ANNEX 1

SCOPE OF WORK

Scope of Work

ESIA of the dam and associated structures including access

The following shall be undertaken by the Consultant:

Task 1: Initial Site Visit and Coordination of Study

- Consultant is to make arrangements for a visit to Yangon to meet with SN Power representatives and the local consultants, MIID, for an orientation meeting and latest update on the status of the project. This should commence early January 2017.
- Conduct a site visit accompanied by SNP to familiarize the Consultant with the area and project-related issues
- Preliminary discussions of the details of the ESIA work in relation to issues, conditions, methodologies, available reports and data post field visit and agreement on a detailed schedule moving forward
- SNP will make all reports and information available to the Consultant for review at this time for the next task

Task 2: "Gap Report" and Review of existing reports and data:

- Review existing information on project features, design and technical aspects, and identify any issues that require further clarification or more details – note that the technical feasibility studies will be undertaken in parallel and some information may be lacking at this early stage
- Review of sections on legal requirements, policies and procedures, including those in draft format that could affect the completion of the ESIA, and identify any additional actions or missing elements
- Review all available environmental data in the Pre-Feasibility Report and subsequent environmental reports on water quality, hydrology and ecology, and identify all gaps in data and quality issues with existing information
- Review all available social baseline data and information in the Pre-Feasibility Report and subsequent field reports on livelihood, local economic conditions, education, health, history, relations between groups, government capacity at all levels and the consultation process, and identify all gaps in data and quality issues with existing information and any further results – if required additional consultations will be carried out by the nominated subcontractor under the Consultant supervision
- Assess the security situation by reviewing all information in the reports, in discussions with MIID and other sources, and identify all issues to be addressed in the ESIA and any further information requirements
- Approval form SN Power will be sought by the Consultant for any additional ground survey or data collection required to complete the ESIA

Task 3: Analysis of Policy and Legal Requirements

- Update the sections in the Pre-Feasibility Study on legal requirements and update on any new laws, policies and procedures, including those in draft format that could affect the project implementation
- Compare existing legislature and requirements in relation to IFC Performance Standard

requirements, identifying any gaps and alternatives for addressing these gaps within the context of the ESIA

- Create a table listing all the key elements of the IFC PS requirements and how these are addressed in the ESIA so that donors can have easy reference
- Review and comment on project policy, proposed project impact zone classification and entitlement matrixes that will be provided by SN Power for inclusion in the ESIA based on the information provided in the technical studies
- Draft sections on overarching issues in relation to policy and requirements: these should include gender, vulnerable groups and ethnic minorities
- Evaluate the status of the Danu and other smaller groups in the project area in relation to the IFC PS7 on Indigenous People
- Include findings and recommendation from the planned Human Rights report that will be carried out by SNP during the contract period

Task 4: Write-up and analysis of Environmental Baseline

- Complete description of the terrestrial vegetation, both natural and man-made environments – evaluate the flora of the project area and identify any important or listed species based on samplings and analysis
- Complete description of the fauna (mammals, herpetofauna and birds)– evaluate species in the project area and identify any important or listed species based on samplings and analysis
- Description of the aquatic ecosystem, including fish fauna – evaluate species of the project area and identify any important or listed species based on samplings and analysis
- Participate and/or oversee additional survey work with MIID and other local consultants, as required in the field and discuss findings and data, paying special attention to species listed as endangered or critically endangered by IUCN
- Analyse any additional information and field surveys as required for any species on the IUCN Red Lists to ensure that these species are common to the area and located in other parts of the catchment or in the region – to be discussed with SNP after the "Gap Report"

Task 5: Write-up and analysis of Social Baseline

- Complete sections on regional characteristics and descriptions based on the information in the Pre-Feasibility Report and other sources
- Oversee MIID's detailed socio-economic and health survey of left-bank villages and villages located at the tail-end of the reservoir using the methodology and formats that have been used for right-bank villages and based on the information provided in the Pre-feasibility study and reconnaissance
- Complete the description of cultural practices and beliefs of the Danu ethnic group and cultural heritage issues (physical cultural resources) in the project area, including the location of holy sites, graveyards and shrines in the proposed reservoir, project construction lands or along transmission line and road corridors in coordination with MIID.
- Description of cultural practices and beliefs of the local Shan ethnic group (end of the

reservoir and adjacent areas) and cultural heritage issues (physical cultural resources) in the project area, including the location of holy sites, graveyards and shrines in the proposed reservoir, project construction lands or along transmission line and road corridors.

