticulatus*	Reticulated Phyton	Non-Endemic	Carnivore			Threatened
CLASS AVES								
No.	**Family**	**Scientific Name**	**Common Name**	**Endemicity**	**Trophic Guilds**	**IUCN Status**	**CITES**	**DAO 2004-15**
1	ACCIPITRIDAE	*Accipiter trivirgatus*	Crested Goshawk	Resident	Raptorial		Appendix 2	
2	BUCEROTIDAE	*Aceros leucocephalus*	Writhed Hornbill	Endemic	Frugivore		Appendix 2	
3	BUCEROTIDAE	*Aceros waldeni*	Walden's Hornbill	Endemic	Frugivore		Appendix 2	Critically endangered
4	ALCEDINIDAE	*Actenoides hombroni*	Blue-capped Wood-Kingfisher	Endemic	Piscivore			Vulnerable
5	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	Endemic	Nectivore			
6	NECTARINIIDAE	*Aethopyga linaraborae*	Lina's Sunbird	Endemic	Nectivore			
7	NECTARINIIDAE	*Aethopyga primigenius*	Grey-hooded Sunbird	Endemic	Nectivore			
8	NECTARINIIDAE	*Aethopyga pulcherrima*	Metallic Winged Sunbird	Endemic	Nectivore			
9	ALCEDINIDAE	*Alcedo argentata*	Silvery Kingfisher	Endemic	Piscivore			Vulnerable
10	RALLIDAE	*Amaurornis phoenicurus*	White Breasted Waterhen	Resident	Insectivore-Graminivore	Least Concern		
11	MOTACILLIDAE	*Anthus novaeseelandiae*	Richard's Pipit	Resident	Insectivore-Graminivore			
12	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	Resident	Insectivore-Frugivore			
13	STURNIDAE	*Aplonis panayensis*	Asian Glossy Starling	Resident	Insectivore-Frugivore			
14	STURNIDAE	*Basilornis miranda*	Apo Myna	Endemic	Insectivore-			

					Frugivore			
15	PODARGIDAE	*Batrachostomus septimus*	Philippine Frogmouth	Endemic	Insectivore-Vermivore			
16	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	Endemic	Insectivore			
17	ARDEIDAE	*Bubulcus ibis*	Cattle Egret	R/M	Insectivore		Appendix 3	
18	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	Resident	Insectivore-Graminivore			
19	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	Endemic	Insectivore-Graminivore			
20	CUCULIDAE	*Centropus viridis*	Philippine Coucal	Endemic	Insectivore-Graminivore			
21	ALCEDINIDAE	*Ceyx lepidus*	Variable Dwarf Kingfisher	Resident	Piscivore			
22	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	Resident	Insectivore - Graminivore			
23	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	Endemic	Insectivore			Vulnerable
24	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	Resident	Insectivore			
25	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	Endemic	Insectivore			
26	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	Endemic	Insectivore-Vermivore			Vulnerable
27	CAMPEPHAGIDAE	*Coracina striata*	Bar-Bellied Cuckoo-Shrike	Resident	Insectivore-Vermivore			
28	CORVIDAE	*Corvus enca*	Slender-Billed Crow	Resident	Carnivore			
29	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	Resident	Insectivore-Graminivore			
30	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	Resident	Piscivore			
31	MUSCICAPIDAE	*Cyornis rufigastra*	Mangrove Blue Flycatcher	Resident	Insectivore			
32	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	Resident	Insectivore			
33	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	Resident	Insectivore			
34	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	Resident	Insectivore			
35	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	Resident	Insectivore			
36	MUSCICAPIDAE	*Ficedula basilanica*	Little Slaty Flycatcher	Endemic	Insectivore			Vulnerable
37	MUSCICAPIDAE	*Ficedula parva*	Red-Breasted Flycatcher	Migrant	Insectivore			
38	COLUMBIDAE	*Gallicolumba criniger*	Mindanao Bleeding Heart	Endemic	Insectivore - Graminivore			Endangered
39	RALLIDAE	*Gallicrex cinerea*	Watercock	Resident	Insectivore-Graminivore			
40	RALLIDAE	*Gallirallus torquatus*	Barred Rail	Resident	Insectivore-Graminivore			

41	PHASIANIDAE	*Gallus gallus*	Red Junglefowl	Resident	Insectivore-Graminivore			
42	COLUMBIDAE	*Geopelia striata*	Zebra Dove	Resident	Insectivore - Graminivore			
43	ACANTHIZIDAE	*Gerygone sulphurea*	Golden-Bellied Flyeater	Resident	Insectivore			
44	HALCYONIDAE	*Halcyon smyrnensis*	White-throated Kingfisher	Resident	Piscivore			
45	ALCEDINIDAE	*Halcyon winchelli*	Rufous-lored Kingfisher*	Endemic	Piscivore			
46	ACCIPITRIDAE	*Haliastur indus*	Bhraminy Kite	Resident	Raptorial		Appendix 2	
47	APODIDAE	*Hirundapus celebensis*	Purple Needletail	Resident	Insectivore			
48	HIRUNDINIDAE	*Hirundo rustica*	Barn Swallow	Migrant	Piscivore			
49	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	Resident	Piscivore			
50	PYCNONOTIDAE	*Hypsipetes philippinus*	Philippine Bulbul	Endemic	Frugivore			
51	PYCNONOTIDAE	*Hypsipetes rufigularis*	Zamboanga Bulbul	Endemic	Frugivore			
52	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	Resident	Graminivore			
53	ZOSTEROPIDAE	*Lophozosterops goodfellowi*	Black-masked White-eye*	Endemic	Insectivore-Frugivore			
54	PSITTACIDAE	*Loriculus philippensis*	Colasisi	Endemic	Graminivore		Appendix 2	
55	TIMALIIDAE	*Macronous striaticeps*	Brown Tit-Babbler	Endemic	Insectivore			
56	COLUMBIDAE	*Macropygia phasianella*	Reddish Cuckoo-Dove	Resident	Insectivore - Graminivore			
57	APODIDAE	*Mearnsia picina*	Philippine Needletail	Endemic	Insectivore			
58	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	Resident	Insectivore-Graminivore			
59	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	Resident	Insectivore			
60	FALCONIDAE	*Microhierax erythrogenys*	Philippine Falconet	Endemic	Insectivore-Piscivore			
61	MOTACILLIDAE	*Motacilla cinerea*	Grey Wagtail	Migrant	Insectivore-Graminivore			
62	PICIDAE	*Mulleripicus funebris*	Sooty Woodpecker	Endemic	Insectivore			
63	MUSCICAPIDAE	*Muscicapa dauurica*	Asian Brown Flycatcher	Migrant	Insectivore			
64	MUSCICAPIDAE	*Muscicapa griseisticta*	Grey-Streaked Flycatcher	Migrant	Insectivore			
65	MUSCICAPIDAE	*Muscicapa sibirica*	Dark Sided Flycatcher	Migrant	Insectivore			
66	NECTARINIIDAE	*Nectarinia jugularis*	Olive-backed Sunbird	Resident	Nectivore			
67	NECTARINIIDAE	*Nectarinia sperata*	Purple Throated Sunbird	Resident	Nectivore			

68	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	Resident	Frugitive			
69	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	Resident	Graminivore			
70	CAMPEPHAGIDAE	*Pericrocotus flammeus*	Scarlet Minivet	Resident	Insectivore-Vermivore			
71	COLUMBIDAE	*Phapitreron cinereiceps*	Dark-Eared Brown Dove	Endemic	Insectivore - Graminivore			Critically endangered
72	SYLVIIDAE	*Phylloscopus borealis*	Arctic Warbler	Migrant	Insectivore			
73	SYLVIIDAE	*Phylloscopus olivaceus*	Philippine Leaf-Warbler	Endemic	Insectivore			
74	PITTIDAE	*Pitta steerii*	Steere's Pitta	Endemic	Insectivore			Vulnerable
75	PSITTACIDAE	*Prioniturus montanus*	Montane Racquet Tail	Endemic	Graminivore		Appendix 2	
76	PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow Vented Bulbul	Resident	Frugivore			
77	PYCNONOTIDAE	*Pycnonotus urostictus*	Yellow-Wattled Bulbul	Endemic	Frugivore			
78	RHABDORNITHIDAE	*Rhabdornis inornatus*	Stripe-Breasted Rhabdornis	Endemic	Insectivore-Frugivore			
79	RHIPIDURIDAE	*Rhipidura javanica*	Pied Fantail	Resident	Insectivore			
80	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	Endemic	Insectivore			
81	MUSCICAPIDAE	*Saxicola caprata*	Pied Bushchat	Resident	Insectivore			
82	SITTIDAE	*Sitta frontalis*	Velvet-Fronted Nuthatch	Resident	Insectivore			
83	TIMALIIDAE	*Stachyris capitalis*	Rusty-crowned Babbler	Endemic	Insectivore			
84	TURNICIDAE	*Turnix sylvatica*	Small Bottonquail	Resident	Insectivore-Graminivore			
CLASS MAMMALIA								
No.	**Family**	**Scientific Name**	**Common Name**	**Endemicity**	**Trophic Guilds**	**IUCN Status**	**CITES**	**DAO 2004-15**
1	CERCOPITHECIDAE	*Macaca fascicularis*	Long-tailed macaque	Non Endemic				
2	CYNOCEPHALIDAE	*Cynocephalus volans*	Philippine flying lemur, Kagwang	Endemic	Frugivore			
3	MURIDAE	*Rattus exulans*	Polynesian Rat	Non Endemic	Omnivore	Least Concern		
4	MURIDAE	*Mus musculus*	House Mouse	Non Endemic	Omnivore	Least Concern		
5	MURIDAE	*Rattus tanezumi*	Asian Black Rat	Non Endemic	Graminivore-Frugivore	Least Concern		
6	MURIDAE	*Apomys insignis*	Mindanao montane forest mouse	Endemic	Graminivore-Frugivore			
7	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse	Endemic	Graminivore-Frugivore			

8	MURIDAE	*Rattus argentiventer*	Rice-field rat	Non Endemic	Graminivore-Frugivore			
9	MURIDAE	*Rattus everetti*	Common Philippine forest rat	Endemic	Graminivore-Frugivore			
10	SCIURIDAE	*Sundasciurus philippinensis*	Philippine tree squirrel	Endemic	Frugivore			
11	SORICIDAE	*Crocidura beatus*	Common Mindanao shrew	Endemic				
12	SUIDAE	*Sus philippensis*	Philippine Warty Pig	Endemic	Omnivore			Vulnerable
13	TUPAIIDAE	*Urogale everetti*	Mindanao tree shrew	Endemic				
14	VIVERRIDAE	*Paradoxurus hermaphroditus*	Common palm civet	Non Endemic				
15	VIVERRIDAE	*Viverra tangalunga*	Malay civet, *tangalung*	Non Endemic				

Taxa	Total number
Family	37
Genera	56
Species	74
Total Number of Individuals	**153**

Class	No. of Families	No. of Genera	No. of Species
Amphibians	2	5	6
Reptiles	3	7	8
Birds	29	39	53
Mammals	3	5	7
TOTAL	**37**	**56**	**74**

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SCM

TRANSECT 2					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
1	RHACOPHORIDAE	*Polypedates leucomystax*	Common Tree Frog	A	5
2	BUFONIDAE	*Bufo marinus*	Giant Marine Toad	A	3
3	MICROHYLIDAE	*Kaloula picta*	Slender-digit Chorus Frog	A	2
4	SCINCIDAE	*Lygosoma quadrupes*	Oriental Slender Skink	R	3
5	AGAMIDAE	*Calotes cristatellus*	Indonesian Calotes	R	2
6	SCINCIDAE	*Mabuya multicarinata*	Two Striped Mabouya	R	2
7	SCINCIDAE	*Lamprolepis smaragdina*	Spotted Green Tree Skink	R	2
8	GEKKONIDAE	*Hemidactylus frenatus*	Common House Gecko	R	2
9	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	R	1
10	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	R	1
11	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	R	1
12	ELAPIDAE	*Naja samarensis*	Samar Cobra/Peter's Cobra	R	1
13	COLUBRIDAE	*Elaphe erythrura*	Common Rat Snake	R	1
14	COLUBRIDAE	*Boiga cynodon*	Large Blunt-headed Tree Snake	R	1
15	PHYTONIDAE	*Phyton reticulatus*	Reticulated Phyton	R	1
16	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	12
17	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	8
18	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	8
19	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	8
20	NECTARINIIDAE	*Nectarinia sperata*	Purple Throated Sunbird	B	8
21	COLUMBIDAE	*Phapitreron cinereiceps*	Dark-Eared Brown Dove	B	8
22	NECTARINIIDAE	*Aethopyga pulcherrima*	Metallic Winged Sunbird	B	5
23	PHASIANIDAE	*Gallus gallus*	Red Junglefowl	B	5
24	ACANTHIZIDAE	*Gerygone sulphurea*	Golden-Bellied Flyeater	B	5
25	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	B	5
26	MUSCICAPIDAE	*Muscicapa dauurica*	Asian Brown Flycatcher	B	5
27	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	4
28	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	B	4
29	MOTACILLIDAE	*Motacilla cinerea*	Grey Wagtail	B	4
30	MUSCICAPIDAE	*Muscicapa sibirica*	Dark Sided Flycatcher	B	4
31	SYLVIIDAE	*Phylloscopus borealis*	Arctic Warbler	B	4
32	MUSCICAPIDAE	*Saxicola caprata*	Pied Bushchat	B	4
33	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	3
34	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	3
35	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	3
36	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	3
37	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	3
38	NECTARINIIDAE	*Nectarinia jugularis*	Olive-backed Sunbird	B	3
39	PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow Vented Bulbul	B	3
40	PYCNONOTIDAE	*Pycnonotus urostictus*	Yellow-Wattled Bulbul	B	3
41	RHABDORNITHIDAE	*Rhabdornis inornatus*	Stripe-Breasted Rhabdornis	B	3
42	SITTIDAE	*Sitta frontalis*	Velvet-Fronted Nuthatch	B	3
43	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	B	2

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SCM

TRANSECT 2					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
44	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	2
45	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	2
46	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	2
47	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	2
48	MUSCICAPIDAE	*Ficedula parva*	Red-Breasted Flycatcher	B	2
49	COLUMBIDAE	*Gallicolumba criniger*	Mindanao Bleeding Heart	B	2
50	COLUMBIDAE	*Geopelia striata*	Zebra Dove	B	2
51	HALCYONIDAE	*Halcyon smyrnensis*	White-throated Kingfisher	B	2
52	HIRUNDINIDAE	*Hirundo rustica*	Barn Swallow	B	2
53	COLUMBIDAE	*Macropygia phasianella*	Reddish Cuckoo-Dove	B	2
54	APODIDAE	*Mearnsia picina*	Philippine Needletail	B	2
55	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	B	2
56	ALCEDINIDAE	*Actenoides hombroni*	Blue-capped Wood-Kingfisher	B	1
57	NECTARINIIDAE	*Aethopyga linaraborae*	Lina's Sunbird	B	1
58	NECTARINIIDAE	*Aethopyga primigenius*	Grey-hooded Sunbird	B	1
59	RALLIDAE	*Amaurornis phoenicurus*	White Breasted Waterhen	B	1
60	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	1
61	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	1
62	CAMPEPHAGIDAE	*Coracina striata*	Bar-Bellied Cuckoo-Shrike	B	1
63	CORVIDAE	*Corvus enca*	Slender-Billed Crow	B	1
64	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	B	1
65	APODIDAE	*Hirundapus celebensis*	Purple Needletail	B	1
66	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	1
67	PYCNONOTIDAE	*Hypsipetes rufigularis*	Zamboanga Bulbul	B	1
68	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	B	1
69	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	B	1
70	SYLVIIDAE	*Phylloscopus olivaceus*	Philippine Leaf-Warbler	B	1
71	RHIPIDURIDAE	*Rhipidura javanica*	Pied Fantail	B	1
72	TIMALIIDAE	*Stachyris capitalis*	Rusty-crowned Babbler	B	1
73	ACCIPITRIDAE	*Accipiter trivirgatus*	Crested Goshawk	B	1
74	MURIDAE	*Rattus exulans*	Polynesian Rat	M	8
75	MURIDAE	*Rattus tanezumi*	Asian Black Rat	M	3
76	SORICIDAE	*Crocidura beatus*	Common Mindanao shrew	M	2
77	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse	M	1
78	MURIDAE	*Rattus everetti*	Common Philippine forest rat	M	1
79	VIVERRIDAE	*Paradoxurus hermaphroditus*	Common palm civet	M	1
80	VIVERRIDAE	*Viverra tangalunga*	Malay civet, *tangalung*	M	1

Taxa	**Total number**
Family	42
Genera	62
Species	80
Total Number of Individuals	**220**

Class	No. of Families	No. of Genera	No. of Species
Amphibians	3	3	3
Reptiles	6	11	12
Birds	30	43	58
Mammals	3	5	7
TOTAL	**42**	**62**	**80**

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SCM

TRANSECT 3					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
1	BUFONIDAE	*Bufo marinus*	Giant Marine Toad	A	5
2	MICROHYLIDAE	*Kaloula picta*	Slender-digit Chorus Frog	A	4
3	BUFONIDAE	*Pelophryne brevipes*	Southeast Asian Toadlet	A	3
4	RANIDAE	*Rana magna*	Giant Philippine Frog	A	1
5	RANIDAE	*Platymantis dorsalis*	Common Forest Frog	A	1
6	RANIDAE	*Occidozyga laevis*	Puddle Frog	A	1
7	AGAMIDAE	Draco fimbriatus	Mindanao Flying Lizard	R	2
8	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	R	3
9	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	R	2
10	ELAPIDAE	*Ophiophagus hannah*	King Cobra	R	2
11	COLUBRIDAE	*Ahaetulla prassina prassina*	Elongate-headed Tree Snake	R	2
12	COLUBRIDAE	*Dendrelaphis pictus*	Common Bronze-backed Snake	R	2
13	SCINCIDAE	*Lygosoma quadrupes*	Oriental Slender Skink	R	1
14	SCINCIDAE	*Lamprolepis smaragdina*	Spotted Green Tree Skink	R	1
15	VARANIDAE	*Varanus salvator*	Monitor Lizard	R	1
16	STURNIDAE	*Aplonis panayensis*	Asian Glossy Starling	B	7
17	PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow Vented Bulbul	B	7
18	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	6
19	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	B	6
20	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	5
21	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	B	5
22	HALCYONIDAE	*Halcyon smyrnensis*	White-throated Kingfisher	B	5
23	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	5
24	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	5
25	NECTARINIIDAE	*Nectarinia jugularis*	Olive-backed Sunbird	B	5
26	ALCEDINIDAE	*Alcedo argentata*	Silvery Kingfisher	B	4
27	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	4
28	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	4
29	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	4
30	ZOSTEROPIDAE	*Lophozosterops goodfellowi*	Black-masked White-eye	B	4
31	TIMALIIDAE	*Macronous striaticeps*	Brown Tit-Babbler	B	4
32	NECTARINIIDAE	*Nectarinia sperata*	Purple Throated Sunbird	B	4
33	NECTARINIIDAE	*Aethopyga primigenius*	Grey-hooded Sunbird	B	3
34	MOTACILLIDAE	*Anthus novaeseelandiae*	Richard's Pipit	B	3
35	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	3
36	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	3
37	PHASIANIDAE	*Gallus gallus*	Red Junglefowl	B	3
38	HIRUNDINIDAE	*Hirundo rustica*	Barn Swallow	B	3
39	TURNICIDAE	*Turnix sylvatica*	Small Bottonquail	B	3
40	NECTARINIIDAE	*Aethopyga linaraborae*	Lina's Sunbird	B	2
41	NECTARINIIDAE	*Aethopyga pulcherrima*	Metallic Winged Sunbird	B	2
42	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	2
43	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	2

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SCM

TRANSECT 3					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
44	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	2
45	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	2
46	ALCEDINIDAE	*Ceyx lepidus*	Variable Dwarf Kingfisher	B	2
47	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	2
48	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	B	2
49	RALLIDAE	*Gallirallus torquatus*	Barred Rail	B	2
50	ACANTHIZIDAE	*Gerygone sulphurea*	Golden-Bellied Flyeater	B	2
51	ACCIPITRIDAE	*Haliastur indus*	Bhraminy Kite	B	2
52	APODIDAE	*Hirundapus celebensis*	Purple Needletail	B	2
53	PYCNONOTIDAE	*Hypsipetes philippinus*	Philippine Bulbul	B	2
54	COLUMBIDAE	*Macropygia phasianella*	Reddish Cuckoo-Dove	B	2
55	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	B	2
56	MOTACILLIDAE	*Motacilla cinerea*	Grey Wagtail	B	2
57	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	B	2
58	PYCNONOTIDAE	*Pycnonotus urostictus*	Yellow-Wattled Bulbul	B	2
59	RHIPIDURIDAE	*Rhipidura javanica*	Pied Fantail	B	2
60	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	B	1
61	STURNIDAE	*Basilornis miranda*	Apo Myna	B	1
62	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	1
63	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	1
64	CAMPEPHAGIDAE	*Coracina striata*	Bar-Bellied Cuckoo-Shrike	B	1
65	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	1
66	MUSCICAPIDAE	*Ficedula basilanica*	Little Slaty Flycatcher	B	1
67	RALLIDAE	*Gallicrex cinerea*	Watercock	B	1
68	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	B	1
69	MUSCICAPIDAE	*Muscicapa griseisticta*	Grey-Streaked Flycatcher	B	1
70	COLUMBIDAE	*Phapitreron cinereiceps*	Dark-Eared Brown Dove	B	1
71	SYLVIIDAE	*Phylloscopus borealis*	Arctic Warbler	B	1
72	SYLVIIDAE	*Phylloscopus olivaceus*	Philippine Leaf-Warbler	B	1
73	PITTIDAE	*Pitta steerii*	Steere's Pitta	B	1
74	PSITTACIDAE	*Prioniturus montanus*	Montane Racquet Tail	B	1
75	MUSCICAPIDAE	*Saxicola caprata*	Pied Bushchat	B	1
76	MURIDAE	*Rattus exulans*	Polynesian Rat	M	10
77	MURIDAE	*Rattus argentiventer*	Rice-field rat	M	10
78	MURIDAE	*Rattus everetti*	Common Philippine forest rat	M	1
79	TUPAIIDAE	*Urogale everetti*	Mindanao tree shrew	M	1
80	VIVERRIDAE	*Paradoxurus hermaphroditus*	Common palm civet	M	1
81	VIVERRIDAE	*Viverra tangalunga*	Malay civet, *tangalung*	M	1

Taxa	**Total number**
Family	43
Genera	64
Species	81
Total Number of Individuals	**216**

Class	**No. of Families**	**No. of Genera**	**No. of Species**
Amphibians	3	6	6
Reptiles	6	9	9
Birds	31	45	60
Mammals	3	4	6
TOTAL	**43**	**64**	**81**

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 4					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
1	BUFONIDAE	*Pelophryne brevipes*	Southeast Asian Toadlet	A	4
2	BUFONIDAE	*Bufo marinus*	Giant Marine Toad	A	2
3	RANIDAE	*Rana magna*	Giant Philippine Frog	A	2
4	RHACOPHORIDAE	*Polypedates leucomystax*	Common Tree Frog	A	1
5	RANIDAE	*Platymantis corrugatus*	Rough backed Forest Frog	A	1
6	VARANIDAE	*Varanus salvator*	Monitor Lizard	R	3
7	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	R	2
8	SCINCIDAE	*Lygosoma quadrupes*	Oriental Slender Skink	R	2
9	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	R	1
10	GEKKONIDAE	*Gekko monarchus*	Variable-back Narrow-disked Gecko	R	1
11	COLUBRIDAE	*Elaphe erythrura*	Common Rat Snake	R	1
12	COLUBRIDAE	*Chrysopelea paradisi*	Paradise Tree Snake	R	1
13	COLUBRIDAE	*Boiga cynodon*	Large Blunt-headed Tree Snake	R	1
14	ACCIPITRIDAE	*Accipiter trivirgatus*	Crested Goshawk	B	1
15	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	8
16	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	8
17	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	B	6
18	NECTARINIIDAE	*Aethopyga primigenius*	Grey-hooded Sunbird	B	6
19	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	6
20	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	6
21	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	6
22	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	5
23	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	5
24	CORVIDAE	*Corvus enca*	Slender-Billed Crow	B	5
25	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	4
26	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	4
27	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	4
28	PHASIANIDAE	*Gallus gallus*	Red Junglefowl	B	4
29	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	B	4
30	CAMPEPHAGIDAE	*Pericrocotus flammeus*	Scarlet Minivet	B	4
31	PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow Vented Bulbul	B	4
32	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	B	3
33	ALCEDINIDAE	*Actenoides hombroni*	Blue-capped Wood-Kingfisher	B	2
34	RALLIDAE	*Amaurornis phoenicurus*	White Breasted Waterhen	B	2
35	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	2
36	MUSCICAPIDAE	*Cyornis rufigastra*	Mangrove Blue Flycatcher	B	2
37	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	2
38	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	2
39	RALLIDAE	*Gallicrex cinerea*	Watercock	B	2
40	COLUMBIDAE	*Geopelia striata*	Zebra Dove	B	2
41	PYCNONOTIDAE	*Hypsipetes rufigularis*	Zamboanga Bulbul	B	2
42	MUSCICAPIDAE	*Muscicapa sibirica*	Dark Sided Flycatcher	B	2
43	NECTARINIIDAE	*Nectarinia sperata*	Purple Throated Sunbird	B	2
44	SYLVIIDAE	*Phylloscopus olivaceus*	Philippine Leaf-Warbler	B	2
45	TIMALIIDAE	*Stachyris capitalis*	Rusty-crowned Babbler	B	2
46	BUCEROTIDAE	*Aceros leucocephalus*	Writhed Hornbill	B	1
47	STURNIDAE	*Basilornis miranda*	Apo Myna	B	1
48	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	1
49	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	1
50	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	1
51	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	1
52	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	B	1
53	COLUMBIDAE	*Gallicolumba criniger*	Mindanao Bleeding Heart	B	1

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 4					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
54	APODIDAE	*Hirundapus celebensis*	Purple Needletail	B	1
55	PYCNONOTIDAE	*Hypsipetes philippinus*	Philippine Bulbul	B	1
56	ZOSTEROPIDAE	*Lophozosterops goodfellowi*	Black-masked White-eye	B	1
57	TIMALIIDAE	*Macronous striaticeps*	Brown Tit-Babbler	B	1
58	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	B	1
59	MOTACILLIDAE	*Motacilla cinerea*	Grey Wagtail	B	1
60	PICIDAE	*Mulleripicus funebris*	Sooty Woodpecker	B	1
61	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	B	1
62	SYLVIIDAE	*Phylloscopus borealis*	Arctic Warbler	B	1
63	RHABDORNITHIDAE	*Rhabdornis inornatus*	Stripe-Breasted Rhabdornis	B	1
64	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	B	1
65	MUSCICAPIDAE	*Saxicola caprata*	Pied Bushchat	B	1
66	SITTIDAE	*Sitta frontalis*	Velvet-Fronted Nuthatch	B	1
67	MURIDAE	*Rattus tanezumi*	Asian Black Rat	M	6
68	MURIDAE	*Rattus exulans*	Polynesian Rat	M	4
69	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse	M	3
70	CERCOPITHECIDAE	*Macaca fascicularis*	Long-tailed macaque	M	3
71	MURIDAE	*Apomys insignis*	Mindanao montane forest mouse	M	2
72	MURIDAE	*Rattus argentiventer*	Rice-field rat	M	2
73	SUIDAE	*Sus philippensismindanensis*	Philippine Warty Pig	M	2
74	MURIDAE	*Rattus everetti*	Common Philippine forest rat	M	1
75	VIVERRIDAE	*Paradoxurus hermaphroditus*	Common palm civet	M	1