- Provide any additional information on regional history and inter-ethnic relations and conflict
- Complete description of uses of the project impacted areas or adjacent areas of the reservoir, construction lands, camp and work areas, transmission line corridors and road corridors
- Complete description of regional development trends, infrastructure and services in the project area and other social challenges that could be of concern for the development of this Project – identify any developmental NGO activities that could complement project activities
- Oversee additional survey work with MIID and other local sub-consultants, as required in the field and discuss findings and data
- Oversee ongoing consultations led by MIID in impacted communities during the contract period, as required, in order to quality control the ongoing work
- Analyse any additional information and field surveys as required for completion of the socio-economic analysis of the project zones – to be discussed with SNP after the "Gap Report"

Task 6: Analysis of Stakeholder Management and Consultation Process:

- Complete stakeholder mapping and analysis of stakeholder relations in terms of decision-making and influence, including the identification of any vulnerable groups
- Compile a list of meetings and consultations for the report based on material and information provided by SNP and MIID, and ongoing consultations
- Summarize the main topics, comments and outcomes of the various consultation meetings held in the project area
- Complete an assessment of local government understanding of national legislation and international standards, and their capacity to carry out tasks related to project mitigation

Task 7: Impact Assessment

- Revise and improve the chapter (6) on alternatives in the Pre-Feasibility Report taking into consideration different layouts, ranking and criteria, including energy demand and supply alternatives, siting alternatives, production regimes and project design
- Provide a simple and concise methodology for assessing impact in terms of extent, magnitude and duration – the methodology should be used for all E&S components so that there can be comparison of the different themes and topics and prioritization
- List all impacts on the environment:
    - Impacts on physical and chemical environment
    - Impacts on biological environment
- List all impacts on the communities and social aspects:
    - Impacts due to loss of land and production
    - Impacts on natural resources (forests/river)

  - Health and safety aspects
- Identity cumulative impacts
  - From the four projects on the river (Upper, Middle, Lower Yeywa and Deedoke schemes and the basin as a whole) in terms of hydrology and water management
  - The IFC approach to cumulative impacts as Valued Environmental and Social Components (VECs) is to be used in relation to defining scope and impacts
  - Issues related to fisheries and aquatic biodiversity
  - Issues related to impacts on communities – loss of land, fisheries, livelihoods, natural resource access, etc.

Task 8: Executive Summary

- The Executive Summary should be no more than five pages in length and shall build on the Executive Summary in the Pre-Feasibility Report
- It should contain a summary of each of the main chapters and sections in the report, including main findings and analysis
- It should reiterate the main points of policy and approach to E&S for the project
- Include a project site map and relevant tables

Task 9: Submission of the Draft ESIA

- Follow the outline in the Pre-Feasibility and in the annex to this ToR and modify as required in order to cover all topics and issues
- Provide maps, photos and other materials (using existing or improved ones) for the report
- Submit the Draft ESIA for review by SNP

Task 10: Submission of Final Draft ESIA

- Comments on the Draft ESIA will be provided by SNP
- Revise, in consultation with SNP, the report and finalize it for submission

ESMP

The following shall be undertaken by the Consultant:

Task 1: Analysis of the Scope and Extent of the ESMP

- Consultant is to review the draft Table of Contents and finalize this in discussion with the consultant, including agreement of tasks to be carried out by the two parties
- Submit a detailed plan and schedule as to how the write-up and analysis will be carried out
- Identify any further needs for surveys, information or data
- Agree on staff arrangement
- Coordination with ongoing consultations and other activities
- Identify any further technical information required to complete the report sections

Task 2: Draft of EMP Sections

- Draft sections as outlined in the ToR Annex and agreed to as of Task 1 above
- Construction management plan in cooperation SNP and with information provided by the ongoing technical studies
- Water quality and fisheries monitoring plans
- Conservation, forestry and biodiversity offset management and monitoring plans
- Transmission Line
- Reservoir clearance, filling and safety issues
- Operational environmental framework

Task 3: Draft of SMP Sections

- Draft sections as outlined in the ToR Annex and agreed to as of Task 1 above
- Stakeholder Management and communication strategy together with SNP
- Compensation, restoration and replacement of loss for all project areas, including the TL Corridor
- Development initiatives and implementation arrangements
- Social management of construction areas for population influx and camp followers
- Operational social program framework

Task 8: Executive Summary

- The Executive Summary should be no more than five pages in length
- It should contain a summary of each of the main chapters and sections in the report, including main mitigation measures and strategies
- Include a summary table of all measures and objectives

Task 9: Submission of the Draft ESMP

- Follow the outline in ToR and modify as required in order to cover all topics and issues
- Provide maps, photos and other materials (using existing or improved ones) for the report
- Submit the Draft ESMP for review by SNP

Task 10: Submission of Final Draft ESMP

- Comments on the Draft ESMP will be provided by SNP
- Revise, in consultation with SNP, the report and finalize it for submission

The Client will at its sole discretion decide whether to proceed or not with some of these services at the relevant time of the assignment. These optional services, if requested by the Client will be treated as additional services with reference to the Contractual conditions.

Deliverables

Language
All deliverables shall be in the English language.

Approval of deliverables
As a minimum and unless stated otherwise in the relevant sections the Consultant will seek the approval without comments from the Client of any deliverables and as part of the Services. To this extent, the Consultant will submit as much revisions that are required to obtain this approval.