Taxa	**Total number**
Family	41
Genera	63
Species	75
Total Number of Individuals	**186**

Class	**No. of Families**	**No. of Genera**	**No. of Species**
Amphibians	3	5	5
Reptiles	4	8	8
Birds	30	45	53
Mammals	4	5	9
TOTAL	**41**	**63**	**75**

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 5					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
1	RHACOPHORIDAE	*Polypedates leucomystax*	Common Tree Frog	A	3
2	RANIDAE	*Platymantis dorsalis*	Common Forest Frog	A	3
3	RANIDAE	*Occidozyga laevis*	Puddle Frog	A	2
4	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	R	4
5	AGAMIDAE	*Calotes cristatellus*	Indonesian Calotes	R	3
6	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	R	2
7	SCINCIDAE	*Lamprolepis smaragdina*	Spotted Green Tree Skink	R	2
8	GEKKONIDAE	*Gekko monarchus*	Variable-back Narrow-disked Gecko	R	2
9	SCINCIDAE	*Dasia sp.*		R	1
10	ELAPIDAE	*Ophiophagus hannah*	King Cobra	R	1
11	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	8
12	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	5

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 5					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
13	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	5
14	COLUMBIDAE	*Geopelia striata*	Zebra Dove	B	5
15	APODIDAE	*Hirundapus celebensis*	Purple Needletail	B	5
16	ZOSTEROPIDAE	*Lophozosterops goodfellowi*	Black-masked White-eye	B	5
17	PICIDAE	*Mulleripicus funebris*	Sooty Woodpecker	B	5
18	PSITTACIDAE	*Prioniturus montanus*	Montane Racquet Tail	B	5
19	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	4
20	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	4
21	HIRUNDINIDAE	*Hirundo rustica*	Barn Swallow	B	4
22	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	B	4
23	TURNICIDAE	*Turnix sylvatica*	Small Bottonquail	B	4
24	ARDEIDAE	*Bubulcus ibis*	Cattle Egret	B	3
25	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	3
26	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	3
27	CAMPEPHAGIDAE	*Coracina striata*	Bar-Bellied Cuckoo-Shrike	B	3
28	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	3
29	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	3
30	HALCYONIDAE	*Halcyon smyrnensis*	White-throated Kingfisher	B	3
31	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	3
32	PSITTACIDAE	*Loriculus philippensis*	Colasisi	B	3
33	NECTARINIIDAE	*Aethopyga linaraborae*	Lina's Sunbird	B	2
34	STURNIDAE	*Basilornis miranda*	Apo Myna	B	2
35	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	2
36	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	2
37	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	2
38	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	2
39	CORVIDAE	*Corvus enca*	Slender-Billed Crow	B	2
40	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	2
41	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	2
42	ALCEDINIDAE	*Halcyon winchelli*	Rufous-lored Kingfisher	B	2
43	FALCONIDAE	*Microhierax erythrogenys*	Philippine Falconet	B	2
44	MUSCICAPIDAE	*Muscicapa sibirica*	Dark Sided Flycatcher	B	2
45	PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow Vented Bulbul	B	2
46	RHIPIDURIDAE	*Rhipidura javanica*	Pied Fantail	B	2
47	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	B	2
48	BUCEROTIDAE	*Aceros leucocephalus*	Writhed Hornbill	B	1
49	BUCEROTIDAE	*Aceros waldeni*	Walden's Hornbill	B	1
50	PODARGIDAE	*Batrachostomus septimus*	Philippine Frogmouth	B	1
51	ALCEDINIDAE	*Ceyx lepidus*	Variable Dwarf Kingfisher	B	1
52	MUSCICAPIDAE	*Ficedula parva*	Red-Breasted Flycatcher	B	1
53	APODIDAE	*Mearnsia picina*	Philippine Needletail	B	1
54	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	B	1
55	MUSCICAPIDAE	*Muscicapa griseisticta*	Grey-Streaked Flycatcher	B	1
56	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	1
57	CERCOPITHECIDAE	*Macaca fascicularis*	Long-tailed macaque	M	4
58	MURIDAE	*Apomys insignis*	Mindanao montane forest mouse	M	4
59	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse	M	4
60	SUIDAE	*Sus philippensismindanensis*	Philippine Warty Pig	M	4
61	MURIDAE	*Rattus exulans*	Polynesian Rat	M	2
62	MURIDAE	*Rattus argentiventer*	Rice-field rat	M	2
63	MURIDAE	*Rattus everetti*	Common Philippine forest rat	M	2
64	CYNOCEPHALIDAE	*Cynocephalus volans*	Philippine flying lemur, Kagwang	M	1

Taxa	Total number
Family	39
Genera	50
Species	64
Total Number of Individuals	**175**

Class	No. of Families	No. of Genera	No. of Species
Amphibians	2	3	3
Reptiles	4	6	7
Birds	29	36	46
Mammals	4	5	8
TOTAL	**39**	**50**	**64**

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 6					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
1	BUFONIDAE	*Pelophryne brevipes*	Southeast Asian Toadlet	A	2
2	MICROHYLIDAE	*Kaloula picta*	Slender-digit Chorus Frog	A	2
3	RANIDAE	*Rana magna*	Giant Philippine Frog	A	1
4	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	R	4
5	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	R	3
6	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	R	1
7	SCINCIDAE	*Mabuya multicarinata*	Two Striped Mabouya	R	1
8	COLUBRIDAE	*Dendrelaphis pictus*	Common Bronze-backed Snake	R	1
9	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	7
10	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	6
11	NECTARINIIDAE	*Nectarinia jugularis*	Olive-backed Sunbird	B	6
12	NECTARINIIDAE	*Aethopyga pulcherrima*	Metallic Winged Sunbird	B	5
13	MUSCICAPIDAE	*Ficedula basilanica*	Little Slaty Flycatcher	B	5
14	PITTIDAE	*Pitta steerii*	Steere's Pitta	B	5
15	PYCNONOTIDAE	*Pycnonotus urostictus*	Yellow-Wattled Bulbul	B	5
16	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	4
17	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	B	4
18	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	B	4
19	ACCIPITRIDAE	*Accipiter trivirgatus*	Crested Goshawk	B	3
20	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	B	3
21	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	3
22	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	3
23	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	3
24	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	3
25	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	3
26	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	3
27	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	3
28	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	3
29	APODIDAE	*Mearnsia picina*	Philippine Needletail	B	3

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 6					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
30	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	2
31	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	2
32	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	2
33	PYCNONOTIDAE	*Hypsipetes rufigularis*	Zamboanga Bulbul	B	2
34	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	B	2
35	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	2
36	SITTIDAE	*Sitta frontalis*	Velvet-Fronted Nuthatch	B	2
37	ALCEDINIDAE	*Actenoides hombroni*	Blue-capped Wood-Kingfisher	B	1
38	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	1
39	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	1
40	COLUMBIDAE	*Gallicolumba criniger*	Mindanao Bleeding Heart	B	1
41	RALLIDAE	*Gallirallus torquatus*	Barred Rail	B	1
42	PYCNONOTIDAE	*Hypsipetes philippinus*	Philippine Bulbul	B	1
43	TIMALIIDAE	*Macronous striaticeps*	Brown Tit-Babbler	B	1
44	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	B	1
45	PSITTACIDAE	*Prioniturus montanus*	Montane Racquet Tail	B	1
46	TIMALIIDAE	*Stachyris capitalis*	Rusty-crowned Babbler	B	1
47	CYNOCEPHALIDAE	*Cynocephalus volans*	Philippine flying lemur, Kagwang	M	5
48	MURIDAE	*Rattus exulans*	Polynesian Rat	M	5
49	SCIURIDAE	*Sundasciurus philippinensis*	Philippine tree squirrel	M	3
50	MURIDAE	*Rattus tanezumi*	Asian Black Rat	M	2
51	SUIDAE	*Sus philippensismindanensis*	Philippine Warty Pig	M	2
52	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse	M	1
53	MURIDAE	*Rattus everetti*	Common Philippine forest rat	M	1

Taxa	**Total number**
Family	36
Genera	44
Species	53
Total Number of Individuals	**142**

Class	**No. of Families**	**No. of Genera**	**No. of Species**
Amphibians	3	3	3
Reptiles	3	4	5
Birds	26	32	38
Mammals	4	5	7
TOTAL	**36**	**44**	**53**

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 7					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
1	BUFONIDAE	*Bufo marinus*	Giant Marine Toad	A	8
2	RANIDAE	*Platymantis corrugatus*	Rough backed Forest Frog	A	2
3	RHACOPHORIDAE	*Polypedates leucomystax*	Common Tree Frog	A	1
4	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	R	6
5	GEKKONIDAE	*Hemidactylus frenatus*	Common House Gecko	R	6
6	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	R	3
7	GEKKONIDAE	*Gekko monarchus*	Variable-back Narrow-disked Gecko	R	3
8	SCINCIDAE	*Lygosoma quadrupes*	Oriental Slender Skink	R	2
9	GEKKONIDAE	*Cosymbotus platyurus*	Flat Bodied House Gecko	R	2
10	VARANIDAE	*Varanus salvator*	Monitor Lizard	R	2
11	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	R	1
12	AGAMIDAE	Draco fimbriatus	Mindanao Flying Lizard	R	1
13	SCINCIDAE	*Lamprolepis smaragdina*	Spotted Green Tree Skink	R	1
14	COLUBRIDAE	*Ahaetulla prassina prassina*	Elongate-headed Tree Snake	R	1
15	COLUBRIDAE	*Chrysopelea paradisi*	Paradise Tree Snake	R	1
16	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	9
17	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	7
18	ARDEIDAE	*Bubulcus ibis*	Cattle Egret	B	6
19	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	6
20	HIRUNDINIDAE	*Hirundo rustica*	Barn Swallow	B	6
21	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	B	6
22	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	B	6
23	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	5
24	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	5
25	MUSCICAPIDAE	*Muscicapa griseisticta*	Grey-Streaked Flycatcher	B	5
26	RHABDORNITHIDAE	*Rhabdornis inornatus*	Stripe-Breasted Rhabdornis	B	5
27	NECTARINIIDAE	*Aethopyga primigenius*	Grey-hooded Sunbird	B	4
28	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	4
29	CAMPEPHAGIDAE	*Coracina striata*	Bar-Bellied Cuckoo-Shrike	B	4
30	MUSCICAPIDAE	*Muscicapa dauurica*	Asian Brown Flycatcher	B	4
31	SYLVIIDAE	*Phylloscopus borealis*	Arctic Warbler	B	4
32	MUSCICAPIDAE	*Saxicola caprata*	Pied Bushchat	B	4
33	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	3
34	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	3
35	COLUMBIDAE	*Geopelia striata*	Zebra Dove	B	3
36	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	3
37	COLUMBIDAE	*Phapitreron cinereiceps*	Dark-Eared Brown Dove	B	3
38	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	B	2
39	ALCEDINIDAE	*Alcedo argentata*	Silvery Kingfisher	B	2
40	RALLIDAE	*Amaurornis phoenicurus*	White Breasted Waterhen	B	2
41	ALCEDINIDAE	*Ceyx lepidus*	Variable Dwarf Kingfisher	B	2

Appendix 10: List of Fauna Species per Transect, Lamlahak Subwatershed, Lake Sebu, SC

TRANSECT 7					
No.	**Family Name**	**Scientific Name**	**Common Name**	**Class**	**No. of Indi.**
42	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	2
43	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	2
44	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	2
45	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	2
46	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	2
47	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	B	2
48	HALCYONIDAE	*Halcyon smyrnensis*	White-throated Kingfisher	B	2
49	FALCONIDAE	*Microhierax erythrogenys*	Philippine Falconet	B	2
50	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	1
51	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	1
52	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	1
53	MUSCICAPIDAE	*Cyornis rufigastra*	Mangrove Blue Flycatcher	B	1
54	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	B	1
55	ZOSTEROPIDAE	*Lophozosterops goodfellowi*	Black-masked White-eye	B	1
56	COLUMBIDAE	*Macropygia phasianella*	Reddish Cuckoo-Dove	B	1
57	MOTACILLIDAE	*Motacilla cinerea*	Grey Wagtail	B	1
58	RHIPIDURIDAE	*Rhipidura javanica*	Pied Fantail	B	1
59	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	B	1
60	MURIDAE	*Mus musculus*	House Mouse	M	5
61	MURIDAE	*Rattus exulans*	Polynesian Rat	M	3
62	MURIDAE	*Rattus argentiventer*	Rice-field rat	M	3
63	CYNOCEPHALIDAE	*Cynocephalus volans*	Philippine flying lemur, Kagwang	M	1

Taxa	**Total number**
Family	36
Genera	51
Species	63
Total Number of Individuals	**191**

Class	**No. of Families**	**No. of Genera**	**No. of Species**
Amphibians	3	3	3
Reptiles	5	11	12
Birds	26	34	44
Mammals	2	3	4
TOTAL	**36**	**51**	**63**

Appendix 11: Fauna Species Importance Value (SIV) Lamlahak Subwatershed, Lake Sebu, SC

No.	Family Name	Scientific Name	Common Name	Class	SIV
1	PLOCEIDAE	*Passer montanus*	Eurasian Tree Sparrow	B	5.33
2	ESTRILDIDAE	*Lonchura malacca*	Chesnut Munia	B	5.02
3	MURIDAE	*Rattus exulans*	Polynesian Rat	M	4.32
4	HIRUNDINIDAE	*Hirundo tahitica*	Pacific Swallow	B	3.93
5	CHLOROPSEIDAE	*Chloropsis flavipennis*	Philippine Leafbird	B	3.69
6	COLUMBIDAE	*Chalcophaps indica*	Common Emerald Dove	B	3.38
7	APODIDAE	*Collocalia esculenta*	Glossy Swiftlet	B	3.38
8	PHASIANIDAE	*Coturnix chinensis*	Blue-breasted Quail	B	3.30
9	SYLVIIDAE	*Bradypterus caudatus*	Long-tailed Ground-Warbler	B	2.99
10	CUCULIDAE	*Centropus melanops*	Black Faced Coucal	B	2.99
11	STERINIDAE	*Culicicapa helianthea*	Citrine-Canary Flycatcher	B	2.99
12	CUCULIDAE	*Centropus bengalensis*	Lesser Coucal	B	2.83
13	DICAEIDAE	*Dicaeum trigonostigma*	Orange-Bellied Flowerpecker	B	2.83
14	STURNIDAE	*Aplonis minor*	Short-tailed Glossy Starling	B	2.76
15	BUFONIDAE	*Bufo marinus*	Giant Marine Toad	A	2.74
16	DICAEIDAE	*Dicaeum ignipectus*	Fire Breasted Flowerpecker	B	2.68
17	APODIDAE	*Collocalia mearnsi*	Philippine Swiftlet	B	2.60
18	MURIDAE	*Rattus argentiventer*	Rice-field rat	M	2.50
19	NECTARINIIDAE	*Aethopyga boltoni*	Apo Sunbird	B	2.47
20	DICRURIDAE	*Dicrurus hottentottus*	Spangled Drongo	B	2.47
21	SYLVIIDAE	*Megalurus timoriensis*	Tawny Grassbird	B	2.47
22	CUCULIDAE	*Centropus viridis*	Philippine Coucal	B	2.44
23	GEKKONIDAE	*Gekko gecko*	Tokay Gecko	R	2.43
24	PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow Vented Bulbul	B	2.43
25	HIRUNDINIDAE	*Hirundo rustica*	Barn Swallow	B	2.35
26	LOCUSTELLIDAE	*Megalurus palustris*	Striated Grassbird	B	2.32
27	NECTARINIIDAE	*Aethopyga primigenius*	Grey-hooded Sunbird	B	2.27
28	APODIDAE	*Cypsiurus balasiensis*	Asian Palm Swift	B	2.24
29	MUSCICAPIDAE	*Rhipidura superciliaris*	Blue Fantail	B	2.24
30	CAMPEPHAGIDAE	*Coracina mcgregori*	McGregor's Cuckoo-shrike	B	2.21
31	APODIDAE	*Hirundapus celebensis*	Purple Needletail	B	2.11
32	SCINCIDAE	*Dasia grisea*	Northern Keel-scaled Tree Skink	R	2.08
33	NECTARINIIDAE	*Aethopyga pulcherrima*	Metallic Winged Sunbird	B	2.07
34	NECTARINIIDAE	*Nectarinia jugularis*	Olive-backed Sunbird	B	2.07
35	CAMPEPHAGIDAE	*Coracina striata*	Bar-Bellied Cuckoo-Shrike	B	2.04
36	COLUMBIDAE	*Geopelia striata*	Zebra Dove	B	2.04
37	HALCYONIDAE	*Halcyon smyrnensis*	White-throated Kingfisher	B	2.04
38	NECTARINIIDAE	*Nectarinia sperata*	Purple Throated Sunbird	B	1.99
39	SCINCIDAE	*Mabuya multifaciata*	Common Mabouya	R	1.93
40	SYLVIIDAE	*Phylloscopus borealis*	Arctic Warbler	B	1.88
41	MUSCICAPIDAE	*Saxicola caprata*	Pied Bushchat	B	1.88
42	MOTACILLIDAE	*Motacilla cinerea*	Grey Wagtail	B	1.80
43	ORIOLIDAE	*Oriolus chinensis*	Black-Naped Oriole	B	1.80
44	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse	M	1.80
45	MURIDAE	*Rattus everetti*	Common Philippine forest rat	M	1.77
46	PYCNONOTIDAE	*Pycnonotus urostictus*	Yellow-Wattled Bulbul	B	1.75
47	SCINCIDAE	*Lygosoma quadrupes*	Oriental Slender Skink	R	1.72
48	BUFONIDAE	*Pelophryne brevipes*	Southeast Asian Toadlet	A	1.68
49	ZOSTEROPIDAE	*Lophozosterops goodfellowi*	Black-masked White-eye	B	1.68
50	MUSCICAPIDAE	*Muscicapa sibirica*	Dark Sided Flycatcher	B	1.68
51	GEKKONIDAE	*Hemidactylus frenatus*	Common House Gecko	R	1.63
52	RHACOPHORIDAE	*Polypedates leucomystax*	Common Tree Frog	A	1.60
53	RHABDORNITHIDAE	*Rhabdornis inornatus*	Stripe-Breasted Rhabdornis	B	1.60

Appendix 11: Fauna Species Importance Value (SIV) Lamlahak Subwatershed, Lake Sebu, SC

No.	Family Name	Scientific Name	Common Name	Class	SIV
54	RHIPIDURIDAE	*Rhipidura javanica*	Pied Fantail	B	1.57
55	PHASIANIDAE	*Gallus gallus*	Red Junglefowl	B	1.55
56	COLUMBIDAE	*Phapitreron cinereiceps*	Dark-Eared Brown Dove	B	1.55
57	CORVIDAE	*Corvus enca*	Slender-Billed Crow	B	1.52
58	MUSCICAPIDAE	*Muscicapa griseisticta*	Grey-Streaked Flycatcher	B	1.52
59	PSITTACIDAE	*Prioniturus montanus*	Montane Racquet Tail	B	1.52
60	ARDEIDAE	*Bubulcus ibis*	Cattle Egret	B	1.47
61	MURIDAE	*Rattus tanezumi*	Asian Black Rat	M	1.47
62	TIMALIIDAE	*Macronous striaticeps*	Brown Tit-Babbler	B	1.36
63	ACANTHIZIDAE	*Gerygone sulphurea*	Golden-Bellied Flyeater	B	1.31
64	SCINCIDAE	*Lamprolepis smaragdina*	Spotted Green Tree Skink	R	1.29
65	ALCEDINIDAE	*Ceyx lepidus*	Variable Dwarf Kingfisher	B	1.29
66	SYLVIIDAE	*Phylloscopus olivaceus*	Philippine Leaf-Warbler	B	1.29
67	MICROHYLIDAE	*Kaloula picta*	Slender-digit Chorus Frog	A	1.24
68	SUIDAE	*Sus philippensismindanensis*	Philippine Warty Pig	M	1.24
69	RANIDAE	*Rana magna*	Giant Philippine Frog	A	1.21
70	COLUMBIDAE	*Gallicolumba criniger*	Mindanao Bleeding Heart	B	1.21
71	PYCNONOTIDAE	*Hypsipetes philippinus*	Philippine Bulbul	B	1.21
72	RANIDAE	*Platymantis dorsalis*	Common Forest Frog	A	1.16
73	MUSCICAPIDAE	*Ficedula basilanica*	Little Slaty Flycatcher	B	1.16
74	CYNOCEPHALIDAE	*Cynocephalus volans*	Kagwang, Philippine flying lemur	M	1.16
75	MURIDAE	*Mus musculus*	House Mouse	M	1.11
76	GEKKONIDAE	*Gekko monarchus*	Variable-back Narrow-disked Gecko	R	1.08
77	VARANIDAE	*Varanus salvator*	Monitor Lizard	R	1.08
78	APODIDAE	*Mearnsia picina*	Philippine Needletail	B	1.08
79	SITTIDAE	*Sitta frontalis*	Velvet-Fronted Nuthatch	B	1.08
80	ACCIPITRIDAE	*Accipiter trivirgatus*	Crested Goshawk	B	1.00
81	NECTARINIIDAE	*Aethopyga linaraborae*	Lina's Sunbird	B	1.00
82	RALLIDAE	*Amaurornis phoenicurus*	White Breasted Waterhen	B	1.00
83	PYCNONOTIDAE	*Hypsipetes rufigularis*	Zamboanga Bulbul	B	1.00
84	COLUMBIDAE	*Macropygia phasianella*	Reddish Cuckoo-Dove	B	1.00
85	TURNICIDAE	*Turnix sylvatica*	Small Bottonquail	B	0.95
86	CERCOPITHECIDAE	*Macaca fascicularis*	Long-tailed macaque	M	0.95
87	RANIDAE	*Platymantis corrugatus*	Rough backed Forest Frog	A	0.93
88	RANIDAE	*Occidozyga laevis*	Puddle Frog	A	0.93
89	SCINCIDAE	*Mabuya multicarinata*	Two Striped Mabouya	R	0.93
90	COLUBRIDAE	*Ahaetulla prassina prassina*	Elongate-headed Tree Snake	R	0.93
91	COLUBRIDAE	*Dendrelaphis pictus*	Common Bronze-backed Snake	R	0.93
92	ALCEDINIDAE	*Actenoides hombroni*	Blue-capped Wood-Kingfisher	B	0.93
93	STURNIDAE	*Basilornis miranda*	Apo Myna	B	0.93
94	MUSCICAPIDAE	*Cyornis rufigastra*	Mangrove Blue Flycatcher	B	0.93
95	RALLIDAE	*Gallirallus torquatus*	Barred Rail	B	0.93
96	TIMALIIDAE	*Stachyris capitalis*	Rusty-crowned Babbler	B	0.93
97	MUSCICAPIDAE	*Muscicapa dauurica*	Asian Brown Flycatcher	B	0.91
98	ALCEDINIDAE	*Alcedo argentata*	Silvery Kingfisher	B	0.88
99	PICIDAE	*Mulleripicus funebris*	Sooty Woodpecker	B	0.88
100	PITTIDAE	*Pitta steerii*	Steere's Pitta	B	0.88
101	MURIDAE	*Apomys insignis*	Mindanao montane forest mouse	M	0.88
102	VIVERRIDAE	*Paradoxurus hermaphroditus*	Common palm civet	M	0.85
103	AGAMIDAE	*Calotes cristatellus*	Indonesian Calotes	R	0.80
104	GEKKONIDAE	*Cosymbotus platyurus*	Flat Bodied House Gecko	R	0.80
105	STURNIDAE	*Aplonis panayensis*	Asian Glossy Starling	B	0.75

Appendix 11: Fauna Species Importance Value (SIV) Lamlahak Subwatershed, Lake Sebu, SC

No.	Family Name	Scientific Name	Common Name	Class	SIV
106	FALCONIDAE	*Microhierax erythrogenys*	Philippine Falconet	B	0.72
107	SCIURIDAE	*Sundasciurus philippinensis*	Philippine tree squirrel	M	0.72
108	AGAMIDAE	Draco fimbriatus	Mindanao Flying Lizard	R	0.64
109	ELAPIDAE	*Ophiophagus hannah*	King Cobra	R	0.64
110	MUSCICAPIDAE	*Ficedula parva*	Red-Breasted Flycatcher	B	0.64
111	RALLIDAE	*Gallicrex cinerea*	Watercock	B	0.64
112	SORICIDAE	*Crocidura beatus*	Common Mindanao shrew	M	0.64
113	COLUBRIDAE	*Elaphe erythrura*	Common Rat Snake	R	0.56
114	COLUBRIDAE	*Chrysopelea paradisi*	Paradise Tree Snake	R	0.56
115	COLUBRIDAE	*Boiga cynodon*	Large Blunt-headed Tree Snake	R	0.56
116	BUCEROTIDAE	*Aceros leucocephalus*	Writhed Hornbill	B	0.56
117	VIVERRIDAE	*Viverra tangalunga*	Malay civet, *tangalung*	M	0.56
118	CAMPEPHAGIDAE	*Pericrocotus flammeus*	Scarlet Minivet	B	0.52
119	MOTACILLIDAE	*Anthus novaeseelandiae*	Richard's Pipit	B	0.44
120	PSITTACIDAE	*Loriculus philippensis*	Colasisi	B	0.44
121	ALCEDINIDAE	*Halcyon winchelli*	Rufous-lored Kingfisher	B	0.36
122	ACCIPITRIDAE	*Haliastur indus*	Bhraminy Kite	B	0.36
123	SCINCIDAE	*Dasia sp.*		R	0.28
124	ELAPIDAE	*Naja samarensis*	Samar Cobra/Peter's Cobra	R	0.28
125	PHYTONIDAE	*Phyton reticulatus*	Reticulated Phyton	R	0.28
126	BUCEROTIDAE	*Aceros waldeni*	Walden's Hornbill	B	0.28
127	PODARGIDAE	*Batrachostomus septimus*	Philippine Frogmouth	B	0.28
128	TUPAIIDAE	*Urogale everetti*	Mindanao tree shrew	M	0.28

Appendix 12:List of Dominant Families

TRANSECT 1			
No.	**Family Name**	**No. of Species**	**Rank**
1	MUSCICAPIDAE	6	1
2	MURIDAE	5	2
3	NECTARINIIDAE	5	2
4	APODIDAE	4	3
5	RANIDAE	4	3
6	SCINCIDAE	4	3
7	SYLVIIDAE	4	3
8	COLUMBIDAE	3	4
9	CUCULIDAE	3	4
10	PYCNONOTIDAE	3	4
11	BUFONIDAE	2	5
12	CAMPEPHAGIDAE	2	5
13	COLUBRIDAE	2	5
14	DICAEIDAE	2	5
15	GEKKONIDAE	2	5
16	HIRUNDINIDAE	2	5
17	ACANTHIZIDAE	1	6
18	ALCEDINIDAE	1	6
19	ARDEIDAE	1	6
20	CHLOROPSEIDAE	1	6
21	CORVIDAE	1	6
22	DICRURIDAE	1	6
23	ESTRILDIDAE	1	6
24	HALCYONIDAE	1	6
25	LOCUSTELLIDAE	1	6
26	MOTACILLIDAE	1	6
27	PHASIANIDAE	1	6
28	PLOCEIDAE	1	6
29	PSITTACIDAE	1	6
30	RALLIDAE	1	6
31	RHABDORNITHIDAE	1	6
32	RHIPIDURIDAE	1	6
33	SCIURIDAE	1	6
34	SORICIDAE	1	6
35	STERINIDAE	1	6
36	STURNIDAE	1	6
37	TIMALIIDAE	1	6

Appendix 12:List of Dominant Families

TRANSECT 2			
No.	**Family Name**	**No. of Species**	**Rank**
1	NECTARINIIDAE	6	1
2	APODIDAE	5	2
3	COLUMBIDAE	5	2
4	MUSCICAPIDAE	5	2
5	SCINCIDAE	5	2
6	MURIDAE	4	3
7	SYLVIIDAE	4	3
8	CUCULIDAE	3	4
9	PYCNONOTIDAE	3	4
10	CAMPEPHAGIDAE	2	5

Appendix 12:List of Dominant Families

TRANSECT 2			
No.	**Family Name**	**No. of Species**	**Rank**
11	COLUBRIDAE	2	5
12	DICAEIDAE	2	5
13	GEKKONIDAE	2	5
14	HIRUNDINIDAE	2	5
15	PHASIANIDAE	2	5
16	VIVERRIDAE	2	5
17	ACANTHIZIDAE	1	6
18	ACCIPITRIDAE	1	6
19	AGAMIDAE	1	6
20	ALCEDINIDAE	1	6
21	BUFONIDAE	1	6
22	CHLOROPSEIDAE	1	6
23	CORVIDAE	1	6
24	DICRURIDAE	1	6
25	ELAPIDAE	1	6
26	ESTRILDIDAE	1	6
27	HALCYONIDAE	1	6
28	LOCUSTELLIDAE	1	6
29	MICROHYLIDAE	1	6
30	MOTACILLIDAE	1	6
31	ORIOLIDAE	1	6
32	PHYTONIDAE	1	6
33	PLOCEIDAE	1	6
34	RALLIDAE	1	6
35	RHABDORNITHIDAE	1	6
36	RHACOPHORIDAE	1	6
37	RHIPIDURIDAE	1	6
38	SITTIDAE	1	6
39	SORICIDAE	1	6
40	STERINIDAE	1	6
41	STURNIDAE	1	6
42	TIMALIIDAE	1	6

Appendix 12:List of Dominant Families

TRANSECT 3			
No.	**Family Name**	**No. of Species**	**Rank**
1	NECTARINIIDAE	6	1
2	APODIDAE	4	2
3	MUSCICAPIDAE	4	2
4	SYLVIIDAE	4	2
5	COLUMBIDAE	3	3
6	CUCULIDAE	3	3
7	MURIDAE	3	3
8	PYCNONOTIDAE	3	3
9	RANIDAE	3	3
10	SCINCIDAE	3	3
11	STURNIDAE	3	3
12	ALCEDINIDAE	2	4
13	BUFONIDAE	2	4
14	CAMPEPHAGIDAE	2	4
15	COLUBRIDAE	2	4

Appendix 12:List of Dominant Families

TRANSECT 3			
No.	**Family Name**	**No. of Species**	**Rank**
16	DICAEIDAE	2	4
17	HIRUNDINIDAE	2	4
18	MOTACILLIDAE	2	4
19	PHASIANIDAE	2	4
20	RALLIDAE	2	4
21	VIVERRIDAE	2	4
22	ACANTHIZIDAE	1	5
23	ACCIPITRIDAE	1	5
24	AGAMIDAE	1	5
25	CHLOROPSEIDAE	1	5
26	DICRURIDAE	1	5
27	ELAPIDAE	1	5
28	ESTRILDIDAE	1	5
29	GEKKONIDAE	1	5
30	HALCYONIDAE	1	5
31	LOCUSTELLIDAE	1	5
32	MICROHYLIDAE	1	5
33	ORIOLIDAE	1	5
34	PITTIDAE	1	5
35	PLOCEIDAE	1	5
36	PSITTACIDAE	1	5
37	RHIPIDURIDAE	1	5
38	STERINIDAE	1	5
39	TIMALIIDAE	1	5
40	TUPAIIDAE	1	5
41	TURNICIDAE	1	5
42	VARANIDAE	1	5
43	ZOSTEROPIDAE	1	5

Appendix 12:List of Dominant Families

TRANSECT 4			
No.	**Family Name**	**No. of Species**	**Rank**
1	MURIDAE	6	1
2	APODIDAE	4	2
3	MUSCICAPIDAE	4	2
4	SYLVIIDAE	4	2
5	COLUBRIDAE	3	3
6	COLUMBIDAE	3	3
7	CUCULIDAE	3	3
8	NECTARINIIDAE	3	3
9	PYCNONOTIDAE	3	3
10	SCINCIDAE	3	3
11	BUFONIDAE	2	4
12	CAMPEPHAGIDAE	2	4
13	DICAEIDAE	2	4
14	PHASIANIDAE	2	4
15	RALLIDAE	2	4
16	RANIDAE	2	4
17	STURNIDAE	2	4
18	TIMALIIDAE	2	4
19	ACCIPITRIDAE	1	5

Appendix 12:List of Dominant Families

TRANSECT 4			
No.	**Family Name**	**No. of Species**	**Rank**
20	ALCEDINIDAE	1	5
21	BUCEROTIDAE	1	5
22	CERCOPITHECIDAE	1	5
23	CHLOROPSEIDAE	1	5
24	CORVIDAE	1	5
25	DICRURIDAE	1	5
26	ESTRILDIDAE	1	5
27	GEKKONIDAE	1	5
28	HIRUNDINIDAE	1	5
29	LOCUSTELLIDAE	1	5
30	MOTACILLIDAE	1	5
31	ORIOLIDAE	1	5
32	PICIDAE	1	5
33	PLOCEIDAE	1	5
34	RHABDORNITHIDAE	1	5
35	RHACOPHORIDAE	1	5
36	SITTIDAE	1	5
37	STERINIDAE	1	5
38	SUIDAE	1	5
39	VARANIDAE	1	5
40	VIVERRIDAE	1	5
41	ZOSTEROPIDAE	1	5

Appendix 12:List of Dominant Families

TRANSECT 5			
No.	**Family Name**	**No. of Species**	**Rank**
1	MURIDAE	5	1
2	APODIDAE	4	2
3	MUSCICAPIDAE	4	2
4	CUCULIDAE	3	3
5	SCINCIDAE	3	3
6	ALCEDINIDAE	2	4
7	BUCEROTIDAE	2	4
8	CAMPEPHAGIDAE	2	4
9	COLUMBIDAE	2	4
10	DICAEIDAE	2	4
11	GEKKONIDAE	2	4
12	HIRUNDINIDAE	2	4
13	PSITTACIDAE	2	4
14	RANIDAE	2	4
15	STURNIDAE	2	4
16	SYLVIIDAE	2	4
17	AGAMIDAE	1	5
18	ARDEIDAE	1	5
19	CERCOPITHECIDAE	1	5
20	CHLOROPSEIDAE	1	5
21	CORVIDAE	1	5
22	CYNOCEPHALIDAE	1	5
23	ELAPIDAE	1	5
24	ESTRILDIDAE	1	5
25	FALCONIDAE	1	5

Appendix 12:List of Dominant Families

TRANSECT 5			
No.	**Family Name**	**No. of Species**	**Rank**
26	HALCYONIDAE	1	5
27	NECTARINIIDAE	1	5
28	ORIOLIDAE	1	5
29	PHASIANIDAE	1	5
30	PICIDAE	1	5
31	PLOCEIDAE	1	5
32	PODARGIDAE	1	5
33	PYCNONOTIDAE	1	5
34	RHACOPHORIDAE	1	5
35	RHIPIDURIDAE	1	5
36	STERINIDAE	1	5
37	SUIDAE	1	5
38	TURNICIDAE	1	5
39	ZOSTEROPIDAE	1	5

Appendix 12:List of Dominant Families

TRANSECT 6			
No.	**Family Name**	**No. of Species**	**Rank**
1	APODIDAE	4	1
2	MURIDAE	4	1
3	CUCULIDAE	3	2
4	NECTARINIIDAE	3	2
5	PYCNONOTIDAE	3	2
6	SCINCIDAE	3	2
7	COLUMBIDAE	2	3
8	DICAEIDAE	2	3
9	TIMALIIDAE	2	3
10	ACCIPITRIDAE	1	4
11	ALCEDINIDAE	1	4
12	BUFONIDAE	1	4
13	CAMPEPHAGIDAE	1	4
14	CHLOROPSEIDAE	1	4
15	COLUBRIDAE	1	4
16	CYNOCEPHALIDAE	1	4
17	DICRURIDAE	1	4
18	ESTRILDIDAE	1	4
19	GEKKONIDAE	1	4
20	HIRUNDINIDAE	1	4
21	LOCUSTELLIDAE	1	4
22	MICROHYLIDAE	1	4
23	MUSCICAPIDAE	1	4
24	ORIOLIDAE	1	4
25	PHASIANIDAE	1	4
26	PITTIDAE	1	4
27	PLOCEIDAE	1	4
28	PSITTACIDAE	1	4
29	RALLIDAE	1	4
30	RANIDAE	1	4
31	SCIURIDAE	1	4
32	SITTIDAE	1	4
33	STERINIDAE	1	4

Appendix 12:List of Dominant Families

TRANSECT 6			
No.	**Family Name**	**No. of Species**	**Rank**
34	STURNIDAE	1	4
35	SUIDAE	1	4
36	SYLVIIDAE	1	4

Appendix 12:List of Dominant Families

TRANSECT 7			
No.	**Family Name**	**No. of Species**	**Rank**
1	MUSCICAPIDAE	5	1
2	COLUMBIDAE	4	2
3	GEKKONIDAE	4	2
4	SCINCIDAE	4	2
5	APODIDAE	3	3
6	CUCULIDAE	3	3
7	MURIDAE	3	3
8	SYLVIIDAE	3	3
9	ALCEDINIDAE	2	4
10	CAMPEPHAGIDAE	2	4
11	COLUBRIDAE	2	4
12	DICAEIDAE	2	4
13	HIRUNDINIDAE	2	4
14	NECTARINIIDAE	2	4
15	AGAMIDAE	1	5
16	ARDEIDAE	1	5
17	BUFONIDAE	1	5
18	CHLOROPSEIDAE	1	5
19	CYNOCEPHALIDAE	1	5
20	DICRURIDAE	1	5
21	ESTRILDIDAE	1	5
22	FALCONIDAE	1	5
23	HALCYONIDAE	1	5
24	LOCUSTELLIDAE	1	5
25	MOTACILLIDAE	1	5
26	PHASIANIDAE	1	5
27	PLOCEIDAE	1	5
28	RALLIDAE	1	5
29	RANIDAE	1	5
30	RHABDORNITHIDAE	1	5
31	RHACOPHORIDAE	1	5
32	RHIPIDURIDAE	1	5
33	STERINIDAE	1	5
34	STURNIDAE	1	5
35	VARANIDAE	1	5
36	ZOSTEROPIDAE	1	5

Appendix 13. Diversity and Eveness Values of Fauna

No.	Species	No.of Individuals
1	*Bufo marinus*	22
2	*Pelophryne brevipes*	11
3	*Polypedates leucomystax*	10
4	*Rana magna*	5
5	*Platymantis dorsalis*	7
6	*Platymantis corrugatus*	4
7	*Occidozyga laevis*	4
8	*Kaloula picta*	8
9	*Accipiter trivirgatus*	5
10	*Aceros leucocephalus*	2
11	*Aceros waldeni*	1
12	*Actenoides hombroni*	4
13	*Aethopyga boltoni*	16
14	*Aethopyga linaraborae*	5
15	*Aethopyga primigenius*	16
16	*Aethopyga pulcherrima*	16
17	*Alcedo argentata*	6
18	*Amaurornis phoenicurus*	5
19	*Anthus novaeseelandiae*	3
20	*Aplonis minor*	17
21	*Aplonis panayensis*	7
22	*Basilornis miranda*	4
23	*Batrachostomus septimus*	1
24	*Bradypterus caudatus*	20
25	*Bubulcus ibis*	11
26	*Centropus bengalensis*	18
27	*Centropus melanops*	20
28	*Centropus viridis*	13
29	*Ceyx lepidus*	6
30	*Chalcophaps indica*	25
31	*Chloropsis flavipennis*	29
32	*Collocalia esculenta*	25
33	*Collocalia mearnsi*	15
34	*Coracina mcgregori*	10
35	*Coracina striata*	13
36	*Corvus enca*	9
37	*Coturnix chinensis*	24
38	*Culicicapa helianthea*	20
39	*Cyornis rufigastra*	4
40	*Cypsiurus balasiensis*	13
41	*Dicaeum ignipectus*	16
42	*Dicaeum trigonostigma*	18
43	*Dicrurus hottentottus*	16
44	*Ficedula basilanica*	7
45	*Ficedula parva*	3
46	*Gallicolumba criniger*	5
47	*Gallicrex cinerea*	3
48	*Gallirallus torquatus*	4
49	*Gallus gallus*	12
50	*Geopelia striata*	13
51	*Gerygone sulphurea*	9
52	*Halcyon smyrnensis*	13
53	*Halcyon winchelli*	2
54	*Haliastur indus*	2

Appendix 13. Diversity and Eveness Values of Fauna

No.	Species	No.of Individuals
55	*Hirundapus celebensis*	14
56	*Hirundo rustica*	17
57	*Hirundo tahitica*	32
58	*Hypsipetes philippinus*	5
59	*Hypsipetes rufigularis*	5
60	*Lonchura malacca*	46
61	*Lophozosterops goodfellowi*	11
62	*Loriculus philippensis*	3
63	*Macronous striaticeps*	7
64	*Macropygia phasianella*	5
65	*Mearnsia picina*	6
66	*Megalurus palustris*	14
67	*Megalurus timoriensis*	16
68	*Microhierax erythrogenys*	4
69	*Motacilla cinerea*	10
70	*Mulleripicus funebris*	6
71	*Muscicapa dauurica*	9
72	*Muscicapa griseisticta*	9
73	*Muscicapa sibirica*	11
74	*Nectarinia jugularis*	16
75	*Nectarinia sperata*	15
76	*Oriolus chinensis*	10
77	*Passer montanus*	50
78	*Pericrocotus flammeus*	4
79	*Phapitreron cinereiceps*	12
80	*Phylloscopus borealis*	11
81	*Phylloscopus olivaceus*	6
82	*Pitta steerii*	6
83	*Prioniturus montanus*	9
84	*Pycnonotus goiavier*	18
85	*Pycnonotus urostictus*	12
86	*Rhabdornis inornatus*	10
87	*Rhipidura javanica*	7
88	*Rhipidura superciliaris*	13
89	*Saxicola caprata*	11
90	*Sitta frontalis*	6
91	*Stachyris capitalis*	4
92	*Turnix sylvatica*	7
93	*Macaca fascicularis*	7
94	*Cynocephalus volans*	7
95	*Rattus exulans*	37
96	*Mus musculus*	9
97	*Rattus tanezumi*	11
98	*Apomys insignis*	6
99	*Apomys littoralis*	10
100	*Rattus argentiventer*	19
101	*Rattus everetti*	7
102	*Sundasciurus philippinensis*	4
103	*Crocidura beatus*	3
104	*Sus philippensismindanensis*	8
105	*Urogale everetti*	1
106	*Paradoxurus hermaphroditus*	3
107	*Viverra tangalunga*	2

Appendix 13. Diversity and Eveness Values of Fauna

No.	Species	No.of Individuals
108	Draco fimbriatus	3
109	*Calotes cristatellus*	5
110	*Mabuya multifaciata*	9
111	*Mabuya multicarinata*	4
112	*Lygosoma quadrupes*	9
113	*Dasia grisea*	11
114	*Dasia sp.*	1
115	*Lamprolepis smaragdina*	6
116	*Cosymbotus platyurus*	5
117	*Gekko gecko*	18
118	*Gekko monarchus*	6

Appendix 13. Diversity and Eveness Values of Fauna

No.	Species	No.of Individuals
119	*Hemidactylus frenatus*	13
120	*Varanus salvator*	6
121	*Ophiophagus hannah*	3
122	*Naja samarensis*	1
123	*Ahaetulla prassina prassina*	4
124	*Elaphe erythrura*	2
125	*Dendrelaphis pictus*	4
126	*Chrysopelea paradisi*	2
127	*Boiga cynodon*	2
128	*Phyton reticulatus*	1

Fauna Species Diversity and Evenness	
H`	4.57
E	0.94
No. of Individuals (N)	1283
No. of Species (S)	128

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 1		
No.	**Species**	**No.of Ind.**
1	*Passer montanus*	20
2	*Lonchura malacca*	10
3	*Hemidactylus frenatus*	5
4	*Hirundapus celebensis*	5
5	*Rattus exulans*	5
6	*Aethopyga pulcherrima*	4
7	*Bufo marinus*	4
8	*Coracina striata*	4
9	*Mus musculus*	4
10	*Cosymbotus platyurus*	3
11	*Muscicapa sibirica*	3
12	*Platymantis dorsalis*	3
13	*Aethopyga boltoni*	2
14	*Aethopyga primigenius*	2
15	*Aplonis minor*	2
16	*Bubulcus ibis*	2
17	*Centropus melanops*	2
18	*Chalcophaps indica*	2
19	*Chloropsis flavipennis*	2
20	*Collocalia esculenta*	2
21	*Coturnix chinensis*	2
22	*Gerygone sulphurea*	2
23	*Hirundo rustica*	2
24	*Mabuya multifaciata*	2
25	*Motacilla cinerea*	2
26	*Muscicapa griseisticta*	2
27	*Nectarinia jugularis*	2
28	*Pelophryne brevipes*	2
29	*Phylloscopus olivaceus*	2
30	*Prioniturus montanus*	2

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 1		
No.	**Species**	**No.of Ind.**
31	*Pycnonotus goiavier*	2
32	*Pycnonotus urostictus*	2
33	*Rattus argentiventer*	2
34	*Ahaetulla prassina prassina*	1
35	*Apomys littoralis*	1
36	*Bradypterus caudatus*	1
37	*Centropus bengalensis*	1
38	*Centropus viridis*	1
39	*Ceyx lepidus*	1
40	*Collocalia mearnsi*	1
41	*Coracina mcgregori*	1
42	*Corvus enca*	1
43	*Crocidura beatus*	1
44	*Culicicapa helianthea*	1
45	*Cyornis rufigastra*	1
46	*Cypsiurus balasiensis*	1
47	*Dasia grisea*	1
48	*Dendrelaphis pictus*	1
49	*Dicaeum ignipectus*	1
50	*Dicaeum trigonostigma*	1
51	*Dicrurus hottentottus*	1
52	*Ficedula basilanica*	1
53	*Gallicolumba criniger*	1
54	*Gallirallus torquatus*	1
55	*Geopelia striata*	1
56	*Halcyon smyrnensis*	1
57	*Hirundo tahitica*	1
58	*Hypsipetes philippinus*	1
59	*Lygosoma quadrupes*	1
60	*Mabuya multicarinata*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 1		
No.	**Species**	**No.of Ind.**
61	*Macronous striaticeps*	1
62	*Megalurus palustris*	1
63	*Megalurus timoriensis*	1
64	*Nectarinia sperata*	1
65	*Occidozyga laevis*	1
66	*Phylloscopus borealis*	1
67	*Platymantis corrugatus*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 1		
No.	**Species**	**No.of Ind.**
68	*Rana magna*	1
69	*Rattus everetti*	1
70	*Rhabdornis inornatus*	1
71	*Rhipidura javanica*	1
72	*Rhipidura superciliaris*	1
73	*Saxicola caprata*	1
74	*Sundasciurus philippinensis*	1

Fauna Species Diversity and Evenness in Transect1	
H`	3.93
E	0.91
No. of Individuals (N)	153
No. of Species (S)	74

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 2		
No.	**Species**	**No.of Ind.**
1	*Accipiter trivirgatus*	1
2	*Passer montanus*	12
3	*Chalcophaps indica*	8
4	*Coturnix chinensis*	8
5	*Lonchura malacca*	8
6	*Nectarinia sperata*	8
7	*Phapitreron cinereiceps*	8
8	*Rattus exulans*	8
9	*Aethopyga pulcherrima*	5
10	*Gallus gallus*	5
11	*Gerygone sulphurea*	5
12	*Megalurus timoriensis*	5
13	*Muscicapa dauurica*	5
14	*Polypedates leucomystax*	5
15	*Dicaeum ignipectus*	4
16	*Dicrurus hottentottus*	4
17	*Motacilla cinerea*	4
18	*Muscicapa sibirica*	4
19	*Phylloscopus borealis*	4
20	*Saxicola caprata*	4
21	*Bradypterus caudatus*	3
22	*Bufo marinus*	3
23	*Centropus melanops*	3
24	*Chloropsis flavipennis*	3
25	*Collocalia esculenta*	3
26	*Culicicapa helianthea*	3
27	*Lygosoma quadrupes*	3
28	*Nectarinia jugularis*	3
29	*Pycnonotus goiavier*	3

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 2		
No.	**Species**	**No.of Ind.**
30	*Pycnonotus urostictus*	3
31	*Rattus tanezumi*	3
32	*Rhabdornis inornatus*	3
33	*Sitta frontalis*	3
34	*Aethopyga boltoni*	2
35	*Calotes cristatellus*	2
36	*Centropus bengalensis*	2
37	*Collocalia mearnsi*	2
38	*Coracina mcgregori*	2
39	*Crocidura beatus*	2
40	*Dicaeum trigonostigma*	2
41	*Ficedula parva*	2
42	*Gallicolumba criniger*	2
43	*Geopelia striata*	2
44	*Halcyon smyrnensis*	2
45	*Hemidactylus frenatus*	2
46	*Hirundo rustica*	2
47	*Kaloula picta*	2
48	*Lamprolepis smaragdina*	2
49	*Mabuya multicarinata*	2
50	*Macropygia phasianella*	2
51	*Mearnsia picina*	2
52	*Rhipidura superciliaris*	2
53	*Actenoides hombroni*	1
54	*Aethopyga linaraborae*	1
55	*Aethopyga primigenius*	1
56	*Amaurornis phoenicurus*	1
57	*Aplonis minor*	1
58	*Apomys littoralis*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 2		
No.	**Species**	**No.of Ind.**
59	*Boiga cynodon*	1
60	*Centropus viridis*	1
61	*Coracina striata*	1
62	*Corvus enca*	1
63	*Cypsiurus balasiensis*	1
64	*Dasia grisea*	1
65	*Elaphe erythrura*	1
66	*Gekko gecko*	1
67	*Hirundapus celebensis*	1
68	*Hirundo tahitica*	1
69	*Hypsipetes rufigularis*	1
70	*Mabuya multifaciata*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 2		
No.	**Species**	**No.of Ind.**
71	*Megalurus palustris*	1
72	*Naja samarensis*	1
73	*Oriolus chinensis*	1
74	*Paradoxurus hermaphroditus*	1
75	*Phylloscopus olivaceus*	1
76	*Phyton reticulatus*	1
77	*Rattus everetti*	1
78	*Rhipidura javanica*	1
79	*Stachyris capitalis*	1
80	*Viverra tangalunga*	1

Fauna Species Diversity and Evenness in Transect 2	
H`	4.12
E	0.94
No. of Individuals (N)	220
No. of Species (S)	80

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 3		
No.	**Species**	**No.of Ind.**
1	*Rattus argentiventer*	10
2	*Rattus exulans*	10
3	*Aplonis panayensis*	7
4	*Pycnonotus goiavier*	7
5	*Passer montanus*	6
6	*Rhipidura superciliaris*	6
7	*Bufo marinus*	5
8	*Collocalia esculenta*	5
9	*Cypsiurus balasiensis*	5
10	*Halcyon smyrnensis*	5
11	*Hirundo tahitica*	5
12	*Lonchura malacca*	5
13	*Nectarinia jugularis*	5
14	*Alcedo argentata*	4
15	*Chalcophaps indica*	4
16	*Chloropsis flavipennis*	4
17	*Culicicapa helianthea*	4
18	*Kaloula picta*	4
19	*Lophozosterops goodfellowi*	4
20	*Macronous striaticeps*	4
21	*Nectarinia sperata*	4
22	*Aethopyga primigenius*	3
23	*Anthus novaeseelandiae*	3
24	*Aplonis minor*	3
25	*Coturnix chinensis*	3
26	*Gallus gallus*	3

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 3		
No.	**Species**	**No.of Ind.**
27	*Gekko gecko*	3
28	*Hirundo rustica*	3
29	*Pelophryne brevipes*	3
30	*Turnix sylvatica*	3
31	*Aethopyga linaraborae*	2
32	*Aethopyga pulcherrima*	2
33	*Ahaetulla prassina prassina*	2
34	*Bradypterus caudatus*	2
35	*Centropus bengalensis*	2
36	*Centropus melanops*	2
37	*Centropus viridis*	2
38	*Ceyx lepidus*	2
39	*Dasia grisea*	2
40	*Dendrelaphis pictus*	2
41	*Dicaeum ignipectus*	2
42	*Dicrurus hottentottus*	2
43	Draco fimbriatus	2
44	*Gallirallus torquatus*	2
45	*Gerygone sulphurea*	2
46	*Haliastur indus*	2
47	*Hirundapus celebensis*	2
48	*Hypsipetes philippinus*	2
49	*Macropygia phasianella*	2
50	*Megalurus timoriensis*	2
51	*Motacilla cinerea*	2
52	*Ophiophagus hannah*	2
53	*Oriolus chinensis*	2

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 3		
No.	**Species**	**No.of Ind.**
54	*Pycnonotus urostictus*	2
55	*Rhipidura javanica*	2
56	*Aethopyga boltoni*	1
57	*Basilornis miranda*	1
58	*Collocalia mearnsi*	1
59	*Coracina mcgregori*	1
60	*Coracina striata*	1
61	*Dicaeum trigonostigma*	1
62	*Ficedula basilanica*	1
63	*Gallicrex cinerea*	1
64	*Lamprolepis smaragdina*	1
65	*Lygosoma quadrupes*	1
66	*Megalurus palustris*	1
67	*Muscicapa griseisticta*	1
68	*Occidozyga laevis*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 3		
No.	**Species**	**No.of Ind.**
69	*Paradoxurus hermaphroditus*	1
70	*Phapitreron cinereiceps*	1
71	*Phylloscopus borealis*	1
72	*Phylloscopus olivaceus*	1
73	*Pitta steerii*	1
74	*Platymantis dorsalis*	1
75	*Prioniturus montanus*	1
76	*Rana magna*	1
77	*Rattus everetti*	1
78	*Saxicola caprata*	1
79	*Urogale everetti*	1
80	*Varanus salvator*	1
81	*Viverra tangalunga*	1

Fauna Species Diversity and Evenness in Transect 3	
H`	4.17
E	0.95
No. of Individuals (N)	216
No. of Species (S)	81

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 4		
No.	**Species**	**No.of Ind.**
1	*Accipiter trivirgatus*	1
2	*Chloropsis flavipennis*	8
3	*Lonchura malacca*	8
4	*Aethopyga boltoni*	6
5	*Aethopyga primigenius*	6
6	*Collocalia esculenta*	6
7	*Hirundo tahitica*	6
8	*Passer montanus*	6
9	*Rattus tanezumi*	6
10	*Aplonis minor*	5
11	*Centropus bengalensis*	5
12	*Corvus enca*	5
13	*Chalcophaps indica*	4
14	*Collocalia mearnsi*	4
15	*Coturnix chinensis*	4
16	*Gallus gallus*	4
17	*Megalurus palustris*	4
18	*Pelophryne brevipes*	4
19	*Pericrocotus flammeus*	4
20	*Pycnonotus goiavier*	4
21	*Rattus exulans*	4
22	*Apomys littoralis*	3
23	*Dicrurus hottentottus*	3
24	*Macaca fascicularis*	3
25	*Varanus salvator*	3

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 4		
No.	**Species**	**No.of Ind.**
26	*Actenoides hombroni*	2
27	*Amaurornis phoenicurus*	2
28	*Apomys insignis*	2
29	*Bradypterus caudatus*	2
30	*Bufo marinus*	2
31	*Cyornis rufigastra*	2
32	*Dicaeum ignipectus*	2
33	*Dicaeum trigonostigma*	2
34	*Gallicrex cinerea*	2
35	*Geopelia striata*	2
36	*Hypsipetes rufigularis*	2
37	*Lygosoma quadrupes*	2
38	*Mabuya multifaciata*	2
39	*Muscicapa sibirica*	2
40	*Nectarinia sperata*	2
41	*Phylloscopus olivaceus*	2
42	*Rana magna*	2
43	*Rattus argentiventer*	2
44	*Stachyris capitalis*	2
45	*Sus philippensismindanensis*	2
46	*Aceros leucocephalus*	1
47	*Basilornis miranda*	1
48	*Boiga cynodon*	1
49	*Centropus melanops*	1
50	*Centropus viridis*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 4		
No.	**Species**	**No.of Ind.**
51	*Chrysopelea paradisi*	1
52	*Coracina mcgregori*	1
53	*Culicicapa helianthea*	1
54	*Cypsiurus balasiensis*	1
55	*Dasia grisea*	1
56	*Elaphe erythrura*	1
57	*Gallicolumba criniger*	1
58	*Gekko monarchus*	1
59	*Hirundapus celebensis*	1
60	*Hypsipetes philippinus*	1
61	*Lophozosterops goodfellowi*	1
62	*Macronous striaticeps*	1
63	*Megalurus timoriensis*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 4		
No.	**Species**	**No.of Ind.**
64	*Motacilla cinerea*	1
65	*Mulleripicus funebris*	1
66	*Oriolus chinensis*	1
67	*Paradoxurus hermaphroditus*	1
68	*Phylloscopus borealis*	1
69	*Platymantis corrugatus*	1
70	*Polypedates leucomystax*	1
71	*Rattus everetti*	1
72	*Rhabdornis inornatus*	1
73	*Rhipidura superciliaris*	1
74	*Saxicola caprata*	1
75	*Sitta frontalis*	1

Fauna Species Diversity and Evenness in Transect 4	
H`	4.08
E	0.95
No. of Individuals (N)	186
No. of Species (S)	75

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 5		
No.	**Species**	**No.of Ind.**
1	*Hirundo tahitica*	8
2	*Bradypterus caudatus*	5
3	*Collocalia esculenta*	5
4	*Geopelia striata*	5
5	*Hirundapus celebensis*	5
6	*Lophozosterops goodfellowi*	5
7	*Mulleripicus funebris*	5
8	*Prioniturus montanus*	5
9	*Aplonis minor*	4
10	*Apomys insignis*	4
11	*Apomys littoralis*	4
12	*Chloropsis flavipennis*	4
13	*Gekko gecko*	4
14	*Hirundo rustica*	4
15	*Macaca fascicularis*	4
16	*Oriolus chinensis*	4
17	*Sus philippensismindanensis*	4
18	*Turnix sylvatica*	4
19	*Bubulcus ibis*	3
20	*Calotes cristatellus*	3
21	*Centropus melanops*	3
22	*Chalcophaps indica*	3
23	*Coracina striata*	3
24	*Culicicapa helianthea*	3
25	*Dicaeum trigonostigma*	3

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 5		
No.	**Species**	**No.of Ind.**
26	*Halcyon smyrnensis*	3
27	*Lonchura malacca*	3
28	*Loriculus philippensis*	3
29	*Platymantis dorsalis*	3
30	*Polypedates leucomystax*	3
31	*Aethopyga linaraborae*	2
32	*Basilornis miranda*	2
33	*Centropus bengalensis*	2
34	*Centropus viridis*	2
35	*Collocalia mearnsi*	2
36	*Coracina mcgregori*	2
37	*Corvus enca*	2
38	*Coturnix chinensis*	2
39	*Dicaeum ignipectus*	2
40	*Gekko monarchus*	2
41	*Halcyon winchelli*	2
42	*Lamprolepis smaragdina*	2
43	*Mabuya multifaciata*	2
44	*Microhierax erythrogenys*	2
45	*Muscicapa sibirica*	2
46	*Occidozyga laevis*	2
47	*Pycnonotus goiavier*	2
48	*Rattus argentiventer*	2
49	*Rattus everetti*	2
50	*Rattus exulans*	2
51	*Rhipidura javanica*	2
52	*Rhipidura superciliaris*	2

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 5		
No.	**Species**	**No.of Ind.**
53	*Aceros leucocephalus*	1
54	*Aceros waldeni*	1
55	*Batrachostomus septimus*	1
56	*Ceyx lepidus*	1
57	*Cynocephalus volans*	1
58	*Dasia sp.*	1
59	*Ficedula parva*	1

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 5		
No.	**Species**	**No.of Ind.**
60	*Mearnsia picina*	1
61	*Megalurus timoriensis*	1
62	*Muscicapa griseisticta*	1
63	*Ophiophagus hannah*	1
64	*Passer montanus*	1

Fauna Species Diversity and Evenness in Transect 5	
H`	4.03
E	0.97
No. of Individuals (N)	175
No. of Species (S)	64

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 6		
No.	**Species**	**No.of Ind.**
1	*Accipiter trivirgatus*	3
2	*Culicicapa helianthea*	7
3	*Hirundo tahitica*	6
4	*Nectarinia jugularis*	6
5	*Aethopyga pulcherrima*	5
6	*Cynocephalus volans*	5
7	*Ficedula basilanica*	5
8	*Pitta steerii*	5
9	*Pycnonotus urostictus*	5
10	*Rattus exulans*	5
11	*Centropus melanops*	4
12	*Cypsiurus balasiensis*	4
13	*Dicrurus hottentottus*	4
14	*Gekko gecko*	4
15	*Aethopyga boltoni*	3
16	*Bradypterus caudatus*	3
17	*Centropus bengalensis*	3
18	*Centropus viridis*	3
19	*Collocalia esculenta*	3
20	*Collocalia mearnsi*	3
21	*Coturnix chinensis*	3
22	*Dasia grisea*	3
23	*Dicaeum ignipectus*	3
24	*Lonchura malacca*	3
25	*Mearnsia picina*	3
26	*Sundasciurus philippinensis*	3
27	*Chalcophaps indica*	2
28	*Chloropsis flavipennis*	2

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 6		
No.	**Species**	**No.of Ind.**
29	*Dicaeum trigonostigma*	2
30	*Hypsipetes rufigularis*	2
31	*Kaloula picta*	2
32	*Oriolus chinensis*	2
33	*Passer montanus*	2
34	*Pelophryne brevipes*	2
35	*Rattus tanezumi*	2
36	*Sitta frontalis*	2
37	*Sus philippensismindanensis*	2
38	*Actenoides hombroni*	1
39	*Aplonis minor*	1
40	*Apomys littoralis*	1
41	*Coracina mcgregori*	1
42	*Dendrelaphis pictus*	1
43	*Gallicolumba criniger*	1
44	*Gallirallus torquatus*	1
45	*Hypsipetes philippinus*	1
46	*Mabuya multicarinata*	1
47	*Mabuya multifaciata*	1
48	*Macronous striaticeps*	1
49	*Megalurus palustris*	1
50	*Prioniturus montanus*	1
51	*Rana magna*	1
52	*Rattus everetti*	1
53	*Stachyris capitalis*	1

Fauna Species Diversity and Evenness in Transect 6	
H`	3.8
E	0.96
No. of Individuals (N)	142
No. of Species (S)	53

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 7		
No.	**Species**	**No.of Ind.**
1	*Lonchura malacca*	9
2	*Bufo marinus*	8
3	*Dicaeum trigonostigma*	7
4	*Bubulcus ibis*	6
5	*Chloropsis flavipennis*	6
6	*Gekko gecko*	6
7	*Hemidactylus frenatus*	6
8	*Hirundo rustica*	6
9	*Megalurus palustris*	6
10	*Megalurus timoriensis*	6
11	*Centropus melanops*	5
12	*Hirundo tahitica*	5
13	*Mus musculus*	5
14	*Muscicapa griseisticta*	5
15	*Rhabdornis inornatus*	5
16	*Aethopyga primigenius*	4
17	*Bradypterus caudatus*	4
18	*Coracina striata*	4
19	*Muscicapa dauurica*	4
20	*Phylloscopus borealis*	4
21	*Saxicola caprata*	4
22	*Centropus bengalensis*	3
23	*Centropus viridis*	3
24	*Dasia grisea*	3
25	*Gekko monarchus*	3
26	*Geopelia striata*	3
27	*Passer montanus*	3
28	*Phapitreron cinereiceps*	3
29	*Rattus argentiventer*	3
30	*Rattus exulans*	3
31	*Aethopyga boltoni*	2
32	*Alcedo argentata*	2
33	*Amaurornis phoenicurus*	2

Appendix 14: Fauna Species Diversity and Evenness per Transect

TRANSECT 7		
No.	**Species**	**No.of Ind.**
34	*Ceyx lepidus*	2
35	*Chalcophaps indica*	2
36	*Collocalia mearnsi*	2
37	*Coracina mcgregori*	2
38	*Cosymbotus platyurus*	2
39	*Coturnix chinensis*	2
40	*Dicaeum ignipectus*	2
41	*Dicrurus hottentottus*	2
42	*Halcyon smyrnensis*	2
43	*Lygosoma quadrupes*	2
44	*Microhierax erythrogenys*	2
45	*Platymantis corrugatus*	2
46	*Varanus salvator*	2
47	*Ahaetulla prassina prassina*	1
48	*Aplonis minor*	1
49	*Chrysopelea paradisi*	1
50	*Collocalia esculenta*	1
51	*Culicicapa helianthea*	1
52	*Cynocephalus volans*	1
53	*Cyornis rufigastra*	1
54	*Cypsiurus balasiensis*	1
55	Draco fimbriatus	1
56	*Lamprolepis smaragdina*	1
57	*Lophozosterops goodfellowi*	1
58	*Mabuya multifaciata*	1
59	*Macropygia phasianella*	1
60	*Motacilla cinerea*	1
61	*Polypedates leucomystax*	1
62	*Rhipidura javanica*	1
63	*Rhipidura superciliaris*	1

Fauna Species Diversity and Evenness in Transect 6	
H`	3.94
E	0.95
No. of Individuals (N)	191
No. of Species (S)	63

Fauna Species Diversity and Evenness per Transect							
	T1	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**
H`	3.93	4.12	4.17	4.08	4.03	3.8	3.94
E	0.91	0.94	0.95	0.95	0.97	0.96	0.95
No. of Individuals (N)	153	220	216	186	175	142	191
No. of Species (S)	74	80	81	75	64	53	63

Appendix 15.1. List of Wildlife during PRBA

No.	Family Name	Scientific Name	Common Name	Endemicity	Trophic Guild	IUCN	CITES	DAO
1	ANATIDAE	*Anas luzonica*	Philippine Duck*	Endemic	Piscivore	Vulnerable		Vulnerable
2	ARDEIDAE	*Ardeola speciosa*	Javan Pond-Heron*	Non Endemic	Insectivore			
3	STRIGIDAE	*Bubo philippensis*	Philippine Eagle- Owl*	Endemic	Raptorial	Vulnerable	Appendix 2	Vulnerable
4	PSITTACIDAE	*Cacatua haematuropygia*	Philippine Cockatoo*	Endemic	Graminivore		Appendix 2	Critically endangered
5	ALCEDINIDAE	*Ceyx melanurus*	Philippine- Dwarf Kingfisher*	Endemic	Piscivore	Vulnerable		Vulnerable
6	APODIDAE	*Collocalia whiteheadi*	Whitehead's Mountain Swiftlet*	Endemic	Insectivore			
7	DICAEIDAE	*Dicaeum anthonyi*	Flame-crowned Flowerpecker*	Endemic	Insectivore			
8	DICAEIDAE	*Dicaeum nigrilore*	Olive-capped Flowerpecker*	Endemic	Insectivore			
9	DICAEIDAE	*Dicaeum proprium*	Whiskered Flowerpecker*	Endemic	Insectivore			
10	COLUMBIDAE	*Ducula carola*	Spotted Imperial- Pigeon*	Endemic	Insectivore - Graminivore			Vulnerable
11	ESTRILDIDAE	*Erythrura coloria*	Red-eared Parrotfinch*	Endemic	Graminivore			
12	EURYLAIMIDAE	*Eurylaimus steerii*	Wattled Broadbill*	Endemic	Insectivore-Vermivore			Vulnerable
13	MUSCICAPIDAE	*Ficedula crypta*	Cryptic Flycatcher*	Endemic	Insectivore			
14	MUSCICAPIDAE	*Ficedula disposita*	Furtive Flycatcher*	Endemic	Insectivore			
15	ARDEIDAE	*Gorsachius goisagi*	Japanese Night-Heron*	Non Endemic	Insectivore			
16	ZOSTEROPIDAE	*Hypocryptadius cinnamomeus*	Cinnamon Ibon*	Endemic	Insectivore-Frugivore			
17	MUSCICAPIDAE	*Hypothymis coelestis*	Celestial Monarch*	Endemic	Insectivore			Vulnerable
18	MUSCICAPIDAE	*Hypothymis helenae*	Short-crested Monarch*	Endemic	Insectivore			
19	JACANIDAE	*Irediparra gallinacea*	Comb-crested Jacana*	Non Endemic	Piscivore			
20	LANIIDAE	*Lanius validirostris*	Mountain Shrike*	Endemic	Insectivore-Vermivore			
21	TIMALIIDAE	*Leonardina woodi*	Bagobo Babbler*	Endemic	Insectivore			
22	TIMALIIDAE	*Micromacronus leytensis*	Miniature Tit-Babbler*	Endemic	Insectivore			
23	STRIGIDAE	*Mimizuku gurneyi*	Giant Scops-Owl/Lesser Eagle- Owl*	Endemic	Insectivore-Frugivore		Appendix 1	Vulnerable
24	ORIOLIDAE	*Oriolus albiloris*	White-lored Oriole*	Endemic	Frugitive	Least Concern		
25	SYLVIIDAE	*Orthotomus cinereiceps*	White-eared Tailorbird*	Endemic	Insectivore			

Appendix 15.1. List of Wildlife during PRBA

No.	Family Name	Scientific Name	Common Name	Endemicity	Trophic Guild	IUCN	CITES	DAO
26	SYLVIIDAE	*Orthotomus heterolaemus*	Rufous-headed Tailorbird*	Endemic	Insectivore			
27	SYLVIIDAE	*Orthotomus nigriceps*	Black-headed Tailorbird*	Endemic	Insectivore			
28	STRIGIDAE	*Otus mirus*	Mindanao Scops-Owl*	Endemic	Insectivore-Frugivore		Appendix 2	
29	PARIDAE	*Parus semilarvatus*	White-fronted Tit*	Endemic	Insectivore-Vermivore			
30	PELECANIDAE	*Pelecanus philippensis*	Spot-billed Pelican*	Non Endemic	Piscivore			
31	BUCEROTIDAE	*Penelopides affinis*	Mindanao Hornbill*	Endemic	Frugivore		Appendix 2	
32	BUCEROTIDAE	*Penelopides manillae*	Luzon Hornbill*	Endemic	Frugivore		Appendix 2	
33	COLUMBIDAE	*Phapitreron brunneiceps*	Mindanao Brown-dove*	Endemic	Insectivore - Graminivore			
34	ACCIPITRIDAE	*Pithecophaga jefferyi*	Philippine Eagle*	Endemic	Raptorial		Appendix 1	Critically endangered
35	RALLIDAE	*Porzana fusca*	Ruddy Breasted Crake*	Non Endemic	Insectivore-Graminivore			
36	PSITTACIDAE	*Prioniturus waterstradti*	Mindanao Racquet-tail*	Endemic	Graminivore		Appendix 2	
37	TIMALIIDAE	*Ptilocichla mindanensis*	Streaked- Ground Babbler*	Endemic	Insectivore			
38	FRINGILLIDAE	*Pyrrhula leucogenis*	White-cheeked Bullfinch*	Endemic	Insectivore-Vermivore			
39	MUSCICAPIDAE	*Rhinomyias goodfellowi*	Slaty backed/Goodfellow's Jungle-Flycatcher*	Endemic	Insectivore			
40	SCOLOPACIDAE	*Scolopax rusticola*	Eurasian Woodcock*	Non Endemic	Piscivore			
41	SCOLOPACIDAE	*Scolopax sp.*	Bukidnon Woodcock*	Endemic	Piscivore			
42	FRINGILLIDAE	*Serinus estherae*	Mountain Serin*	Non Endemic	Insectivore-Vermivore			
43	ACCIPITRIDAE	*Spilornis cheela*	Crested Serpent Eagle*	Non Endemic	Raptorial		Appendix 2	
44	ACCIPITRIDAE	*Spizaetus philippensis*	Philippine Hawk-Eagle*	Endemic	Raptorial		Appendix 3	Vulnerable
45	TIMALIIDAE	*Stachyris plateni*	Pygmy Babbler*	Endemic	Insectivore			
46	PODICIPEDIDAE	*Tachybaptus ruficollis*	Little Grebe*	Non Endemic	Piscivore			
47	PSITTACIDAE	*Trichoglossus johnstoniae*	Mindanao Lorikeet*	Endemic	Graminivore		Appendix 2	

Appendix 15.1. List of Wildlife during PRBA

No.	Family Name	Scientific Name	Common Name	Endemicity	Trophic Guild	IUCN	CITES	DAO
48	CERCOPITHECIDAE	*Macaca fascicularis*	Long-tailed macaque*	Non Endemic	Omnivore			
49	CERVIDAE	*Cervus mariannus*	Philippine brown deer*	Endemic	Herbivore			
50	CYNOCEPHALIDAE	*Cynocephalus volans*	Kagwang, Philippine flying lemur*	Endemic	Insectivore-Graminivore			
51	MEGADERMATIDAE	*Megaderma spasma*	Common Asian ghost bat, lesser false vampire*	Non Endemic	Frugivore			
52	MURIDAE	*Apomys insignis*	Mindanao montane forest mouse*	Endemic	Graminivore-Frugivore			
53	MURIDAE	*Apomys littoralis*	Mindanao lowland forest mouse*	Endemic	Graminivore-Frugivore			
54	MURIDAE	*Batomys salomonseni*	Mindanao hairy-tailed rat*	Non Endemic	Graminivore-Frugivore			
55	MURIDAE	*Bullimus bagobus*	Large Mindanao forest rat*	Non Endemic	Graminivore-Frugivore			
56	MURIDAE	*Crunomys melanius*	Southern Philippine shrew-mouse*	Non Endemic	Insectivore			
57	PTEROPODIDAE	*Rousettus amplexicaudatus*	Common Rousette*	Non Endemic	Insectivore			
58	PTEROPODIDAE	*Acerodon jubatus*	Golden-crowned flying fox*	Endemic	Frugivore		Appendix 1	Endangered
59	PTEROPODIDAE	*Eonycteris robusta*	Philippine nectar bat, Philippine dawn bat*	Endemic	Nectivore			
60	PTEROPODIDAE	*Haplonycteris fischeri*	Philippine pygmy fruit bat*	Endemic	Frugivore			
61	PTEROPODIDAE	*Ptenochirus minor*	Lesser musky fruit bat*	Endemic	Frugivore			
62	PTEROPODIDAE	*Pteropus vampyrus*	Large flying fox*	Non Endemic	Frugivore	Least concern	Appendix 2	
63	RHINOLOPHIDAE	*Hipposideros diadema*	Diadem roundleaf bat*	Non Endemic	Frugivore			
64	RHINOLOPHIDAE	*Rhinolophus virgo*	Yellow-faced horseshoe bat*	Endemic	Frugivore			
65	SCIURIDAE	*Exilisciurus concinnus*	Philippine pygmy squirrel*	Endemic	Frugivore			
66	SCIURIDAE	*Sundasciurus philippinensis*	Philippine tree squirrel*	Endemic	Insectivore-Frugivore			
67	SORICIDAE	*Crocidura beatus*	Common Mindanao shrew*	Endemic	Insectivore-Frugivore			
68	TARSIIDAE	*Tarsius syrichta*	Philippine tarsier*	Endemic	Insectivore-Frugivore		Appendix 2	
69	TUPAIIDAE	*Urogale everetti*	Mindanao tree shrew*	Endemic	Insectivore-Frugivore			
70	VESPERTILIONIDAE	*Miniopterus australis*	Little bent-winged bat*	Non Endemic	Frugivore			

Appendix 15.1. List of Wildlife during PRBA

No.	Family Name	Scientific Name	Common Name	Endemicity	Trophic Guild	IUCN	CITES	DAO
71	VESPERTILIONIDAE	*Miniopterus schreibersi*	Common bent-winged bat*	Non Endemic	Frugivore		Appendix 3	
72	VESPERTILIONIDAE	*Scotophilus kuhlii*	Lesser Asian house bat*	Non Endemic	Frugivore/Carnivore			
73	VIVERRIDAE	*Paradoxurus hermaphroditus*	Common palm civet*	Non Endemic	Omnivore	Least concern	Appendix 3	
74	VIVERRIDAE	*Viverra tangalunga*	Malay civet, *tangalung**	Non Endemic	Frugivore			

Appendix 15.2. List Of Fauna Species Account Per Class

CLASS AMPHIBIA

COMMON FOREST FROG
RANIDAE: *Platymantis dorsalis*
Habits: Natural habitats are subtropical or tropical moist lowland forests, subtropical or tropical moist montane forests, plantations, rural gardens, and heavily degraded former forest. It is threatened by habitat loss. **Observed at transects 1, 3 and 5.**

COMMON TREE FROG
RHACOPHORIDAE :*Polypedatesleucomystax*
Habits: Inhabits in forest and open areas. Feeds on invertebrates; oviparous; arboreal; nocturnal; non-endemic; and common. **Observed at transects 2, 4, 5 and 7.**

GIANT MARINE TOAD
BUFONIDAE :*Bofumarinus*
Habits: Thrives in open, non-forested areas; feeds on invertebrates; oviparous; terrestrial; introduced; common. **Observed at transects 1, 2, 3, 4 and 8.**

GIANT PHILIPPINE FROG
RANIDAE :*Rana magna*
Habits: Thrives in primary forest; feeds on invertebrates; oviparous; amphibious; nocturnal; endemic; common. **Observed at transects 1, 3, 4 and 6.**

PUDDLE FROG
RANIDAE: *Occidozygalaevis*
Habits: This frog is found in a range of habitats, from polluted puddles and marshes to clear mountain streams and is active both diurnally and nocturnally which feeds on invertebrates. **Observed at transects 1, 3, and 5.**

ROUGH BACKED FOREST FROG
RANIDAE: *Platymantis corrugatus*
Habits: Inhabits in primary, secondary and man-made forest. **Observed at transects 1, 4 and 7.**

SLENDER-DIGIT CHORUS FROG
MICROHYLIDAE: *Kaloula picta*
Habits: Natural habitats are subtropical or tropical moist lowland forests, subtropical or tropical moist shrubland, subtropical or tropical seasonally wet or flooded lowland grassland, rivers, freshwater lakes and marshes, arable and pasture land. **Observed at transects 2, 3 and 6.**

SOUTHEAST ASIAN TOADLET
BUFONIDAE: *Pelophryne brevipes*
Habits: Inhabits in primary forest. Feeds on vertebrates. **Observed at transects 1, 3, 4 and 6**

CLASS REPTILIA

COMMON BRONZE-BACK SNAKE
COLUBRIDAE: *Dendrelaphis pictus*
Habits: Habitats including scrub, secondary forest, back-beach habitats as well as parks and gardens. It is active by day, searching for its food prey - mainly lizards and frogs. **Observed at transects 1, 3 and 6.**

COMMON HOUSE GECKO
GEKKONIDAE: *Hemidactylus frenatus*
Habits: Abundant in open areas, vegetation near houses like gardens and plantations. **Observed at transects 1, 2 and 7.**

COMMON MABOUYA
SCINCIDAE: *Mabuyamultifasciata*
Habits: This kind of lizards mainly feed on insects and have good characteristics to mimic in decaying logs or piles of rotting vegetation if threats are observed. **Observed at transects 1, 2, 4, 5, 6 and 7.**

COMMON RAT SNAKE

COLUBRIDAE: *Elaphe erythrura*
Habits: Frequently found in the vicinity of human dwellings and often entering houses. Its latitudinal distribution is from medium to 500 meters above sea level. It feeds heavily on rats and occasionally on birds. **Observed at transects 2 and 4.**

ELONGATE-HEADED TREE SNAKE
COLUBRIDAE : *Ahaetulla prassina prassina*
Habits: Primarily diurnal and arboreal, living in humid rainforests and feeds on small reptiles and amphibians, particularly lizards and tree frogs. **Observed at transects 1, 3 and 7.**

FLAT-BODIED HOUSE GECKO
GEKKONIDAE: *Cosymbotusplatyurus*
Habits: Common in areas near human settlements, also found in forests edges, and near farms. **Observed at transects 1 and 7.**

INDONESIAN CALOTES
AGAMIDAE: *Calotes cristatellus*
Habits: Found in secondary growth, at the forest fringe and also in agricultural areas, especially if they are situated near a forest. **Observed at transects: 2 and 5**

KING COBRA
ELAPIDAE: *Ophiopagus hannah*
Habits: Normally restricts its diet to cold-blooded animals, particularly other snakes. Near streams in dense or open forest, bamboo thickets, adjacent agricultural areas, and dense mangrove swamps. **Observed at transects 3 and 5.**

LARGE BLUNT-HEADED TREE SNAKE
COLUBRIDAE : *Boigacynodon*
Habits: A nocturnal species of rear-fanged colubrid snake that feeds on small birds, but may also take lizards and small mammals found resting in tree branches, overhanging a tributary of rivers. **Observed at transects 2 and 4.**

MINDANAO FLYING LIZARD
AGAMIDAE: *Draco fimbriatus*
Habits: The Mindanao Flying Dragon inhabits regions of primary and secondary-growth forests. There appears to be a dependence on primary dipterocarp forest for this species' survival. **Observed at transects 3 and 7.**

MONITOR LIZARD
VARANIDAE: *Varanus salvator*
Habits: Particularly common in mangrove areas as it is a strong swimmer and it can flourish on a diet of crabs and other large invertebrates. It is also an agile climber, and a raider of bird's nests. **Observed at transects 3, 4 and 7.**

NORTHERN KEEL-SCALED TREE SKINK
SCINCIDAE: *Dasiagrisea*
Habits: Diurnal, but elusive, resident of lowland primary and secondary forests. **Observed at transects 1, 2, 3, 4, 6 and 7.**

ORIENTAL SLENDER SKINK
SCINCIDAE: *Lygosomaquadrupes*
Habits: Is commonly observed within or beneath rotting logs, as well as in loose soil surrounding the root networks of large trees. **Observed at transects 1, 2, 3, 4, and 7.**

PARADISE TREE SNAKE
COLUBRIDAE: Chrysopelea paradise
Habits: It is mostly found in moist forests and can cover a horizontal distance of about 100 meters in a glide from the top of a tree. Mildly venomous with rear fangs and also can constrict its prey mostly lizards and bats. **Observed at transects 4 and 7.**

RETICULATED PYTHON
BOIDAE: *Python reticulatus*
Habits: Thrives in forested areas from sea level to 1,333 meter as well as wooded areas and piles of dirt near human habitations. **Observed at transect 2.**

SAMAR COBRA/PETER'S COBRA
ELAPIDAE : *Naja samarensis*
Habits: Observed in a wide range of habitats from tropical moist forest, to low-lying plains and dry forested regions. Also be found in agricultural areas such as rice fields, pineapple plantations, coconut groves and rural villages. **Observed at transect 2.**

SPOTTED GREEN TREE SKINK
SCINCIDAE: *Lamprolepis smaragdina*
Habits: It is commonly observed in the areas near agricultural farms along forest edges, an individual was observed basking on exposed rocks or portion of the ground with patches of grass vegetation. **Observed at transects 2, 3, 5 and 7.**

TOKAY GECKO
GEKKONIDAE: *Gekko gecko*
Habits: Emerges to feed on insects and small vertebrates at night. The species is easily distinguished by its size, and distinctive pattern of reddish-orange spots on a blue-grey background. **Observed at transects 2, 3, 5, 6 and 7.**

TWO STRIPED MABOUYA
SCINCIDAE: *Mabuyamulticarinata*
Habits: Generally brown in color. Occurs in Malaysia (Borneo), Philippines (Palau Islands), Taiwan (Lanyu). **Observed at transects 1, 2 and 6.**

VARIABLE-BACK NARROW-DISKED GECKO
GEKKONIDAE: *Gekko monarchus*
Habits: It has a variety of microhabitats in tree trunks, sometimes of forest floors on the rocks and buttresses of the trees. **Observed at transects 4, 5 and 7.**

SCINCIDAE : Dasia sp.
Habits: lives almost exclusively in trees, only rarely descending to nest or to move between trees. **Observe at transect 5.**

CLASS AVES

APO MYNA
STURNIDAE: *Basilornis Miranda*
Habits: Found in forest and forest edgeabove 1250m, singly, in pairs and in small groups. Eat both fruits and insects. **Observed at transects 3, 4 and 5**

APO SUNBIRD
NECTARINIIDAE: *Aethopygaboltoni*
Habits: Fairly noisy and active in montane mossy forest, singly in pairs or in mixed flocks usually above 1500m,but has been recorded as low as 1100m. **Observed in transects 1,2,3,4,6 and 7.**

ARCTIC WARBLER
SYLVIIDAE: *Phylloscopus borealis*
Habits: Usually found gleaning insects in outer branches in the canopy and understory of forest edge, and second growth in mixed flocks. **Observed at transects 1, 2, 3 4 and 7.**

ASIAN BROWN FLYCATCHER
MUSCICAPIDAE: *Muscicapadauurica*
Habits: Found conspicuously perched in the canopy in forest, forest edge, second growth gardens and sometimes associated with the forest stream. **Observed at transects 2 and 7.**

ASIAN GLOSSY STARLING
STURNIDAE:*Aplonispanayensis*
Habits: Gregarious resident in cities, parks, coconut plantations, second growth forest, forest edge, and in the lowlands. Returns to roost in flocks that are particularly noisy when settling for the night. **Observed at transect 3.**

ASIAN PALM SWIFT
APODIDAE: *Cypsiurusbalasiensis*
Habits: Almost always associated with palms, particularly coconut palms, in the lowlands flying within and over the canopy and over adjacent fields and rice fields. **Observed in transect 1,2,3,4,6 and 7.**

STEERE'S PITTA
PITTIDAE: *Pitta steerii*
Habits: Confined to forest, often in association with limestone, on or near the ground, below 1000 m. **Observed at transects 3 and 6.**

BAR-BELLIED CUCKOO-SHRIKE
CAMPEPHAGIDAE:*Coracinastriata*

Habits: Noisy and conspicuous flying over clearings and between ridges in the canopies of forest and second growth, up to around 2000 m, in small groups or in mixed flocks with other cuckoo-shrikes. Feeds on insects including larvae.**Observed at transect 1,2,3, 5 and 7.**

BARN SWALLOW
HIRUNDINIDAE: *Hirundorustica*
Habits: Forages over a wide range of habitats from open country, wetlands, and towns to forested mountain passes. Flight is fast and erratic, usually low over the ground but may fly very high. **Observed at transect 1,2,3,5 and 7.**

BARRED RAIL
RALLIDAE:*Gallirallustorquatus*
Habits: Can be found from edges of wetlands, gardens, drier cogon grasslands, logged over areas and plantations. Shy but conspicuous, often seen foraging along roads or running across them particularly in early morning and late afternoon. **Observed at transect 1, 3 and 6.**

BHRAMINY KITE
ACCIPITRIDAE:*Haliasturindus*
Habits: Found in open country and forest edge, often over lakes, rivers, estuaries and along the coast. Usually found in the lowlands, but has been seen over 1500 m above montane forest. Feeds on a variety of animals and will take carrion, especially from surface of water. **Observed at transect 3.**

BLACK FACED COUCAL
CUCULIDAE: *Centropusmelanops*
Habits: Found in lowland forest and forest edge, singly or in pairs. Forages in dense vines and tangles in the middle and upper stories, usually below 1000m**. Has been observed in seven transects.**

BLACK-MASKED WHITE-EYE
ZOSTEROPIDAE: *Lophozosteropsgoodfellowi*
Habits: Travels in groups and mixed flocks, at all forest levels in submontane and montane mossy forest usually above 1250 m. **Observed in transects 3,4,5 and 7.**

BLACK-NAPED ORIOLE
ORIOLIDAE:*Orioluschinensis*
Habits: Common in forest edge, second growth, scrub, and trees in cultivated areas and gardens, singly or in groups. **Observed at transects 2,3,4,5 and 6**

BLUE-BREASTED QUAIL
PHASIANIDAE:*Coturnixchinensis*
Habits: Found on the ground in a wide variety of open land from cogon grasslands to rice-fields and pastures in the lowlands but in suitable habitat at higher elevations to at least 1100 m. **Observed at seven transects.**

BLUE-CAPPED WOOD-KINGFISHER
ALCEDINIDAE: *Actenoideshombroni*
Habits: Confined to mid-montane and lower mossy forest from 1000 to 2000 m where it associates to some degree with streams, feeding on snails, insects and crustacean as well as small vertebrates. **Observed at transects 2,4, and 6.**

BLUE FANTAIL
MUSCICAPIDAE: Rhipidurasuperciliaris
Habits: Fairly inconspicuous in forest and forest edge in the understory, up to 10 m from the ground, singly or in mixed flocks, below 1200m. **Observed at transects 1,2,3,4,5 and 7.**

BROWN TIT-BABBLER
TIMALIIDAE: Macronousstriaticeps
Habits: Noisy but shy, travelling in small flocks near the ground in the dense underbrush in the forest, forest edge, and second growth up to about 1500 m. **Observed at transects 1,3,4 and 6.**

CATTLE EGRET
ARDEIDAE: *Bubulcus ibis*
Habits: Usually in pastures or rice fields, but also in and near marshes or lakes. Often associated with large domestic animals like cattle, carabaos which they follow waiting to catch disturbed insects. **Observed at transects 1, 5 and 7.**

CHESTNUT MUNIA
TIMALIIDAE:*Lonchuramalacca*

Habits: Once considered the National Bird of the Philippines, found in rice fields, grasslands, and open country, usually in large tightly gathered flocks. **Observed at seven transects.**

CITRINE-CANARY FLYCATCHER
STERINIDAE: *Culicicapahelianthea*
Habits: Usually found in mid-mountain forests and higher, up to 2500 m, but may occur in lowlands on some islands. Prefers the understory where it perches upright flying out to catch insects. Seen either singly or in mixed flocks.**Observed at seven transects.**

COLASISI
PSITTACIDAE: *Loriculusphilippensis*
Habits: Found in all forest types and forest patches, even garden in cities, up to 1000 m but has been recorded to the limits of mossy forest at about 2500 m, singly or in pairs. Found in groups at feeding trees. Feeds on the blossoms and fluid released by flowering coconut palms, bananas and other fruits.**Observe at transect 4.**

COMMON EMERALD-DOVE
COLUMBIDAE:*Chalcophapsindica*
Habits: Very shy, rarely seen except flying low through understory of forest and second growth or between patches of forest in the lowlands to about 1000 m.Feeds on forest floor and sides of roads in forest, early in morning. **Observed at seven transects.**

CRESTED GOSHAWK
ACCIPITRIDAE: *Accipiter trivirgatus*
Habits: Found in forest and forest edge at all levels, but tends to hunt from perch low in forest. **Observed at transects 2, 4 and 6.**

DARK SIDED FLYCATCHER
MUSCICAPIDAE: *Muscicapasibirica*
Habits: Usually flycatches from exposed perch in middle story and canopy of trees in forests and forest edge. **Observed in transects 1, 2, 4 and 5.**

DARK-EARED BROWN DOVE
COLUMBIDAE: *Phapitreroncinereiceps*
Habits: Both races are poorly known but generally are found in the forest, singly or in pairs, usually in the middle story or canopy. The Mindanao races ranges from middle to higher elevations from about 500 and 2000 m. The Basilan and Tawi-Tawi populations are found in the lowlands. **Observe at transects2, 3 and 7.**

EURASIAN TREE SPARROW
PLOCEIDAE:*Passer montanus*
Habits: Found in association with humans in cities, towns, and cultivated areas. Usually occurs in pairs or in small groups. **Observed at seven transects.**

FIRE BREASTED FLOWERPECKER
DICAEIDAE: *Dicaeumignipectus*
Habits: Found in montane forests and forest edge in fruiting and flowering trees, singly and in mixed flocks, above 1000 m. **Observed in seven transects.**

GLOSSY SWIFTLET
APODIDAE:*Collocaliaesculenta*
Habits: This most conspicuous swiftlet ranges from the sea coasts to the high mountains, often feeding low over forest or close to the ground over streams and clearings, including roads. **Observed at seven transects.**

GOLDEN-BELLIED FLYEATER
ACANTHIZIDAE: *Gerygonesulphurea*
Habits: Found in trees in open country, residential areas, second growth, and mangroves, singly or in pairs. Gleans insects from outer branches and leaves.**Observed at transect 1, 2 and 3.**

GREY-HOODED SUNBIRD
NECTARINIIDAE: *Aethopygaprimigenius*
Habits: In submontane and montane forest and forest edge, singly, in pairs and in mixed flocks between 1000 and 1700 m on the larger mountain masses. Particularly fond on the flower of banana plants. **Observed at transect 1,2,3,4 and 7.**

GREY WAGTAIL
MOTACILLIDAE: *Motacillacinerea*

Habits: More often found in stream beds or along forest roads with water running across or along them, at all elevations; rarely encountered in open areas and rice fields. Usually solitary or in pairs.**Observed at transect 1,2,3,4 and 7.**

GREY-STREAKED FLYCATCHER
MUSCICAPIDAE: *Muscicapagriseisticta*
Habits: Perches conspicuously in the tops of trees in forests, forest edge, second growth and trees in open areas, where it is often seen flying out 10 to 20 m catching insects on the wing. **Observed at transect 1, 3, 5 and 7.**

LESSER COUCAL
CUCULIDAE: *Centropusbengalensis*
Habits: Found in grassland and open country, almost never in forest or even forest edge. Skulks through dense grass, often perches in open and on top of grass.**Observed at seven transects.**

LINA'S SUNBIRD
NECTARINIIDAE: *Aethopygalinaraborae*
Habits: Occurs singly, in pairs or mixed flocks from 1000 m and above in montane forest. **Observed at transects 1, 2, 3, 4, 6 and 7.**

LITTLE SLATY FLYCATCHER
MUSCICAPIDAE: *Ficedulabasilanica*
Habits: Found in the understory from the ground to about 10 m in forest and second growth below 100 m. **Observed at transects 1, 3 and 6.**

LONG-TAILED GROUND-WARBLER
SYLVIIDAE:*Bradypteruscaudatus*
Habits: Uncommon in forest, forest edge, and dense second growth above 700m, singly or in pairs, on or near the ground. **Observed in seven transects.**

MANGROVE BLUE FLYCATCHER
MUSCICAPIDAE: *Cyornisrufigastra*
Habits: A lowland species preferring open scrubby country, disturbed forest, forest edge and second growth in the understory, usually less than 10m from the ground, alone or in pairs. **Observed at transect 1, 4 and 7.**

MCGREGOR'S CUCKOO-SHRIKE
CAMPEPHAGIDAE: *Coracinamcgregori*
Habits: Forages on the canopy or understory of the forest and forest edge above 1000 m, in groups or in mixed flocks. **Observed in seven transects.**

METALLIC-WINGED SUNBIRD
NECTARINIIDAE: *Aethopygapulcherrima*
Habits: Found in forest, forest edge, second growth, and plantation of banana and related species, singly, or in mixed flocks usually in mid-mountain forest up to 1500m but sometimes in lowlands on Mindanao, and up to 2000m in Luzon. **Observed at transects 1, 2, 3 and 6.**

MINDANAO BLEEDING HEART
COLUMBIDAE: *Gallicolumbacriniger*
Habits: A shy, secretive dove usually seen walking on the ground in virgin or second growth forest or along trails or roads in the forest. Ranges from lowland to mid-mountain forest usually below 1000 m. **Observe at transects 1, 2, 4 and 6**

MONTANE RACQUET TAIL
PSITTACIDAE: *Prioniturusmontanus*
Habits: Found in mid-mountain forest usually above 1000m to the limits of montane mossy forest 2500 m, alone or in pairs and small groups. **Observed at transects 1, 3, 5 and 6.**

OLIVE-BACKED SUNBIRD
NECTARINIIDAE:*Nectariniajugularis*
Habits: Active and noisy, found in second growth, coconut plantations, scrub, mangroves, and gardens in towns and cities usually below 1000 m, singly or in pairs, in fruiting trees. **Observed at transects 1, 2, 3 and 6.**

ORANGE-BELLIED FLOWERPECKER
DICAEIDAE:*Dicaeumtrigonostigma*
Habits: Prefers more disturbed forest edge and recent second growth, including cultivated land, in fruiting and flowering trees below 1500 m. **Observed at seven transects.**

PACIFIC SWALLOW
HIRUNDINIDAE: *Hirundotahitica*

Habits: Occurs in small groups along coasts and over towns and open areas, usually at lower elevations, rarer over forest. **Observed at seven transects.**

PHILIPPINE BULBUL
PYCNONOTIDAE:*Hypsipetesphilippinus*
Habits: Noisy and conspicuous in forest and forest edge up to 2000 m, singly, in groups, rarely in mixed flocks within the canopy and understory. **Observed at transect 1, 3, 4 and 6.**

PHILIPPINE COUCAL
CUCULIDAE: *Centropusviridis*
Habits: Found in a wide variety of habitats from grassland, mixed cultivation, second growth, and forest up to 2000 m, alone or in pairs. **Observed at seven transects.**

PHILIPPINE FALCONET
FALCONIDAE: *Microhieraxerythrogenys*
Habits: Found in open forest, clearings, and forest edge, singly, in pairs or in family groups, from lowlands to mid-mountain forest. **Observed at transects 5 and 7.**

PHILIPPINE FROGMOUTH
PODARGIDAE: *Batrachostomusseptimus*
Habits: Nocturnal in forest and forest edge up to about 2500m. **Observed at transect 5.**

PHILIPPINE LEAFBIRD
CHLOROPSEIDAE: *Chloropsisflavipennis*
Habits: Very difficult to see in the forest and forest edge, from lowlands up to 1500m, singly or in pairs.**Observed in seven transects.**

PHILIPPINE LEAF-WARBLER
SYLVIIDAE: *Phylloscopusolivaceus*
Habits: Usually foundin lowland and mid-mountain forest and forest edge below the altitudinal range of Mountain Leaf-Warbler, but has been recorded above 1500 m in Mindanao.**Observed at transects 1,2,3 and 4.**

PHILIPPINE NEEDLETAIL
APODIDAE:Mearnsiapicina
Habits: Usually seen in small groups feeding aerially above the forest or cleared areas adjacent to forestusually below 1000m.**Observed at transects 2, 5 and 6.**

PHILIPPINE SWIFTLET
APODIDAE: *Collocaliamearnsi*
Habits: Forages above forests and in clearings usually at the middle to higher elevations above 900 m. **Observed at seven transects.**

PIED BUSHCHAT
MUSCICAPIDAE: *Saxicolacaprata*
Habits: Found in bamboo groves, thickets, and forests, in the understory usually within a few meters from the ground where it is secretive, more often heard than seen. **Observed at transects 1,2,3,4 and 7.**

PIED FANTAIL
RHIPIDURIDAE :*Rhipidurajavanica*
Habits: Found in parks, residential areas, early second growth, bamboo thickets, and mangroves, singly or in pairs. Conspicuous and noisy, constantly fanning tail. **Observed at transects 1,2,3,5 and 7.**

PURPLE NEEDLETAIL
APODIDAE: *Hirundapuscelebensis*
Habits: Similar to Brown-backed Needletail, but has been seen over cities, including manila. **Observe at transect 1,2,3,4 and 5.**

PURPLE THROATED SUNBIRD
NECTARINIIDAE: *Nectarinasperata*
Habits: Ranges in the lowlands from mangroves to second growth, cultivated areas, and gardens. Very fond of flowering coconuts. Usually in pairs but may travel in small groups. **Observed at transect 1,2, 3 and 4.**

RED-BREASTED FLYCATCHER
MUSCICAPIDAE: *Ficedulaparva*
Habits: Found in forest edge, open country to gardens, stays low to the ground, frequently flicks tail upward flashing white base to tail. **Observed at transects 2 and 5.**

RED JUNGLE FOWL
PHASIANIDAE:*Gallus gallus*
Habits: Solitary and terrestrial found in virgin forest, second growth, and forest edge up to 2000 m. Crowing occurs throughout the day but more so in early morning and late afternoon. **Observed at transects 2,3 and 4.**

REDDISH CUCKOO-DOVE
COLUMBIDAE: *Macropygiaphasianella*
Habits: Found in variety of forest types from early second growth to montane mossy forest up to and above 2000 m. Usually seen singly and in pairs flying fast low, over fields, over and through the forest. **Observed at transects 2,3 and 7.**

RICHARD'S PIPIT
MOTACILLIDAE: *Anthusnovaeseelandiae*
Habits: Forages on the ground with erect posture preferably with clear visibility around it in open country; grasslands, ricefields and parks.**Observed at transect 3.**

RUFOUS-LORED KINGFISHER
ALCEDINIDAE: *Halcyon winchelli*
Habits: Easy to hear, hard to see in the forest or along streams in forest, usually below 1000m.it prefers high perches in the forest but also feeds on the ground. Food consists of invertebrates and small vertebrates. **Observed at transect 5.**

RUSTY-CROWNED BABBLER
TIMALIIDAE: *Stachyriscapitalis*
Habits: Active, usually seen foraging in the middle and understory in the small groups, often in mixed flocks in forest and forest edge below 1000m.**Observed at transects 2,4 and 6.**

SCARLET MINIVET
CAMPEPHAGIDAE:*Pericrocotusflammeus*
Habits: Found in the canopy of forests and forest edge in active and noisy groups, often in mixed flock, up to 2000 m. Gives flock call notes when moving from tree to tree. **Observed at transect 4.**

SHORT-TAILED GLOSSY STARLING
STURNIDAE: *Aplonis minor*
Habits: Forages on the canopy of forest and forest edge, above 900m. **Observed in seven transects.**

SILVERY KINGFISHER
ALCEDINIDAE: *Alcedoargentata*
Habits: Found on rocks along the banks of forest streams and small rivers in the lowlands below 1000 m. Favors pool adjacent to forest. Dives into water for a small fish.**Observed at transect 3 and 7.**

SLENDER-BILLED CROW
CORVIDAE: *Corvusenca*
Habits: Fairly noisy in small groups in and above forest, forest edge, and second growth below 1000 m. Flight is direct, holding wings below the horizontal plane of its body, appears to be fluttering. **Observed at transect 1,2,4 and 5.**

SMALL BOTTONQUAIL
TURNICIDAE: *Turnixsylvatica*
Found in grasslands, pastures and fields. **Observed at transects 3 and 5.**

SOOTY WOODPECKER
PICIDAE: *Mulleripicusfunebris*
Habits: Found in forest and forest edge up to 1000 m throughout most of its range but also occurs in montane oak and pine forest, usually singly or in pairs. **Observed at transects 4 and 5.**

SPANGLED DRONGO
DICRURIDAE: Dicrurushottentottus
Habits: Noisy and conspicuous in forests, forest edge, and second growth, below 1500m, singly, in groups, rarely in main flocks. Very active, frequently flying out to catch insects on the wing or fro under leaves. **Observed at transects 1,2,3,4,6 and 7.**

STRIATED GRASSBIRD
LOCUSTELLIDAE: *Megaluruspalustris*
Habits: Noisy and conspicuous in grasslands, rice fields, marshy areas, and open country at any altitude, but more common in the lowlands. Often sits on exposed perches such as telephone wires. **Observed at transects 1,2,3,4,6 and 7.**

STRIPE-BREASTED RHABDORNIS

RHABDORNITHIDAE: *Rhabdornisinornatus*
Habits: Occurs above 800m. Diet varied on insects, fruits and once, in Mindanao, a tree frog recorded. In eastern Mindanao over 100 birds gathered to flycatch termites or some other similar flying insects.**Observed at transects 1, 2, 4 and 7.**

TAWNY GRASSBIRD
SYLVIIDAE: *Megalurustimoriensis*
Habits: Noisy but shy in tall grass, shrubs in open areas, and early second growth in the lowlands and mountains up to 2000 m. Often perches on top of grass and sometimes on telephone wires. **Observed at transects 1,2,3,4,5 and 7.**

VARIABLE DWARF-KINGFISHER
ALCEDINIDAE: *Ceyx Lepidus*
Habits: Perches low in the undergrowth within primary and secondary forest to dart out and catch insects on the wing or on the ground. Dive into streams to bathe, not to forage. Found singly and in pairs in the lowlands. **Observed transects 1,3,5 and 7.**

VELVET-FRONTED NUTHATCH
SITTIDAE: *Sittafrontalis*
Habits: Found creeping up, down or along trunks and branches of trees, mostly in the middle story and canopy, singly or in small groups and in mixed flocks in all forest types. **Observed at transect 2,4 and 6.**

WALDEN'S HORNBILL
BUCEROTIDAE: *Aceroswaldeni*
Habits: Fairly noisy and conspicuous, usually in small groups in forests canopy, but may be seen in tree in clearings, usually below 1000 m. **Observed at transect 5.**

WATERCOCK
RALLIDAE: *Gallicrexcinerea*
Habits: Found in shallow freshwater wetlands from ricefields to marshes where it can be very conspicuous as it wades in the water, and inconspicuous in the reeds and grasses at the water's edge. **Observed at transects 3 and 4.**

WHITE-BREASTED WATERHEN
RALLIDAE: *Amaurornisphoenicurus*
Habits: Prefers wetter areas than Plain Bush-hen, from grasslands, forest edge to marshes and mangroves. More conspicuous than most rails, often seen foraging at edge of or in water, along trails, and at edge of roads. Usually alone but several may be together. **Observed at transects 2, 4 and 7.**

WHITE-THROATED KINGFISHER
ALCEDINIDAE:*Halcyon smyrnensis*
Habits: Solitary or in pairs in clearings or along larger streams and rivers in open country and adjacent to forest. Usually confined in the lowlands but may be found above 1000 m. Feeds on anything it can catch, including, in one instance, a young fruit bat. **Observed at transects 1,2,3,5 and 7.**

WRITHED HORNBILL
BUCEROTIDAE: *Acerosleucocephalus*
Habits: Fairly noisy and conspicuous, usually in small groups in forests, but may be seen in tree in clearings, usually below 1200 m. **Observed at transects 4 and 5.**

YELLOW VENTED BULBUL
PYCNONOTIDAE: *Pycnonotusgoiavier*
Habits: Noisy and easily detected, singly or in groups in gardens, cultivated areas, scrub, early second growth, but never in virgin forest. Forages in fruiting and flowering shrubs and trees.**Observed at transects 1,2, 3,4 and 5.**

YELLOW-WATTLED BULBUL
PYCNONOTIDAE: *Pycnonotusurostictus*
Habits: Singly or in groups in second growth and forest edge below 1000m**. Observed at transects 1,2, 3and 6.**

ZAMBOANGA BULBUL
PYCNONOTIDAE: *Hypsipetesrufigularis*
Habits: Found in forest and forest edge, singly, in pairs or groups in or near fruiting trees.**Observed at transect 2,4 and 6.**

ZEBRA DOVE
COLUMBIDAE :*Geopeliastriata*
Habits: Most often seen on the ground, especially on roads, in open country, cultivated areas, and gardens singly or in pairs. **Observed at transects 1,2,4,5 and 7.**

CLASS MAMMALIA

ASIAN BLACK RAT
MURIDA:*Rattustanezumi*
Habits: It is a nocturnal and omnivorous, with preference for grains and fruits. **Observed at transects 2, 4 and 6.**

COMMON MINDANAO SHREW
SORICIDAE: *Crocidura beatus*
Habits: Its natural habitat is subtropical or tropical dry forests. It is threatened by habitat loss. **Observed at transects 1 and 2.**

COMMON PALM CIVET
VIVERRIDAE: *Paradoxurus hermaphrodites*
Habits: Terrestrial and arboreal, showing nocturnal activity patterns with peaks between late evening until after midnight and less active during nights when the moon is brightest. **Observed at transects 2, 3 and 4.**

COMMON PHILIPPINE FOREST RAT
MURIDAE: *Rattus everetti*
Habits: Found in primary and disturbed lowland, montane, and mossy forest, including scrubby areas close to forest. **Observed at transects 1, 2, 3, 4, 5 and 6.**

HOUSE MOUSE
MURIDAE: *Mus musculus*
Habits: Found in a very wide range of man-made habitats including houses, farms, and other types of buildings, and even coal mines and frozen meat stores. Primarily feed on plant matter, but are omnivorous, eat their own faeces to acquire nutrients produced by bacteria in their intestines. **Observed at transects 1 and 7.**

LONG-TAILED MACAQUE
CERCOPITHECIDAE: *Macaca fascicularis*
Habits: Common found in primary and secondary forests and widely distributed all over the Philippines. **Observed at transects 4 and 5.**

MALAY CIVET, TANGALUNGA
VIVERRIDAE: *Viverra tangalunga*
Habits: Noctunal animal in an open country or grassland areas, secondary or or original forest, often following human trails. Feeds on fruits and and chicken. **Observed at transects 2 and 3**

MINDANAO LOWLAND FOREST MOUSE
MURIDAE: *Apomys littoralis*
Habits: The nocturnal Camiguin forest mouse forages on the ground **.** Known only from the central highlands of Camiguin Island in the Philippines, the Camiguin forest mouse has been documented at elevations between 1,000 and 1,400 metres **observed at transects 1,2,4, 5 and 6.**

MINDANAO MONTANE FOREST MOUSE
MURIDAE: *Apomys insignis*
Habits: Pefers primary forest, but also occurring in disturbed forest but does not occur in human dominated areas such as agricultural areas and grasslands. **Observed at transects 4 and 5.**

MINDANAO TREE SHREW
TUPAIIDAE: *Urogale everetti*
Habits: Inhabits mid-elevation ranges and prefers montane and lower mossy forest, though it can be found in disturbed habitats near forested areas. **Observed in transect 3.**

PHILIPPINE FLYING LEMUR, KAGWANG
CYNOCEPHALIDAE: *Cynocephalus* volans
Habits: Active at night feeding on young leaves, buds and ripening fruits of certain tree species. **Observed at transects 5, 6 and 7.**

PHILIPPINE TREE SQUIRREL
SCIURIDAE: *Sundasciurus philippinensis*
Habits: Lives inside virgin forest in the lowlands up to about 1200-1400 m asl, on mountains. Feed on the hard fruits of forest trees. **Observed at transects 1 and 6.**

PHILIPPINE WARTY PIG
SUIDAE:*Sus philippensis*
Habits: Formerly found in most habitats (from sea level to up to 2800 m) but is now confined to remote forests due to loss of habitat and heavy hunting by noose traps or trigger set bullets. **Observed at transects 4, 5 and 6.**

POLYNESIAN RAT
MURIDAE: *Rattus exulans*
Habits: This rat also may have played a role in the complete deforestation of Easter Island by eating the nuts of the local palm tree, thus preventing regrowth of the forest. **Observed at seven transects.**

RICE-FIELD RAT
MURIDAE: *Rattus argentiventer*
Habits: Primarily reside in cultivated areas such as rice paddies and grasslands. Largely dependent on human rice fields and plantations. **Observe at transects 1, 3, 4, 5 and 7.**

PRBA SPECIES

BIRDS

BAGOBO BABBLER
TIMALIIDAE: *Leonardina woodi*
Habits: Solitary birds apparently stay close or on the ground hoping and walking, foraging for invertebrates for montane forest from 1000 to 1800 m.

BLACK-HEADED TAILORBIRD
SYLVIIDAE: *Orthotomus nigriceps*
Habits: Generally restricted to forest below 1000m.

BUKIDNON WOODCOCK
SCOLOPACIDAE: *Scolopax sp.*
Habits: Solitary. By day usually in the ground in mid and montane forest above 1000 m becoming more common in mossy forest.

CELESTIAL MONARCH
MUSCICAPIDAE: *Hypothymis coelestis*
Habits: Forages singly or in mixed flocks usually in middle and upper canopy in forest or forest edge below 1000 m.

CINNAMON IBON
ZOSTEROPIDAE: *Hypocryptadius cinnamomeus*
Habits: Active gleaning insects from small branches and leaves in submontane to montane mossy forest in all forest levels, in groups, and in mixed flocks above 1000 m.

COMB-CRESTED JACANA
JACANIDAE: *Irediparra gallinacea*
Habits: Poorly known in PhilippinesF. Found in freshwater wetlands from lakes and marshes with floating and emergent vegetation on which it walks freely. Usually alone or in pairs.

CRESTED SERPENT-EAGLE
ACCIPITRIDAE: *Spilornis cheela*
Habits: The most conspicuous of all Philippine raptors. Soars high above forest and forest edge giving distinctive plaintive whistling calls.

CRYPTIC FLYCATCHER
MUSCICAPIDAE: *Ficedula crypta*
Habits: Secretive, found singly or in pairs in mid-mountain forest in the understory and second growth, up to 10 m from the ground, from about 700 to 1500 m.

EURASIAN WOODCOCK
SCOLOPACIDAE: *Scolopax rusticola*

Habits: Found in forest and forest edge during the day coming out at night to feed in ricefields and open fields. Solitary.

FLAME-CROWNED FLOWERPECKER
DICAEIDAE: *Dicaeum anthonyi*
Habits: Found in all levels of the forest, particularly in mossy forest and forest edge in fruiting and flowering trees, singly, in pairs or in mixed flocks, usually above 800 m.

FURTIVE FLYCATCHER
MUSCICAPIDAE: *Ficedula disposita*
Habits: Singly or in pairs in dense second growth, specially climbing bamboo in the understory below 700 m. secretive, perching motionless usually below 5 m from the ground with occasional rapid but short flight from perch to perch.

GOODFELLOW'S JUNGLE-FLYCATCHER/ SLATY BACKED-FLYCATCHER
MUSCICAPIDAE: *Rhinomyias goodfellowi*
Habits: Sits quietly on exposed perches on forest understory, usually 2 to 10 m from the ground, above 1000 m.

JAPANESE NIGHT-HERON
ARDEIDAE: *Gorsachius goisagi*
Habits: Solitary, secretive, and shy usually noticed when flushed in the dark, deeply shaded forest trails or along streams up to least 1200 m.

JAVAN POND-HERON
ARDEIDAE: *Ardeola speciosa*
Habits: Recent colonist of the Philippines found singly or in flocks in ricefields and marshes. Passive feeder stands and waits for prey at edge of water.

GIANT SCOPS-OWL/ LESSER EAGLE- OWL
STRIGIDAE: *Mimizuku gurneyi*
Habits: Lives in forest and forest edge usually foraging high in the understory. Ranges from lowlands to about 1500 m, higher on some mountain.

LITTLE GREBE
PODICIPEDIDAE: *Tachybaptus ruficollis*
Habits: Frequents shallow freshwater lakes and ponds, usually with grasses and reeds but also in rivers and estuaries.

LUZON HORNBILL
BUCEROTIDAE: *Penelopides manillae*
Habits: Common in primary forest; eats fruit, insects and small animals.

MINDANAO HORNBILL
BUCEROTIDAE: *Penelopides affinis*
Habits: It is social and often seen in pairs of small groups and noisy. Feeds primarily on fruits. Also eats insects, beetles, ants and earthworms (rarely

MINDANAO BROWN-DOVE
COLUMBIDAE: *Phapitreron brunneiceps*
Habits: Inhabits in lowland, hill and lower montane forests up to 1,500 m.

MINDANAO LORIKEET
PSITTACIDAE: *Trichoglossus johnstoniae*
Habits: Found in montane forest and forest edge from 1000 to 2500 m, singly or in pairs or in flocks. Noisy, often flying very quickly in tight formation between feeding trees.

Mindanao Racquet-tail
PSITTACIDAE: *Prioniturus waterstradti*
Habits: Its natural habitat is subtropical or tropical moist montane forests at 820-2,700 m, but it has been recorded as low as 450 m. It occurs in groups of 2-10 individuals and apparently undertakes daily altitudinal migrations.

MINDANAO SCOPS-OWL
STRIGIDAE: *Otus mirus*
Habits: prefers mid-montane and mossy forest above 1000 m where it mostly feeds on insects. More common above 1500 m.

MINIATURE TIT-BABBLER
TIMALIIDAE: *Micromacronus leytensis*

Habits: Noisy, in canopy or understory of forest edge up to 1300 m traveling in small groups or in mixed flocks.

MOUNTAIN SERIN
FRINGILLIDAE: *Serinus estherae*
Habits: It lives in mossy forest and forest edge, singly or in groups above 1500 m.

MOUNTAIN SHRIKE
LANIIDAE: *Lanius validirostris*
Habits: Fairly conspicuous in clearings in montane forest, open second growth forest, forest edge, and scrub in grasslands, above 1000 m, singly or in pairs, but it can be found in continuous forest.

OLIVE-CAPPED FLOWERPECKER
DICAEIDAE: *Dicaeum nigrilore*
Habits: Found in mid-mountain and montane mossy forest above 900 m, singly, in small groups or in mixed flocks preferring fruiting or flowering trees.

Philippine Cockatoo
PSITTACIDAE: *Cacatua haematuropygia*
Habits: Resident in lowland, riverine, and mangrove forests, but may be found in the forest edge and open fields as well as high in the mountains. Can be seen singly or in pairs or in flocks of varying sizes up to 3o or more birds.

PHILIPPINE DUCK
ANATIDAE:*Anasluzonica*
Habits: Normally sedentary, preferring freshwater lakes, marshes, and rivers where it can be found in small groups often with other species of surface-feeding ducks. However, also roosts in secluded bays with up to 1200 birds.

PHILIPPINE DWARF-KINGFISHER
ALCEDINIDAE: *Ceyxmelanurus*
Habits: Found in virgin and second growth forest, not along streams, usually near the ground or up to 5 m alone or in pairs. Difficult to see as it perches quietly and darts invisibly from perch to perch.

PHILIPPINE EAGLE
ACCIPITRIDAE: *Pithecophaga jefferyi*
Habits: Found in forests, forest edge, and logged over forest from lowland to over 2000 m, singly or in pairs. Opportunistic feeders, preying on any medium small to medium large animals including snakes, birds and a variety of mammals including Philippine deer.

PHILIPPINE EAGLE-OWL
STRIGIDAE: *Bubo philippensis*
Habits: Lives in forest and forest edge in the lowlands, often near rivers and lakes. Also in coconut plantations with patches of second growth. However, little is known about this secretive owl.

PHILIPPINE HAWK-EAGLE
ACCIPITRIDAE: *Spizaetus philippensis*
Habits: Found in forest and advanced second growth from the lowlands to over 1900 m in montane mossy forest. While perched usually remains concealed in the canopy.

PYGMY BABBLER
TIMALIIDAE: *Stachyris plateni*
Habits: Usually forages in the understory of forest, forest edge and second growth but may be found in the canopy. Travels in small groups often in mixed flocks up to 1000 m.

RED-EARED PARROTFINCH
ESTRILDIDAE: *Erythrura coloria*
Habits: Found on or near the ground in the understory of forest and second growth, and in cogon grass at forest edge, singly or in groups above 1000 m. very fond of feeding in the dead blackened branches that collects around the bottom of mountain palms.

RUDDY BREASTED CRAKE
RALLIDAE: *Porzana fusca*
Habits: Found in ricefields and marshes but also along streams and paths in forest up to 1500 m. Crepuscular, usually seen at first light or dusk feeding along edge of well-vegetated ponds, gullies, canals, etc.

RUFOUS-HEADED TAILORBIRD
SYLVIIDAE: *Orthotomus heterolaemus*

Habits: Its natural habitats are subtropical or tropical moist lowland forests and subtropical or tropical moist montane forests.

SHORT-CRESTED MONARCH
MUSCICAPIDAE: *Hypothymis helenae*
Habits: Poorly known but generally found in the understory of forests, singly or in pairs, nearly always in mixed flocks, below 1000 m.

SPOTTED IMPERIAL- PIGEON
COLUMBIDAE: *Ducula carola*
Habits: Appears to move locally from the mountains to the lowland based on the availability of fruiting trees. Usually seen in groups from a few birds to large flocks in forest edge from the lowlands to the mossy forest of the highest peaks above 2500 m.

SPOT-BILLED PELICAN
PELECANIDAE: *Pelecanus philippensis*
Habits: Prefers freshwater, but mat be found along the coast in tidal marshes, usually in groups. Forages by swimming, dipping bill down into water to 'net' fish.

STREAKED- GROUND BABBLER
TIMALIIDAE: *Ptilocichla mindanensis*
Habits: Noisy but hard to see mouse-like staying on or near the ground, singly or in pairs, or small flocks in a dense undergrowth in forest and second growth, usually below 1000 m.

WATTLED BROADBILL
EURYLAIMIDAE: *Eurylaimus steerii*
Uncommon and local in forest understory below 1000 m. Often solitary sitting still on an exposed perch, but groups do join in flocks.

WHISKERED FLOWERPECKER
DICAEIDAE: *Dicaeum proprium*
Habits: Found in forest, forest edge, and second growth in fruiting and flowering trees, singly or in pairs above 900 m.

WHITE-EARED TAILORBIRD
SYLVIIDAE: *Orthotomus cinereiceps*
Habits: Preferring dense tangles in forest or forest edge usually below 1000 m.

WHITE-CHEEKED BULLFINCH
FRINGILLIDAE: *Pyrrhula leucogenis*
Habits: Found in the canopy and understory of montane forest and forest edge, singly, in pairs or in flocks.

WHITE-FRONTED TIT
PARIDAE: *Parus semilarvatus*
Habits: Local in forest, forest edge and second growth, singly, in groups, and infrequently in mixed flocks below 1000 m.

WHITEHEAD'S MOUNTAIN SWIFTLET
APODIDAE: *Collocalia whiteheadi*
Habits: Poorly known with all known specimens taken from restricted locations in mountains above 1000 m.

WHITE-LORED ORIOLE
ORIOLIDAE: *Oriolus albiloris*
Habits: Eats fruit. Found in subtropical or Tropical Heavily Degraded Former Forest.

MAMMALS

COMMON ASIAN GHOST BAT, LESSER FALSE VAMPIRE
MEGADERMATIDAE: *Megaderma spasma*
Habits: Roosts in groups in caves, pits, building, and hollow trees. Favours grasshoppers and moths but sometimes they eat small vertebrates including other bats.

COMMON BENT-WINGED BAT
VESPERTILIONIDAE: *Miniopterus schreibersi*
Habits: Colonies are formed in large caves or mines but they can also be found in other areas such as tunnels or ruins or other man made sites.

COMMON ROUSETTE
PTEROPODIDAE: *Rousettus amplexicaudatus*
Habits: Lives in colonies of variable sizes in low caves. Feeds on fruits.

DIADEM ROUNDLEAF BAT
RHINOLOPHIDAE: *Hipposideros diadema*
Habits: Usually insectivorous. Prefers insects or small birds and spiders rarely. Sometimes classified as carnivore.

GOLDEN-CROWNED FLYING FOX
PTEROPODIDAE: *Acerodon jubatus*
Habits: Frugivores and found in mature lowland forests.

LARGE FLYING FOX
PTEROPODIDAE: *Pteropterusvampyrus*
Habits: Feeds exclusively on fruits and noted for being the largest member of the bat family by wingspan. Of all other Old World fruit bats, it lacks the ability to echolocate.

LARGE MINDANAO FOREST RAT
MURIDAE: *Bullimus bagobus*
Habits: Occurs in lowland forest, occasionally into mossy forest, from 300 m to 500 m in lowland forest on Leyte, and in montane forest at 740 m on Maripipi.

LESSER MUSKY FRUIT BAT
PTEROPODIDAE: *Ptenochirus minor*
Habits: Found in lowland and montane forest and secondary forest. It does not occur in agricultural or urban areas.

LESSER ASIAN HOUSE BAT
VESPERTILIONIDAE: *Scotophilus kuhlii*
Habits: Fond of small insects. They prefer to feed on airborne insects, hymenopterans and dipterans, which can be found under the canopies of tall trees and riparian forests at nights. Small insects such as wasps, bees, moths, and beetles are all fearful of yellow house bats. Larger soft-bodied insects can also become yellow house bats' food.

LITTLE BENT-WINGED BAT
VESPERTILIONIDAE: *Miniopterus australis*
Habits: Nocturnal, using echolocation, fly between shrub and canopy layers of extremely wooded areas and prey on the small bugs under the canopy.

MINDANAO HAIRY-TAILED RAT
MURIDAE: *Batomys salomonseni*
Habits: The species occurs in montane and mossy forest.

PHILIPPINE BROWN DEER
CERVIDAE: *Cervus mariannus*
Habits: Abundant in the vicinity of original forests. Also feeds on the young shoots of cogon grass and on the young leaves buds of low forest growth.

PHILIPPINE NECTAR BAT, PHILIPPINE DAWN BAT
PTEROPODIDAE: *Eonycteris robusta*
Habits: Staying singly on the roof and walls of the cave and was not seen to form groups like other species.

PHILIPPINE PYGMY FRUIT BAT
PTEROPODIDAE: *Haplonycteris fischeri*
Habits: Found in primary forest, especially at middle elevations, moderately common in secondary forest, and is also present in mixed agricultural habitats and second-growth forest eats primarily fruits and most likely of plants of the genus Piper.

PHILIPPINE PYGMY SQUIRREL
SCIURIDAE: *Exilisciurus concinnus*
Habits: It is lowland and montane primary and secondary forest species, its highest abundance is at middle elevations in small clearings.

PHILIPPINE TARSIER
TARSIIDAE: *Tarsius syrichta*
Habits: Habitat is the second growth, secondary forest, and primary forest from sea level to 700 m., primarily insectivore. Eats insects, spiders, lizard and small vertebrates; using both hands in seizing and carrying prey to its mouth.

SOUTHERN PHILIPPINE SHREW-MOUSE
MURIDAE: *Crunomys melanius*
Habits: Inhabits in lowland forest and tolerates some level of habitat disturbance.

YELLOW-FACED HORSESHOE BAT
RHINOLOPHIDAE: *Rhinolophus virgo*
Habits: Found in primary lowland forest up to the lower limits of montane forest. Also been found frequently in heavily disturbed agricultural areas if there is second-growth vegetation near the caves where the bats roost.

DAGGER-TOOTHED FLOWERBAT
PTEROPODIDAE: *Macroglossusminimus*
Habits: Found in both primary and secondary tropical moist forest woodlands, mangroves, swamp forest, plantations, rural gardens and urban areas.

GREATER MUSKY FRUIT BAT
PTEROPODIDAE: *Ptenochirus jagori*
Habits: Frugivorous tree and cave roosting species occurs from sea level to at least 1,950 m and is abundant in primary forest and common in secondary forest.

SHORT-NOSED FRUIT BAT
PTEROPODIDAE: *Cynopterus brachyotis*
Habits: Common non-endemic chiropteran species, an arboreal frugivore feeding particularly on small fruits found in agricultural areas and secondary forests.

Appendix 16. General List of Arthropods

No.	ORDER	Family Name	Scientific Name	Common Name	Tot # Ind.	Rank
2	DIPTERA	CULICIDAE	*Culex sp.*	Common mosquitoes	37	1
3	ISOPTERA	TERMITIDAE	*Isoptera sp.*	Termites/ White ants	32	2
4	ORTHOPTERA	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	26	3
1	ARANEAE	LINYPHIIDAE	*Atypus sp.*	field spider	13	4
5	COLEOPTERA	COCCINELLIDAE	*Apidomopha sp.*	no infromation	13	5
6	DIPTERA	MUSCIDAE	*Musca domestica*	Common housefly	12	6
7	ORTHOPTERA	GRYLLIDAE	*Euscyrtus concinnus*	Crickets	9	7
8	DIPTERA	AGROMYZIDAE	*Liriomyza sativae*	Gall making /Leaf miner flies	10	8
9	HYMENOPTERA	APIDAE	*Apis mellifera*	Honeybees; western honey bee or European honey bee	12	9
10	COLEOPTERA	BUPRESTIDAE	*Agrilus sexsignatus*	Varicose borer	9	10
11	COLEOPTERA	COCCINELLIDAE	*Menochilus sexmaculata*	Ladybird beetles	11	11
12	HEMIPTERA	ALEYRODIDAE	*Trialeurodes vaporariorum*	White flies	11	12
13	COLEOPTERA	CURCULIONIDAE	*Liparus glabirostris*	Weevils/Snout beetles	8	13
14	LEPIDOPTERA	GEOMETRIDAE	*Ozola minor*	Measuring worm/Loopers	13	14
15	ARANEAE	LINYPHIIDAE	*Verrucosa sp./Verrucosa arenata*	Triangulate orbweaver/arrowhead spider	7	15
16	COLEOPTERA	CHRYSOMELIDAE	*Tricholochmaea vaccinii*	Leaf beetles	7	16
17	HOMOPTERA	DELPHACIDAE	*Fulgoromorpha*	Plant-hoppers	7	17
18	HYMENOPTERA	APIDAE	*Apis indica*	Honey bee	7	18
19	ORTHOPTERA	BLATTIDAE	*Periplaneta americana*	Cockroach	7	19
20	COLEOPTERA	BOSTRICHIDAE	*Melalgus confertus*	Branch and Twig borer	9	20
21	HOMOPTERA	CICADIDAE	*Tibicen linnei*	Cicada	11	21
22	HYMENOPTERA	FORMICIDAE	*Leptogenys sp.*	Genial killer ant	11	22
23	COLEOPTERA	SCARABAEIDAE	*Oryctes rhinoceros*	Rhinoceros beetle	8	23
24	HYMENOPTERA	EUMENINAE	*Monobia quadridens*	Mason Wasp	8	24
25	LEPIDOPTERA	MORPHIDAE	*Heliconius cydna*	Black and White Helicon	8	25
26	ODONATA	LIBELLULIDAE	*Libelulla semifasciata*	Painted Skimmer	7	26
27	HYMENOPTERA	APIDAE	*Bombus sp.*	Bumble bee	6	27
28	ORTHOPTERA	ACRIDIDAE	*Neoconocephalus sp. 2*	Katydid	6	28
29	THYSANOPTERA	THRIPIDAE	*Baliothrips biformis*	Thrips	6	29
30	HEMIPTERA	APHIDIDAE	*Acyrthosiphon pisum*	Pea aphids/ Aphids or Plant lice	8	30
31	LEPIDOPTERA	PAPILIONIDAE	*Doleschallia sp.*	Leafwing	8	31
32	ARANEAE	LINYPHIIDAE	*Frontinella pyramitela*	Bowl and doily spider	5	32
33	COLEOPTERA	COCCINELLIDAE	*Harmonia axyridis*	Asian Lady Beetle	5	33
34	HOMOPTERA	PSEUDOCOCCIDAE	*Maconellicoccus hirsutus*	Pink Mealy bug	5	34
35	LEPIDOPTERA	PSYCHIDAE	*Oiketicus abbotii*	Bagworms and caseworms	5	35
36	HEMIPTERA	COREIDAE	*Euthochtha galeator*	Leaf-footed/Coreid bugs	7	36
37	HYMENOPTERA	FORMICIDAE	*Odontomachus sp.*	Trapjaw ants	7	37
38	LEPIDOPTERA	PAPILIONIDAE	*Eurema lisa*	Little Yellow	7	38
39	LEPIDOPTERA	PAPILIONIDAE	*Mycalesis mineus*	Dark-banded bushbrown	7	39
40	LEPIDOPTERA	NYMPHALIDAE	*Melanitis leda*	Greenhorned caterpillar	7	40

Appendix 16. General List of Arthropods

No.	ORDER	Family Name	Scientific Name	Common Name	Tot # Ind.	Rank
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41	ORTHOPTERA	ACRIDIDAE	*Romalea guttata*	Eastern Lubber Grasshopper	7	41
42	ORTHOPTERA	TETTIGONIIDAE	*Tettigonia viridissima*	Long-horned grasshopper and Katydids/ Green Bush Cricket	7	42
43	HOMOPTERA	PSEUDOCOCCIDAE	*Scotinophara spp.*	Black bugs	4	43
44	HYMENOPTERA	FORMICIDAE	*Lasius sp.*	Citrunella ants	4	44
45	HEMIPTERA	CICADAE	*Magicicada septendicum*	Cicada	6	45
46	HEMIPTERA	PYRRHOCORIDAE	*Pyrrhocoris apterus*	Red/ Fire bugs	6	46
47	DIPTERA	TEPHRITIDAE	*Bactrocera dorsalis*	Fruit flies	5	47
48	HEMIPTERA	PENTATOMIDAE	*Acanthosoma labiduroides*	Stink/Shield bugs	5	48
49	HYMENOPTERA	FORMICIDAE	*Camponatus sp.*	Carpenter Ants	5	49
50	LEPIDOPTERA	CRAMBIDAE	*Chilo suppressalis*	Rice stem borer /Striped stem borer	5	50
51	ORTHOPTERA	GRYLLOTALPIDAE	*Gryllotalpa africana*	Mole cricket	5	51
52	ORTHOPTERA	ACRIDIDAE	*Oxya hyla intricata / Oxya spp.*	Short-horned grasshoppers/locusts	5	52
53	COLEOPTERA	CERAMBYCIDAE	*Anoplophora lucipor*	Long-horned beetles	4	53
54	HOMOPTERA	PSYLLIDAE	*Heteropsylla cubana*	Psyllids/Jumping plant lice/Lerp insects	4	54
55	ISOPTERA	PHINOTERMITIDAE	*Coptotermes gestroi*	Asian Termites	4	55
56	LEPIDOPTERA	DANAIDAE	*Danaus plexippus*	Monarch butterfly	4	56
57	ODONATA	LIBELLULIDAE	*Sympetrum internum*	Common Sympetrum/ Cherry-faced Meadowhawk	4	57
58	ODONATA	LIBELLULIDAE	*Erythrodiplax basalis*	Skimmer	4	58
59	ORTHOPTERA	ACRIDIDAE	*Neoconocephalus retusus*	Round-tipped Conehead Katydid	4	59
60	ORTHOPTERA	PHASMIDAE	*Diapheromera Femorata*	Phasmids/Walking sticks	4	60
61	HOMOPTERA	PSEUDOCOCCIDAE	*Brevennia rehi*	Mealybugs	6	61
62	COLEOPTERA	PACHYRRYNCHIDAE	*Pachnaeus litus*	Broad-nosed weevils	3	62
63	COLEOPTERA	SCARABAEIDAE	*Dynastes tityus*	Scarabs/ Lamellicorn beetles /Eastern Hercules Beetle	3	63
64	HOMOPTERA	CICADELLIDAE	*Brunotartessus fulvus*	Leaf-hoppers/ Yellow-headed leafhopper	3	64
65	HOMOPTERA	CICADELLIDAE	*Nephotettix spp.*	Green leafhopper	3	65
66	HYMENOPTERA	CYNIPIDAE	*Neuroterus albipes*	Gall wasps/ gallflies	3	66
67	HYMENOPTERA	EUMENINAE	*Eumenes fraternal*	Potter Wasp	3	67
68	HYMENOPTERA	FORMICIDAE	*Diacamma sp.*	Bladder ants	3	68
69	LEPIDOPTERA	PAPILIONIDAE	*Danaus sp.*	Butterfly	3	69
70	LEPIDOPTERA	PAPILIONIDAE	*Pieris rapae*	Cabbage Butterfly/White-sulphur and orange-tipped butterflies/ The Small White	3	70
71	LEPIDOPTERA	NOCTUIDAE	*Grammodes geometrica*	Owlet moths	3	71
72	LEPIDOPTERA	TORTRICIDAE	*Cnephasia jactatana*	Leaf roller/Tortricid moths	3	72
73	ORTHOPTERA	GRYLLIDAE	*Acheta domesticus*	Crickets	3	73
74	ORTHOPTERA	MANTODAE	*Thesprotia*	Grass Praying Mantis	3	74

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No.	ORDER	Family Name	Scientific Name	Common Name	Tot # Ind.	Rank
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75	HOMOPTERA	FLATIDAE	*Sogatella furcifera*	Whitebacked planthopper	5	75
76	HYMENOPTERA	ANTHROPHORIDAE	*Xylocopa spp./ Xylocopa violacea*	Carpenter Bees	5	76
77	ISOPTERA	COSSIDAE	*Cossus japonica*	Carpenter moths	5	77
78	LEPIDOPTERA	LIMACODIDAE	*Cnidocampa flavescens*	Slug caterpillar/	5	78
79	COLEOPTERA	BUPRESTIDAE	*Chrysobothris monticola*	Metallic wood-boring beetles/jewel beetles	2	79
80	HEMIPTERA	MEMBRACIDAE	*Ceresa taurina*	Treehoppers	2	80
81	ORTHOPTERA	MANTODAE	*Tenedora sinensis*	Praying mantis;	2	81
82	HEMIPTERA	PYRRHOCORIDAE	*Dysdercus cingulatos*	Red Cotton bug	4	82
83	LEPIDOPTERA	PAPILIONIDAE	*Cethosia sp.*	Lacewing butterfly	4	83
84	COLEOPTERA	SCOLYTIDAE	*Dryocoetiops laevis*	Bark beetles	3	84
85	DIPTERA	EPHYDRIDAE	*Hydrellia philippina*	Rice whorl maggot	3	85
86	HEMIPTERA	ALYDIDAE	*Leptocorisa acuta*	Earhead bug/paddy bug/rice bug	3	86
87	HOMOPTERA	COCCIDAE	*Coccus viridis*	Coccids	3	87
88	HOMOPTERA	PSEUDOCOCCIDAE	*Leptocorisa oratorius*	Rice bug	3	88
89	HYMENOPTERA	FORMICIDAE	*Camponatus pennsylvanicus*	Black Carpenter Ants	3	89
90	HYMENOPTERA	FORMICIDAE	*Solenopsis geminata*	Ants	3	90
91	LEPIDOPTERA	PAPILIONIDAE	*Papilio polytes*	Common Mormon	3	91
92	LEPIDOPTERA	COSSIDAE	*Xyleutes spp.*	Bee-hole borer/ carpenter bee	3	92
93	LEPIDOPTERA	LYMANTRIIDAE	*Calliteara angulata*	Tussock-moths	3	93
94	COLEOPTERA	PACHYRRYNCHIDAE	*Metapocyrtus pulverulentus*	Pachyrrynchid beetle	2	94
95	COLEOPTERA	PLATYPODIDAE	*Platypus australis*	Pinhole borers	2	95
96	HOMOPTERA	FLATIDAE	*Phromnia sp.*	Flatids/ Flatid Planthopper	2	96
97	HYMENOPTERA	APIDAE	*Vespula sp.*	Yellow Jacket	2	97
98	LEPIDOPTERA	PAPILIONIDAE	*Hebomoia glaucippe*	Great Orange Tip	2	98
99	LEPIDOPTERA	PAPILIONIDAE/ Pieridae	*Terias hecabe*	Large Grass Yellow or Common Grass Yellow	2	99
100	LEPIDOPTERA	HESPERIIDAE	*Pelopidas mathias*	Rice skipper	2	100
101	LEPIDOPTERA	PYRALIDAE	*Munroessa icciusalis*	Pyralid moths/ Pondside Pyralid Moth	2	101
102	LEPIDOPTERA	TORTRICIDAE	*Petrova cristata*	Tip moth	2	102
103	ODONATA	LIBELLULIDAE	*Erythemis simplicicollis*	Common Pondhawk	2	103
104	ODONATA	LIBELLULIDAE	*Vestes eurina*	Damselfly	2	104
105	HYMENOPTERA	EUMENINAE/ Vespidae	*Vespa sp.*	Vespid wasp	1	105
106	LEPIDOPTERA	MORPHIDAE	*Morpho peleides*	Peleides Blue Morpho, Common Morpho, or The Emperor	1	106
107	ORTHOPTERA	MANTODAE	*Tenodera angustipennis*	Praying Mantis/ Narrow-winged Mantis	1	107

Taxa	Total Number
Order	11
Family	61
Species	107
Genera	101
No. of Individuals	632

Appendix 17. Distribution and Status of Arthropods

No.	ORDER	Family Name	Scientific Name	Common Name	Local Name	Distribution	Status
1	ARANEAE	LINYPHIIDAE	*Atypus sp.*	field spider	field spider; gagamba		ecological
2	ARANEAE	LINYPHIIDAE	*Frontinella pyramitela*	Bowl and doily spider			Resident
3	ARANEAE	LINYPHIIDAE	*Verrucosa sp./Verrucosa arenata*	Triangulate orbweaver/arrowhead spider	field spider; gagamba		ecological
4	COLEOPTERA	BOSTRICHIDAE	*Melalgus confertus*	Branch and Twig borer		Widespread	
5	COLEOPTERA	BUPRESTIDAE	*Agrilus sexsignatus*	Varicose borer			
6	COLEOPTERA	BUPRESTIDAE	*Chrysobothris monticola*	Metallic wood-boring beetles/jewel beetles		Tropical	
7	COLEOPTERA	CERAMBYCIDAE	*Anoplophora lucipor*	Long-horned beetles		Widespread	
8	COLEOPTERA	CHRYSOMELIDAE	*Tricholochmaea vaccinii*	Leaf beetles		Widespread	
9	COLEOPTERA	COCCINELLIDAE	*Apidomoph a sp.*	no infromation	beetle		ecological
10	COLEOPTERA	COCCINELLIDAE	*Harmonia axyridis*	Asian Lady Beetle			Resident
11	COLEOPTERA	COCCINELLIDAE	*Menochilus sexmaculata*	Ladybird beetles	beetle	Widespread	ecological
12	COLEOPTERA	CURCULIONIDAE	*Liparus glabirostris*	Weevils/Snout beetles		Widespread	
13	COLEOPTERA	PACHYRRYNCHIDAE	*Metapocyrtus pulverulentus*	Pachyrrynchid beetle			
14	COLEOPTERA	PACHYRRYNCHIDAE	*Pachnaeus litus*	Broad-nosed weevils		Widespread	
15	COLEOPTERA	PLATYPODIDAE	*Platypus australis*	Pinhole borers		Widespread	
16	COLEOPTERA	SCARABAEIDAE	*Oryctes rhinoceros*	Rhinoceros beetle			
17	COLEOPTERA	SCARABAEIDAE	*Dynastes tityus*	Scarabs/ Lamellicorn beetles /Eastern Hercules Beetle		Widespread	
18	COLEOPTERA	SCOLYTIDAE	*Dryocoetiops laevis*	Bark beetles		Widespread	
19	DIPTERA	AGROMYZIDAE	*Liriomyza sativae*	Gall making /Leaf miner flies		Widespread	
20	DIPTERA	CULICIDAE	*Culex sp.*	Common mosquitoes	mosquito; lamok		ecological
21	DIPTERA	TEPHRITIDAE	*Bactrocera dorsalis*	Fruit flies			
22	DIPTERA	MUSCIDAE	*Musca domestica*	Common housefly	langaw		ecological
23	DIPTERA	EPHYDRIDAE	*Hydrellia philippina*	Rice whorl maggot			
24	HEMIPTERA	ALEYRODIDAE	*Trialeurodes vaporariorum*	White flies		Widespread	
25	HEMIPTERA	ALYDIDAE	*Leptocorisa acuta*	Earhead bug/paddy bug/rice bug			
26	HEMIPTERA	APHIDIDAE	*Acyrthosiph*	Pea aphids/ Aphids		Widespread	

Appendix 17. Distribution and Status of Arthropods

No.	ORDER	Family Name	Scientific Name	Common Name	Local Name	Distribution	Status
			on pisum	or Plant lice			
27	HEMIPTERA	CICADAE	*Magicicada septendicum*	Cicada			Resident
28	HEMIPTERA	COREIDAE	*Euthochtha galeator*	Leaf-footed/Coreid bugs		Widespread	
29	HEMIPTERA	MEMBRACIDAE	*Ceresa taurina*	Treehoppers		Widespread	
30	HEMIPTERA	PENTATOMIDAE	*Acanthosoma labiduroides*	Stink/Shield bugs		Widespread	
31	HEMIPTERA	PYRRHOCORIDAE	*Pyrrhocoris apterus*	Red/ Fire bugs		Widespread	
32	HEMIPTERA	PYRRHOCORIDAE	*Dysdercus cingulatos*	Red Cotton bug	tree bug; baka-bakahan		ecological
33	HOMOPTERA	CICADELLIDAE	*Brunotartessus fulvus*	Leaf-hoppers/ Yellow-headed leafhopper		Widespread	
34	HOMOPTERA	CICADIDAE	*Tibicen linnei*	Cicada		Tropical and sub-tropical	
35	HOMOPTERA	COCCIDAE	*Coccus viridis*	Coccids		Widespread	
36	HOMOPTERA	DELPHACIDAE	*Fulgoromorpha*	Plant-hoppers		Widespread	
37	HOMOPTERA	FLATIDAE	*Phromnia sp.*	Flatids/ Flatid Planthopper		Widespread	
38	HOMOPTERA	PSEUDOCOCCIDAE	*Maconellicoccus hirsutus*	Pink Mealy bug			
39	HOMOPTERA	PSEUDOCOCCIDAE	*Brevennia rehi*	Mealybugs		Widespread	
40	HOMOPTERA	PSYLLIDAE	*Heteropsylla cubana*	Psyllids/Jumping plant lice/Lerp insects		Widespread	
41	HOMOPTERA	PSEUDOCOCCIDAE	*Leptocorisa oratorius*	Rice bug			
42	HOMOPTERA	CICADELLIDAE	*Nephotettix spp.*	Green leafhopper			
43	HOMOPTERA	PSEUDOCOCCIDAE	*Scotinophara spp.*	Black bugs			
44	HOMOPTERA	FLATIDAE	*Sogatella furcifera*	Whitebacked planthopper			
45	HYMENOPTERA	CYNIPIDAE	*Neuroterus albipes*	Gall wasps/ gallflies			
46	HYMENOPTERA	ANTHROPHORIDAE	*Xylocopa spp./ Xylocopa violacea*	Carpenter Bees			Resident
47	HYMENOPTERA	APIDAE	*Apis indica*	Honey bee	bee; bubuyog		ecological
48	HYMENOPTERA	APIDAE	*Apis mellifera*	Honeybees; western honey bee or European honey bee			Resident
49	HYMENOPTERA	APIDAE	*Bombus sp.*	Bumble bee	bubuyog		ecological
50	HYMENOPTERA	APIDAE	*Vespula sp.*	Yellow Jacket			Resident
51	HYMENOPTE	EUMENINAE	*Eumenes*	Potter Wasp			Resident

Appendix 17. Distribution and Status of Arthropods

No.	ORDER	Family Name	Scientific Name	Common Name	Local Name	Distribution	Status
	RA		*fraternal*				
52	HYMENOPTERA	EUMENINAE	*Monobia quadridens*	Mason Wasp			Resident
53	HYMENOPTERA	EUMENINAE/ Vespidae	*Vespa sp./ Vespula germanica*	Vespid wasp	putakte		ecological
54	HYMENOPTERA	FORMICIDAE	*Camponatus sp.*	Carpenter Ants	field ant; langgam		ecological
55	HYMENOPTERA	FORMICIDAE	*Camponatus pennsylvanicus*	Black Carpenter Ants			Resident
56	HYMENOPTERA	FORMICIDAE	*Diacamma sp.*	Bladder ants	field ant; langgam		ecological
57	HYMENOPTERA	FORMICIDAE	*Lasius sp.*	Citrunella ants	field ant; langgam		ecological
58	HYMENOPTERA	FORMICIDAE	*Leptogenys sp.*	Genial killer ant	field ant; langgam		ecological
59	HYMENOPTERA	FORMICIDAE	*Solenopsis geminata*	Ants			Resident
60	HYMENOPTERA	FORMICIDAE	*Odontomachus sp.*	Trapjaw ants	ant; langgam		ecological
61	ISOPTERA	PHINOTERMITIDAE	*Coptotermes gestroi*	Asian Termites			Resident
62	ISOPTERA	COSSIDAE	*Cossus japonica*	Carpenter moths		Widespread	
63	ISOPTERA	TERMITIDAE	*Isoptera sp.*	Termites/ White ants		Tropical and in most warm-temperate zones	
64	LEPIDOPTERA	DANAIDAE	*Danaus plexippus*	Monarch butterfly			Resident
65	LEPIDOPTERA	PAPILIONIDAE	*Cethosia sp.*	Lacewing butterfly	field butterfly; paru-paru		ecological
66	LEPIDOPTERA	PAPILIONIDAE	*Danaus sp.*	Butterfly	butterfly; paru-paru		
67	LEPIDOPTERA	PAPILIONIDAE	*Doleschallia sp.*	Leafwing	butterfly; paru-paru		ecological
68	LEPIDOPTERA	PAPILIONIDAE	*Eurema lisa*	Little Yellow	butterfly; paru-paru		Resident
69	LEPIDOPTERA	PAPILIONIDAE	*Hebomoia glaucippe*	Great Orange Tip	butterfly; paru-paru		ecological
70	LEPIDOPTERA	PAPILIONIDAE	*Mycalesis mineus*	Dark-banded bushbrown	field butterfly; paru-paru		ecological
71	LEPIDOPTERA	PAPILIONIDAE	*Papilio polytes*	Common Mormon	butterfly; paru		Resident
72	LEPIDOPTERA	PAPILIONIDAE	*Pieris rapae*	Cabbage Butterfly/White-sulphur and orange-tipped butterflies/ The Small White	butterfly; paru		Resident
73	LEPIDOPTERA	PAPILIONIDAE/ Pieridae	*Terias hecabe*	Large Grass Yellow or Common Grass Yellow	butterfly; paru-paru		ecological
74	LEPIDOPTERA	CRAMBIDAE	*Chilo suppressalis*	Rice stem borer /Striped stem borer			
75	LEPIDOPTERA	NYMPHALIDAE	*Melanitis leda ismene*	Greenhorned caterpillar			

Appendix 17. Distribution and Status of Arthropods

No.	ORDER	Family Name	Scientific Name	Common Name	Local Name	Distribution	Status
76	LEPIDOPTERA	HESPERIIDAE	*Pelopidas mathias*	Rice skipper			
77	LEPIDOPTERA	COSSIDAE	*Xyleutes spp.*	Bee-hole borer/ carpenter bee			
78	LEPIDOPTERA	GEOMETRIDAE	*Ozola minor*	Measuring worm/Loopers		Common in the tropics and at high elevations.	
79	LEPIDOPTERA	LIMACODIDAE	*Cnidocampa flavescens*	Slug caterpillar/		Widespread	
80	LEPIDOPTERA	LYMANTRIIDAE	*Calliteara angulata*	Tussock-moths		Widespread	
81	LEPIDOPTERA	MORPHIDAE	*Heliconius cydna*	Black and White Helicon			Resident
82	LEPIDOPTERA	MORPHIDAE	*Morpho peleides*	Peleides Blue Morpho, Common Morpho, or The Emperor			Resident
83	LEPIDOPTERA	NOCTUIDAE	*Grammodes geometrica*	Owlet moths		Widespread	
84	LEPIDOPTERA	PSYCHIDAE	*Oiketicus abbotii*	Bagworms and caseworms		Widespread	
85	LEPIDOPTERA	PYRALIDAE	*Munroessa icciusalis*	Pyralid moths/ Pondside Pyralid Moth		Widespread	
86	LEPIDOPTERA	TORTRICIDAE	*Petrova cristata*	Tip moth			
87	LEPIDOPTERA	TORTRICIDAE	*Cnephasia jactatana*	Leaf roller/Tortricid moths		Widespread	
88	ODONATA	LIBELLULIDAE	*Erythemis simplicicollis*	Common Pondhawk			Resident
89	ODONATA	LIBELLULIDAE	*Sympetrum internum*	Common Sympetrum/ Cherry-faced Meadowhawk			Resident
90	ODONATA	LIBELLULIDAE	*Vestes eurina*	Damselfly	damselfly; tutubing karayom		ecological
91	ODONATA	LIBELLULIDAE	*Libelulla semifasciata*	Painted Skimmer	dragonfly; tutubing kalabaw		ecological
92	ODONATA	LIBELLULIDAE	*Erythrodiplax basalis*	Skimmer	dragonfly; tutubing kalabaw		ecological
93	ORTHOPTERA	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	grasshopper; tipaklong		ecological
94	ORTHOPTERA	BLATTIDAE	*Periplaneta americana*	Cockroach			Resident
95	ORTHOPTERA	GRYLLIDAE	*Acheta domesticus*	Crickets			Resident
96	ORTHOPTERA	MANTODAE	*Tenedora sinensis*	Praying mantis;	mandadangkal		ecological
97	ORTHOPTERA	MANTODAE	*Tenodera angustipennis*	Praying Mantis/ Narrow-winged Mantis	mandadangkal		Resident
98	ORTHOPTERA	MANTODAE	*Thesprotia graminis*	Grass Praying Mantis	mandadangkal		Resident
99	ORTHOPTER	GRYLLIDAE	*Euscyrtus*	Crickets			

Appendix 17. Distribution and Status of Arthropods

No.	ORDER	Family Name	Scientific Name	Common Name	Local Name	Distribution	Status
	A		*concinnus*				
100	ORTHOPTERA	GRYLLOTALPIDAE	*Gryllotalpa africana*	Mole cricket		Widespread	
101	ORTHOPTERA	ACRIDIDAE	*Neoconocephalus retusus*	Round-tipped Conehead Katydid	grasshopper; tipaklong		ecological
102	ORTHOPTERA	ACRIDIDAE	*Neoconocephalus sp. 2*	Katydid	grasshopper; tipaklong		ecological
103	ORTHOPTERA	ACRIDIDAE	*Romalea guttata*	Eastern Lubber Grasshopper	grasshopper; tipaklong		Resident
104	ORTHOPTERA	ACRIDIDAE	*Oxya hyla intricata / Oxya spp.*	Short-horned grasshoppers/locusts	grasshopper; tipaklong	Widespread	
105	ORTHOPTERA	PHASMIDAE	*Diapheromera Femorata*	Phasmids/Walking sticks		Tropical and sub-tropical	
106	ORTHOPTERA	TETTIGONIIDAE	*Tettigonia viridissima*	Long-horned grasshopper and Katydids/ Green Bush Cricket		Widespread	
107	THYSANOPTERA	THRIPIDAE	*Baliothrips biformis*	Thrips			

Appendix 18: List of Arthropods per Transect

TRANSECT 1				
No.	**Family Name**	**Scientific Name**	**Common Name**	**No. of Indi**
1	GEOMETRIDAE	*Ozola minor*	Measuring worm/Loopers	7
2	BOSTRICHIDAE	*Melalgus confertus*	Branch and Twig borer	5
3	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	5
4	CURCULIONIDAE	*Liparus glabirostris*	Weevils/Snout beetles	3
5	CULICIDAE	*Culex sp.*	Common mosquitoes	3
6	MUSCIDAE	*Musca domestica*	Common housefly	3
7	PAPILIONIDAE	*Eurema lisa*	Little Yellow	3
8	ACRIDIDAE	*Neoconocephalus retusus*	Round-tipped Conehead Katydid	3
9	CHRYSOMELIDAE	*Tricholochmaea vaccinii*	Leaf beetles	2
10	SCARABAEIDAE	*Oryctes rhinoceros*	Rhinoceros beetle	2
11	PYRRHOCORIDAE	*Pyrrhocoris apterus*	Red/ Fire bugs	2
12	FORMICIDAE	*Camponatus sp.*	Carpenter Ants	2
13	FORMICIDAE	*Lasius sp.*	Citrunella ants	2
14	PAPILIONIDAE	*Danaus sp.*	Butterfly	2
15	NYMPHALIDAE	*Melanitis leda ismene*	Greenhorned caterpillar	2
16	BLATTIDAE	*Periplaneta americana*	Cockroach	2
17	COCCINELLIDAE	*Apidomopha sp.*		1
18	AGROMYZIDAE	*Liriomyza sativae*	Gall making /Leaf miner flies	1
19	ALEYRODIDAE	*Trialeurodes vaporariorum*	White flies	1
20	PSYLLIDAE	*Heteropsylla cubana*	Psyllids/Jumping plant lice/Lerp insects	1
21	PSEUDOCOCCIDAE	*Scotinophara spp.*	Black bugs	1
22	APIDAE	*Bombus sp.*	Bumble bee	1
23	PAPILIONIDAE	*Pieris rapae*	Cabbage Butterfly/White-sulphur and orange-tipped butterflies/ The Small White	1
24	MORPHIDAE	*Heliconius cydna*	Black and White Helicon	1
25	GRYLLIDAE	*Euscyrtus concinnus*	Crickets	1

Appendix 18: List of Arthropods per Transect

TRANSECT 2				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
1	ACRIDIDAE	*Romalea guttata*	Eastern Lubber Grasshopper	1
2	COCCINELLIDAE	*Harmonia axyridis*	Asian Lady Beetle	1
3	MUSCIDAE	*Musca domestica*	Common housefly	2
4	CICADELLIDAE	*Nephotettix spp.*	Green leafhopper	2
5	LINYPHIIDAE	*Frontinella pyramitela*	Bowl and doily spider	2
6	CICADAE	*Magicicada septendicum*	Cicada	1
7	EUMENINAE	*Eumenes fraternal*	Potter Wasp	1
8	COSSIDAE	*Xyleutes spp.*	Bee-hole borer/ carpenter bee	3
9	TERMITIDAE	*Isoptera sp.*	Termites/ White ants	5
10	LIBELLULIDAE	*Libelulla semifasciata*	Painted Skimmer	2
11	THRIPIDAE	*Baliothrips biformis*	Thrips	3
12	LINYPHIIDAE	*Atypus sp.*	field spider	5
13	BUPRESTIDAE	*Agrilus sexsignatus*	Varicose borer	5
14	CHRYSOMELIDAE	*Tricholochmaea vaccinii*	Leaf beetles	2
15	CURCULIONIDAE	*Liparus glabirostris*	Weevils/Snout beetles	2
16	EPHYDRIDAE	*Hydrellia philippina*	Rice whorl maggot	3
17	CULICIDAE	*Culex sp.*	Common mosquitoes	2

Appendix 18: List of Arthropods per Transect

TRANSECT 2				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
18	PENTATOMIDAE	*Acanthosoma labiduroides*	Stink/Shield bugs	2
19	CICADIDAE	*Tibicen linnei*	Cicada	6
20	DELPHACIDAE	*Fulgoromorpha*	Plant-hoppers	3
21	FORMICIDAE	*Odontomachus sp.*	Trapjaw ants	2
22	PAPILIONIDAE	*Papilio polytes*	Common Mormon	3
23	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	2
24	GRYLLIDAE	*Acheta domesticus*	Crickets	2
25	MANTODAE	*Thesprotia graminis*	Grass Praying Mantis	2
26	GRYLLIDAE	*Euscyrtus concinnus*	Crickets	1
27	ACRIDIDAE	*Oxya hyla intricata / Oxya spp.*	Short-horned grasshoppers/locusts	2
28	ACRIDIDAE	*Neoconocephalus sp. 2*	Katydid	1

Appendix 18: List of Arthropods per Transect

TRANSECT 3				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
1	TERMITIDAE	*Isoptera sp.*	Termites/ White ants	8
2	COCCINELLIDAE	*Menochilus sexmaculata*	Ladybird beetles	6
3	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	6
4	COCCINELLIDAE	*Apidomopha sp.*	no infromation	5
5	CULICIDAE	*Culex sp.*	Common mosquitoes	5
6	CICADIDAE	*Tibicen linnei*	Cicada	5
7	FLATIDAE	*Sogatella furcifera*	Whitebacked planthopper	5
8	FORMICIDAE	*Leptogenys sp.*	Genial killer ant	5
9	SCARABAEIDAE	*Oryctes rhinoceros*	Rhinoceros beetle	4
10	PAPILIONIDAE	*Eurema lisa*	Little Yellow	4
11	MORPHIDAE	*Heliconius cydna*	Black and White Helicon	4
12	GRYLLIDAE	*Euscyrtus concinnus*	Crickets	4
13	ACRIDIDAE	*Neoconocephalus sp. 2*	Katydid	4
14	LINYPHIIDAE	*Atypus sp.*	field spider	3
15	LINYPHIIDAE	*Verrucosa sp./Verrucosa arenata*	Triangulate orbweaver/arrowhead spider	3
16	ALYDIDAE	*Leptocorisa acuta*	Earhead bug/paddy bug/rice bug	3
17	PSYLLIDAE	*Heteropsylla cubana*	Psyllids/Jumping plant lice/Lerp insects	3
18	FORMICIDAE	*Camponatus pennsylvanicus*	Black Carpenter Ants	3
19	CRAMBIDAE	*Chilo suppressalis*	Rice stem borer /Striped stem borer	3
20	LIBELLULIDAE	*Libelulla semifasciata*	Painted Skimmer	3
21	LINYPHIIDAE	*Frontinella pyramitela*	Bowl and doily spider	2
22	CHRYSOMELIDAE	*Tricholochmaea vaccinii*	Leaf beetles	2
23	COCCINELLIDAE	*Harmonia axyridis*	Asian Lady Beetle	2
24	PACHYRRYNCHIDAE	*Metapocyrtus pulverulentus*	Pachyrrynchid beetle	2
25	COREIDAE	*Euthochtha galeator*	Leaf-footed/Coreid bugs	2
26	CICADELLIDAE	*Brunotartessus fulvus*	Leaf-hoppers/ Yellow-headed leafhopper	2
27	FLATIDAE	*Phromnia sp.*	Flatids/ Flatid Planthopper	2
28	APIDAE	*Apis indica*	Honey bee	2
29	APIDAE	*Apis mellifera*	Honeybees; western honey bee or European honey bee	2
30	APIDAE	*Bombus sp.*	Bumble bee	2
31	PHINOTERMITIDAE	*Coptotermes gestroi*	Asian Termites	2
32	PAPILIONIDAE	*Pieris rapae*	Cabbage Butterfly/White-sulphur and orange-tipped butterflies/ The Small	2

Appendix 18: List of Arthropods per Transect

TRANSECT 3				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
			White	
33	PSYCHIDAE	*Oiketicus abbotii*	Bagworms and caseworms	2
34	TORTRICIDAE	*Petrova cristata*	Tip moth	2
35	LIBELLULIDAE	*Sympetrum internum*	Common Sympetrum/ Cherry-faced Meadowhawk	2
36	BLATTIDAE	*Periplaneta americana*	Cockroach	2
37	GRYLLOTALPIDAE	*Gryllotalpa africana*	Mole cricket	2
38	TETTIGONIIDAE	*Tettigonia viridissima*	Long-horned grasshopper and Katydids/ Green Bush Cricket	2
39	SCARABAEIDAE	*Dynastes tityus*	Scarabs/ Lamellicorn beetles /Eastern Hercules Beetle	1
40	DELPHACIDAE	*Fulgoromorpha*	Plant-hoppers	1
41	PSEUDOCOCCIDAE	*Maconellicoccus hirsutus*	Pink Mealy bug	1
42	CYNIPIDAE	*Neuroterus albipes*	Gall wasps/ gallflies	1
43	EUMENINAE	*Monobia quadridens*	Mason Wasp	1
44	PAPILIONIDAE	*Danaus sp.*	Butterfly	1
45	NOCTUIDAE	*Grammodes geometrica*	Owlet moths	1
46	MANTODAE	*Tenedora sinensis*	Praying mantis;	1

Appendix 18: List of Arthropods per Transect

TRANSECT 4				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
1	CULICIDAE	*Culex sp.*	Common mosquitoes	10
2	TERMITIDAE	*Isoptera sp.*	Termites/ White ants	10
3	AGROMYZIDAE	*Liriomyza sativae*	Gall making /Leaf miner flies	5
4	CICADAE	*Magicicada septendicum*	Cicada	5
5	EUMENINAE	*Monobia quadridens*	Mason Wasp	5
6	NYMPHALIDAE	*Melanitis leda ismene*	Greenhorned caterpillar	5
7	LIMACODIDAE	*Cnidocampa flavescens*	Slug caterpillar/	5
8	TETTIGONIIDAE	*Tettigonia viridissima*	Long-horned grasshopper and Katydids/ Green Bush Cricket	5
9	PYRRHOCORIDAE	*Pyrrhocoris apterus*	Red/ Fire bugs	4
10	PENTATOMIDAE	*Acanthosoma labiduroides*	Stink/Shield bugs	3
11	COCCIDAE	*Coccus viridis*	Coccids	3
12	PSEUDOCOCCIDAE	*Leptocorisa oratorius*	Rice bug	3
13	APIDAE	*Bombus sp.*	Bumble bee	3
14	LIBELLULIDAE	*Erythrodiplax basalis*	Skimmer	3
15	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	3
16	GRYLLOTALPIDAE	*Gryllotalpa africana*	Mole cricket	3
17	ACRIDIDAE	*Oxya hyla intricata / Oxya spp.*	Short-horned grasshoppers/locusts	3
18	LINYPHIIDAE	*Atypus sp.*	field spider	2
19	BOSTRICHIDAE	*Melalgus confertus*	Branch and Twig borer	2
20	CERAMBYCIDAE	*Anoplophora lucipor*	Long-horned beetles	2
21	COCCINELLIDAE	*Apidomopha sp.*	no infromation	2
22	SCARABAEIDAE	*Oryctes rhinoceros*	Rhinoceros beetle	2
23	TEPHRITIDAE	*Bactrocera dorsalis*	Fruit flies	2
24	PSEUDOCOCCIDAE	*Maconellicoccus hirsutus*	Pink Mealy bug	2
25	PSEUDOCOCCIDAE	*Scotinophara spp.*	Black bugs	2
26	APIDAE	*Vespula sp.*	Yellow Jacket	2
27	PHINOTERMITIDAE	*Coptotermes gestroi*	Asian Termites	2
28	DANAIDAE	*Danaus plexippus*	Monarch butterfly	2
29	PSYCHIDAE	*Oiketicus abbotii*	Bagworms and caseworms	2
30	TORTRICIDAE	*Cnephasia jactatana*	Leaf roller/Tortricid moths	2
31	LIBELLULIDAE	*Erythemis simplicicollis*	Common Pondhawk	2

Appendix 18: List of Arthropods per Transect

TRANSECT 4				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
32	LIBELLULIDAE	*Vestes eurina*	Damselfly	2
33	THRIPIDAE	*Baliothrips biformis*	Thrips	2
34	LINYPHIIDAE	*Verrucosa sp./Verrucosa arenata*	Triangulate orbweaver/arrowhead spider	1
35	BUPRESTIDAE	*Agrilus sexsignatus*	Varicose borer	1
36	CURCULIONIDAE	*Liparus glabirostris*	Weevils/Snout beetles	1
37	MEMBRACIDAE	*Ceresa taurina*	Treehoppers	1
38	CICADELLIDAE	*Brunotartessus fulvus*	Leaf-hoppers/ Yellow-headed leafhopper	1
39	APIDAE	*Apis indica*	Honey bee	1
40	EUMENINAE/ Vespidae	*Vespa sp.*	Vespid wasp	1
41	FORMICIDAE	*Diacamma sp.*	Bladder ants	1
42	FORMICIDAE	*Lasius sp.*	Citrunella ants	1
43	PAPILIONIDAE	*Mycalesis mineus*	Dark-banded bushbrown	1
44	GRYLLIDAE	*Acheta domesticus*	Crickets	1
45	MANTODAE	*Tenodera angustipennis*	Praying Mantis/ Narrow-winged Mantis	1
46	MANTODAE	*Thesprotia graminis*	Grass Praying Mantis	1
47	ACRIDIDAE	*Neoconocephalus sp. 2*	Katydid	1

Appendix 18: List of Arthropods per Transect

TRANSECT 5				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
1	PSEUDOCOCCIDAE	*Brevennia rehi*	Mealybugs	6
2	FORMICIDAE	*Leptogenys sp.*	Genial killer ant	6
3	PAPILIONIDAE	*Doleschallia sp.*	Leafwing	6
4	PAPILIONIDAE	*Mycalesis mineus*	Dark-banded bushbrown	6
5	COCCINELLIDAE	*Apidomopha sp.*	no infromation	5
6	APHIDIDAE	*Acyrthosiphon pisum*	Pea aphids/ Aphids or Plant lice	5
7	COREIDAE	*Euthochtha galeator*	Leaf-footed/Coreid bugs	5
8	ALEYRODIDAE	*Trialeurodes vaporariorum*	White flies	4
9	PAPILIONIDAE	*Cethosia sp.*	Lacewing butterfly	4
10	CULICIDAE	*Culex sp.*	Common mosquitoes	3
11	FORMICIDAE	*Camponatus sp.*	Carpenter Ants	3
12	MORPHIDAE	*Heliconius cydna*	Black and White Helicon	3
13	LINYPHIIDAE	*Verrucosa sp./Verrucosa arenata*	Triangulate orbweaver/arrowhead spider	2
14	COCCINELLIDAE	*Harmonia axyridis*	Asian Lady Beetle	2
15	SCARABAEIDAE	*Dynastes tityus*	Scarabs/ Lamellicorn beetles /Eastern Hercules Beetle	2
16	AGROMYZIDAE	*Liriomyza sativae*	Gall making /Leaf miner flies	2
17	MUSCIDAE	*Musca domestica*	Common housefly	2
18	DELPHACIDAE	*Fulgoromorpha*	Plant-hoppers	2
19	PAPILIONIDAE/ Pieridae	*Terias hecabe*	Large Grass Yellow or Common Grass Yellow	2
20	HESPERIIDAE	*Pelopidas mathias*	Rice skipper	2
21	LIBELLULIDAE	*Sympetrum internum*	Common Sympetrum/ Cherry-faced Meadowhawk	2
22	BLATTIDAE	*Periplaneta americana*	Cockroach	2
23	PHASMIDAE	*Diapheromera Femorata*	Phasmids/Walking sticks	2
24	BUPRESTIDAE	*Agrilus sexsignatus*	Varicose borer	1
25	BUPRESTIDAE	*Chrysobothris monticola*	Metallic wood-boring beetles/jewel beetles	1
26	MEMBRACIDAE	*Ceresa taurina*	Treehoppers	1
27	PSEUDOCOCCIDAE	*Scotinophara spp.*	Black bugs	1

Appendix 18: List of Arthropods per Transect

TRANSECT 5				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
28	APIDAE	*Apis indica*	Honey bee	1
29	FORMICIDAE	*Lasius sp.*	Citrunella ants	1
30	LIBELLULIDAE	*Erythrodiplax basalis*	Skimmer	1
31	GRYLLIDAE	*Euscyrtus concinnus*	Crickets	1
32	ACRIDIDAE	*Neoconocephalus retusus*	Round-tipped Conehead Katydid	1

Appendix 18: List of Arthropods per Transect

TRANSECT 6				
No.	**Family Name**	***Scientific Name***	**Common Name**	**No. of Ind.**
1	CULICIDAE	*Culex sp.*	Common mosquitoes	9
2	TERMITIDAE	*Isoptera sp.*	Termites/ White ants	9
3	APIDAE	*Apis mellifera*	Honeybees; western honey bee or European honey bee	8
4	GEOMETRIDAE	*Ozola minor*	Measuring worm/Loopers	6
5	ANTHROPHORIDAE	*Xylocopa spp./ Xylocopa violacea*	Carpenter Bees	5
6	COSSIDAE	*Cossus japonica*	Carpenter moths	5
7	PYRRHOCORIDAE	*Dysdercus cingulatos*	Red Cotton bug	4
8	COCCINELLIDAE	*Menochilus sexmaculata*	Ladybird beetles	3
9	SCOLYTIDAE	*Dryocoetiops laevis*	Bark beetles	3
10	TEPHRITIDAE	*Bactrocera dorsalis*	Fruit flies	3
11	APHIDIDAE	*Acyrthosiphon pisum*	Pea aphids/ Aphids or Plant lice	3
12	LINYPHIIDAE	*Atypus sp.*	field spider	2
13	BOSTRICHIDAE	*Melalgus confertus*	Branch and Twig borer	2
14	CURCULIONIDAE	*Liparus glabirostris*	Weevils/Snout beetles	2
15	PACHYRRYNCHIDAE	*Pachnaeus litus*	Broad-nosed weevils	2
16	CYNIPIDAE	*Neuroterus albipes*	Gall wasps/ gallflies	2
17	EUMENINAE	*Monobia quadridens*	Mason Wasp	2
18	DANAIDAE	*Danaus plexippus*	Monarch butterfly	2
19	PAPILIONIDAE	*Hebomoia glaucippe*	Great Orange Tip	2
20	CRAMBIDAE	*Chilo suppressalis*	Rice stem borer /Striped stem borer	2
21	NOCTUIDAE	*Grammodes geometrica*	Owlet moths	2
22	PYRALIDAE	*Munroessa icciusalis*	Pyralid moths/ Pondside Pyralid Moth	2
23	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	2
24	GRYLLIDAE	*Euscyrtus concinnus*	Crickets	2
25	PHASMIDAE	*Diapheromera Femorata*	Phasmids/Walking sticks	2
26	LINYPHIIDAE	*Frontinella pyramitela*	Bowl and doily spider	1
27	BUPRESTIDAE	*Chrysobothris monticola*	Metallic wood-boring beetles/jewel beetles	1
28	CHRYSOMELIDAE	*Tricholochmaea vaccinii*	Leaf beetles	1
29	TORTRICIDAE	*Cnephasia jactatana*	Leaf roller/Tortricid moths	1
30	THRIPIDAE	*Baliothrips biformis*	Thrips	1

Appendix 18: List of Arthropods per Transect

TRANSECT 7				
No.	**Family Name**	**Scientific Name**	**Common Name**	**No. of Ind.**
1	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	8
2	ALEYRODIDAE	*Trialeurodes vaporariorum*	White flies	6
3	ACRIDIDAE	*Romalea guttata*	Eastern Lubber Grasshopper	6
4	CULICIDAE	*Culex sp.*	Common mosquitoes	5
5	MUSCIDAE	*Musca domestica*	Common housefly	5
6	FORMICIDAE	*Odontomachus sp.*	Trapjaw ants	5

7	APIDAE	*Apis indica*	Honey bee	3
8	FORMICIDAE	*Solenopsis geminata*	Ants	3
9	LYMANTRIIDAE	*Calliteara angulata*	Tussock-moths	3
10	BUPRESTIDAE	*Agrilus sexsignatus*	Varicose borer	2
11	CERAMBYCIDAE	*Anoplophora lucipor*	Long-horned beetles	2
12	COCCINELLIDAE	*Menochilus sexmaculata*	Ladybird beetles	2
13	PLATYPODIDAE	*Platypus australis*	Pinhole borers	2
14	AGROMYZIDAE	*Liriomyza sativae*	Gall making /Leaf miner flies	2
15	PSEUDOCOCCIDAE	*Maconellicoccus hirsutus*	Pink Mealy bug	2
16	APIDAE	*Apis mellifera*	Honeybees; western honey bee or European honey bee	2
17	EUMENINAE	*Eumenes fraternal*	Potter Wasp	2
18	FORMICIDAE	*Diacamma sp.*	Bladder ants	2
19	PAPILIONIDAE	*Doleschallia sp.*	Leafwing	2
20	LIBELLULIDAE	*Libelulla semifasciata*	Painted Skimmer	2
21	LINYPHIIDAE	*Atypus sp.*	field spider	1
22	LINYPHIIDAE	*Verrucosa sp./Verrucosa arenata*	Triangulate orbweaver/arrowhead spider	1
23	PACHYRRYNCHIDAE	*Pachnaeus litus*	Broad-nosed weevils	1
24	DELPHACIDAE	*Fulgoromorpha*	Plant-hoppers	1
25	CICADELLIDAE	*Nephotettix spp.*	Green leafhopper	1
26	MORPHIDAE	*Morpho peleides*	Peleides Blue Morpho, Common Morpho, or The Emperor	1
27	PSYCHIDAE	*Oiketicus abbotii*	Bagworms and caseworms	1
28	BLATTIDAE	*Periplaneta americana*	Cockroach	1
29	MANTODAE	*Tenedora sinensis*	Praying mantis;	1

Appendix 19. General List of Arthropods' Importance Value

No.	Family Name	Scientific Name	Common Name	Tot # Ind.	SIV	Rank
1	CULICIDAE	*Culex sp.*	Common mosquitoes	37	8.81	1
2	TERMITIDAE	*Isoptera sp.*	Termites/ White ants	32	6.75	2
3	ACRIDIDAE	*Gastrimargus marmoratus*	Band-winged Grasshopper	26	6.65	3
4	LINYPHIIDAE	*Atypus sp.*	field spider	13	4.17	4
5	COCCINELLIDAE	*Apidomopha sp.*	no infromation	13	3.74	5
6	MUSCIDAE	*Musca domestica*	Common housefly	12	3.59	6
7	GRYLLIDAE	*Euscyrtus concinnus*	Crickets	9	3.53	7
8	AGROMYZIDAE	*Liriomyza sativae*	Gall making /Leaf miner flies	10	3.27	8
9	APIDAE	*Apis mellifera*	Honeybees; western honey bee or European honey bee	12	3.16	9
10	BUPRESTIDAE	*Agrilus sexsignatus*	Varicose borer	9	3.11	10
11	COCCINELLIDAE	*Menochilus sexmaculata*	Ladybird beetles	11	3.01	11
12	ALEYRODIDAE	*Trialeurodes vaporariorum*	White flies	11	3.01	12
13	CURCULIONIDAE	*Liparus glabirostris*	Weevils/Snout beetles	8	2.95	13
14	GEOMETRIDAE	*Ozola minor*	Measuring worm/Loopers	13	2.90	14
15	LINYPHIIDAE	*Verrucosa sp./Verrucosa arenata*	Triangulate orbweaver/arrowhead spider	7	2.80	15
16	CHRYSOMELIDAE	*Tricholochmaea vaccinii*	Leaf beetles	7	2.80	16
17	DELPHACIDAE	*Fulgoromorpha*	Plant-hoppers	7	2.80	17
18	APIDAE	*Apis indica*	Honey bee	7	2.80	18
19	BLATTIDAE	*Periplaneta americana*	Cockroach	7	2.80	19
20	BOSTRICHIDAE	*Melalgus confertus*	Branch and Twig borer	9	2.69	20
21	CICADIDAE	*Tibicen linnei*	Cicada	11	2.58	21
22	FORMICIDAE	*Leptogenys sp.*	Genial killer ant	11	2.58	22
23	SCARABAEIDAE	*Oryctes rhinoceros*	Rhinoceros beetle	8	2.53	23
24	EUMENINAE	*Monobia quadridens*	Mason Wasp	8	2.53	24
25	MORPHIDAE	*Heliconius cydna*	Black and White Helicon	8	2.53	25
26	LIBELLULIDAE	*Libelulla semifasciata*	Painted Skimmer	7	2.37	26
27	APIDAE	*Bombus sp.*	Bumble bee	6	2.22	27
28	ACRIDIDAE	*Neoconocephalus sp. 2*	Katydid	6	2.22	28
29	THRIPIDAE	*Baliothrips biformis*	Thrips	6	2.22	29
30	APHIDIDAE	*Acyrthosiphon pisum*	Pea aphids/ Aphids or Plant lice	8	2.11	30
31	PAPILIONIDAE	*Doleschallia sp.*	Leafwing	8	2.11	31
32	LINYPHIIDAE	*Frontinella pyramitela*	Bowl and doily spider	5	2.06	32
33	COCCINELLIDAE	*Harmonia axyridis*	Asian Lady Beetle	5	2.06	33
34	PSEUDOCOCCIDAE	*Maconellicoccus hirsutus*	Pink Mealy bug	5	2.06	34
35	PSYCHIDAE	*Oiketicus abbotii*	Bagworms and caseworms	5	2.06	35
36	COREIDAE	*Euthochtha galeator*	Leaf-footed/Coreid bugs	7	1.95	36
37	FORMICIDAE	*Odontomachus sp.*	Trapjaw ants	7	1.95	37
38	PAPILIONIDAE	*Eurema lisa*	Little Yellow	7	1.95	38
39	PAPILIONIDAE	*Mycalesis mineus*	Dark-banded bushbrown	7	1.95	39
40	NYMPHALIDAE	*Melanitis leda ismene*	Greenhorned caterpillar	7	1.95	40

Appendix 19. General List of Arthropods' Importance Value

No.	Family Name	Scientific Name	Common Name	Tot # Ind.	SIV	Rank
41	ACRIDIDAE	*Romalea guttata*	Eastern Lubber Grasshopper	7	1.95	41
42	TETTIGONIIDAE	*Tettigonia viridissima*	Long-horned grasshopper and Katydids/ Green Bush Cricket	7	1.95	42
43	PSEUDOCOCCIDAE	*Scotinophara spp.*	Black bugs	4	1.90	43
44	FORMICIDAE	*Lasius sp.*	Citrunella ants	4	1.90	44
45	CICADAE	*Magicicada septendicum*	Cicada	6	1.79	45
46	PYRRHOCORIDAE	*Pyrrhocoris apterus*	Red/ Fire bugs	6	1.79	46
47	TEPHRITIDAE	*Bactrocera dorsalis*	Fruit flies	5	1.64	47
48	PENTATOMIDAE	*Acanthosoma labiduroides*	Stink/Shield bugs	5	1.64	48
49	FORMICIDAE	*Camponatus sp.*	Carpenter Ants	5	1.64	49
50	CRAMBIDAE	*Chilo suppressalis*	Rice stem borer /Striped stem borer	5	1.64	50
51	GRYLLOTALPIDAE	*Gryllotalpa africana*	Mole cricket	5	1.64	51
52	ACRIDIDAE	*Oxya hyla intricata / Oxya spp.*	Short-horned grasshoppers/locusts	5	1.64	52
53	CERAMBYCIDAE	*Anoplophora lucipor*	Long-horned beetles	4	1.48	53
54	PSYLLIDAE	*Heteropsylla cubana*	Psyllids/Jumping plant lice/Lerp insects	4	1.48	54
55	PHINOTERMITIDAE	*Coptotermes gestroi*	Asian Termites	4	1.48	55
56	DANAIDAE	*Danaus plexippus*	Monarch butterfly	4	1.48	56
57	LIBELLULIDAE	*Sympetrum internum*	Common Sympetrum/ Cherry-faced Meadowhawk	4	1.48	57
58	LIBELLULIDAE	*Erythrodiplax basalis*	Skimmer	4	1.48	58
59	ACRIDIDAE	*Neoconocephalus retusus*	Round-tipped Conehead Katydid	4	1.48	59
60	PHASMIDAE	*Diapheromera Femorata*	Phasmids/Walking sticks	4	1.48	60
61	PSEUDOCOCCIDAE	*Brevennia rehi*	Mealybugs	6	1.37	61
62	PACHYRRYNCHIDAE	*Pachnaeus litus*	Broad-nosed weevils	3	1.32	62
63	SCARABAEIDAE	*Dynastes tityus*	Scarabs/ Lamellicorn beetles /Eastern Hercules Beetle	3	1.32	63
64	CICADELLIDAE	*Brunotartessus fulvus*	Leaf-hoppers/ Yellow-headed leafhopper	3	1.32	64
65	CICADELLIDAE	*Nephotettix spp.*	Green leafhopper	3	1.32	65
66	CYNIPIDAE	*Neuroterus albipes*	Gall wasps/ gallflies	3	1.32	66
67	EUMENINAE	*Eumenes fraternal*	Potter Wasp	3	1.32	67
68	FORMICIDAE	*Diacamma sp.*	Bladder ants	3	1.32	68
69	PAPILIONIDAE	*Danaus sp.*	Butterfly	3	1.32	69
70	PAPILIONIDAE	*Pieris rapae*	Cabbage Butterfly/White-sulphur and orange-tipped butterflies/ The Small White	3	1.32	70
71	NOCTUIDAE	*Grammodes geometrica*	Owlet moths	3	1.32	71
72	TORTRICIDAE	*Cnephasia jactatana*	Leaf roller/Tortricid moths	3	1.32	72
73	GRYLLIDAE	*Acheta domesticus*	Crickets	3	1.32	73
74	MANTODAE	*Thesprotia graminis*	Grass Praying Mantis	3	1.32	74
75	FLATIDAE	*Sogatella furcifera*	Whitebacked planthopper	5	1.21	75

Appendix 19. General List of Arthropods' Importance Value

No.	Family Name	Scientific Name	Common Name	Tot # Ind.	SIV	Rank
76	ANTHROPHORIDAE	*Xylocopa spp./ Xylocopa violacea*	Carpenter Bees	5	1.21	76
77	COSSIDAE	*Cossus japonica*	Carpenter moths	5	1.21	77
78	LIMACODIDAE	*Cnidocampa flavescens*	Slug caterpillar/	5	1.21	78
79	BUPRESTIDAE	*Chrysobothris monticola*	Metallic wood-boring beetles/jewel beetles	2	1.16	79
80	MEMBRACIDAE	*Ceresa taurina*	Treehoppers	2	1.16	80
81	MANTODAE	*Tenedora sinensis*	Praying mantis;	2	1.16	81
82	PYRRHOCORIDAE	*Dysdercus cingulatos*	Red Cotton bug	4	1.05	82
83	PAPILIONIDAE	*Cethosia sp.*	Lacewing butterfly	4	1.05	83
84	SCOLYTIDAE	*Dryocoetiops laevis*	Bark beetles	3	0.90	84
85	EPHYDRIDAE	*Hydrellia philippina*	Rice whorl maggot	3	0.90	85
86	ALYDIDAE	*Leptocorisa acuta*	Earhead bug/paddy bug/rice bug	3	0.90	86
87	COCCIDAE	*Coccus viridis*	Coccids	3	0.90	87
88	PSEUDOCOCCIDAE	*Leptocorisa oratorius*	Rice bug	3	0.90	88
89	FORMICIDAE	*Camponatus pennsylvanicus*	Black Carpenter Ants	3	0.90	89
90	FORMICIDAE	*Solenopsis geminata*	Ants	3	0.90	90
91	PAPILIONIDAE	*Papilio polytes*	Common Mormon	3	0.90	91
92	COSSIDAE	*Xyleutes spp.*	Bee-hole borer/ carpenter bee	3	0.90	92
93	LYMANTRIIDAE	*Calliteara angulata*	Tussock-moths	3	0.90	93
94	PACHYRRYNCHIDAE	*Metapocyrtus pulverulentus*	Pachyrrynchid beetle	2	0.74	94
95	PLATYPODIDAE	*Platypus australis*	Pinhole borers	2	0.74	95
96	FLATIDAE	*Phromnia sp.*	Flatids/ Flatid Planthopper	2	0.74	96
97	APIDAE	*Vespula sp.*	Yellow Jacket	2	0.74	97
98	PAPILIONIDAE	*Hebomoia glaucippe*	Great Orange Tip	2	0.74	98
99	PAPILIONIDAE/ Pieridae	*Terias hecabe*	Large Grass Yellow or Common Grass Yellow	2	0.74	99
100	HESPERIIDAE	*Pelopidas mathias*	Rice skipper	2	0.74	100
101	PYRALIDAE	*Munroessa icciusalis*	Pyralid moths/ Pondside Pyralid Moth	2	0.74	101
102	TORTRICIDAE	*Petrova cristata*	Tip moth	2	0.74	102
103	LIBELLULIDAE	*Erythemis simplicicollis*	Common Pondhawk	2	0.74	103
104	LIBELLULIDAE	*Vestes eurina*	Damselfly	2	0.74	104
105	EUMENINAE/ Vespidae	*Vespa sp./ Vespula germanica*	Vespid wasp	1	0.58	105
106	MORPHIDAE	*Morpho peleides*	Peleides Blue Morpho, Common Morpho, or The Emperor	1	0.58	106
107	MANTODAE	*Tenodera angustipennis*	Praying Mantis/ Narrow-winged Mantis	1	0.58	107

Appendix 20: List of Arthropods Dominant Families

No.	FAMILY	No. of Species	Rank
1	PAPILIONIDAE/ Pieridae	9	1
2	FORMICIDAE	7	2
3	ACRIDIDAE	5	3
4	LIBELLULIDAE	5	4
5	APIDAE	4	5
6	PSEUDOCOCCIDAE	4	6
7	COCCINELLIDAE	3	7
8	EUMENINAE/ Vespidae	3	8
9	LINYPHIIDAE	3	9
10	MANTODAE	3	10
11	BUPRESTIDAE	2	11
12	CICADELLIDAE	2	12
13	COSSIDAE	2	13
14	FLATIDAE	2	14
15	GRYLLIDAE	2	15
16	MORPHIDAE	2	16
17	PACHYRRYNCHIDAE	2	17
18	PYRRHOCORIDAE	2	18
19	SCARABAEIDAE	2	19
20	TORTRICIDAE	2	20
21	AGROMYZIDAE	1	21
22	ALEYRODIDAE	1	22
23	ALYDIDAE	1	23
24	ANTHROPHORIDAE	1	24
25	APHIDIDAE	1	25
26	BLATTIDAE	1	26
27	BOSTRICHIDAE	1	27
28	CERAMBYCIDAE	1	28
29	CHRYSOMELIDAE	1	29
30	CICADAE	1	30
31	CICADIDAE	1	31
32	COCCIDAE	1	32
33	COREIDAE	1	33
34	CRAMBIDAE	1	34
35	CULICIDAE	1	35
36	CURCULIONIDAE	1	36
37	CYNIPIDAE	1	37
38	DANAIDAE	1	38
39	DELPHACIDAE	1	39
40	EPHYDRIDAE	1	40
41	GEOMETRIDAE	1	41
42	GRYLLOTALPIDAE	1	42
43	HESPERIIDAE	1	43
44	LIMACODIDAE	1	44
45	LYMANTRIIDAE	1	45
46	MEMBRACIDAE	1	46
47	MUSCIDAE	1	47
48	NOCTUIDAE	1	48

Appendix 20: List of Arthropods Dominant Families

No.	FAMILY	No. of Species	Rank
49	NYMPHALIDAE	1	49
50	PENTATOMIDAE	1	50
51	PHASMIDAE	1	51
52	PHINOTERMITIDAE	1	52
53	PLATYPODIDAE	1	53
54	PSYCHIDAE	1	54
55	PSYLLIDAE	1	55
56	PYRALIDAE	1	56
57	SCOLYTIDAE	1	57
58	TEPHRITIDAE	1	58
59	TERMITIDAE	1	59
60	TETTIGONIIDAE	1	60
61	THRIPIDAE	1	61

Appendix 21. Diversity and Evenness of Arthropods

	T1	T2	T3	T4	T5	T6	T7
H`	3.04	3.2	3.68	3.62	3.28	3.18	3.15
E	0.94	0.96	0.96	0.94	0.95	0.93	0.94
No. of Species	25	28	46	47	32	30	29
No. of Individual	**57**	**68**	**130**	**124**	**87**	**91**	**75**

PHOTO DOCUMENTATION