Each deliverable will be submitted to the Client in draft version for approval without comments. SNP will provide its comments, requests for clarification/amendment/completion within 28 calendar days, except if stated otherwise in this section, from the reception of a workable electronic format of the report, including all the appendices.

Supervision of Client's nominated sub-contractor

The Client has nominated Myanmar Institute for Integrated Development as a sub-contractor (Contractor) to the Consultant. The Consultant will be in charge of and responsible for the supervising and overseeing of the Contractor's works. The Consultant shall take all the necessary actions towards the Contractor to correct any deviations from the technical requirements and specifications of the works and thereafter ensuring that the Contractor complies. In particular the Consultant shall ensure that the Contractor rectifies any procedure(s) that may prevent the Consultant from being provided with a complete and full set of accurate baseline data which the Consultant requires to assess the environmental and social impacts of the Project.

The Client shall receive a copy of all instructions and notifications issued by the Consultant. The Consultant will monitor and inform the Client about the implementation of the corrective measures by the Contractor.

For the sake of clarity, the Client remains liable of selecting the Contractor; therefore, the Consultant shall bear no liability regarding the final quality or final quantity of the results provided by the Contractor in the event that the Contractor has failed to abide timely instructions given by the Consultant.

ANNEX 2

BIODIVERSITY REPORTS

ANNEX 2A

Pre-feasibility for the Middle Yeywa Hydropower Project:

Annex 4 - Biodiversity Survey of the Nam Tu River upstream of the Middle Yeywa Hydropower Project

ANNEX 4: BIODIVERSITY SURVEY OF THE NAM TU RIVER UPSTREAM OF THE MIDDLE YEYWA HYDROPOWER PROJECT

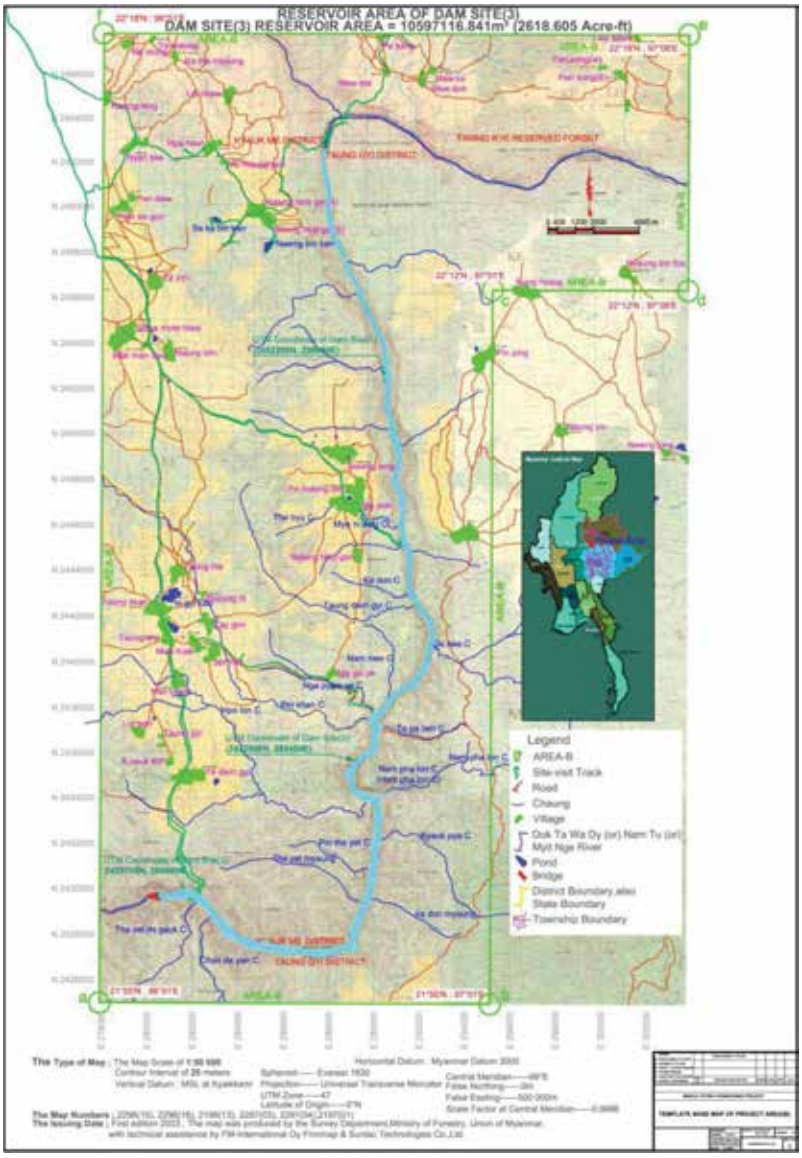
I. INTRODUCTION

The environmental Impact assessment, especially on the biodiversity of intended inundated area of Middle YeYwar hydropower dam on Dodtawaddy River in Naung-cho Township, Shan State, which will be constructed near future, has been carried out in March, April and May 2015.

1.1 Location

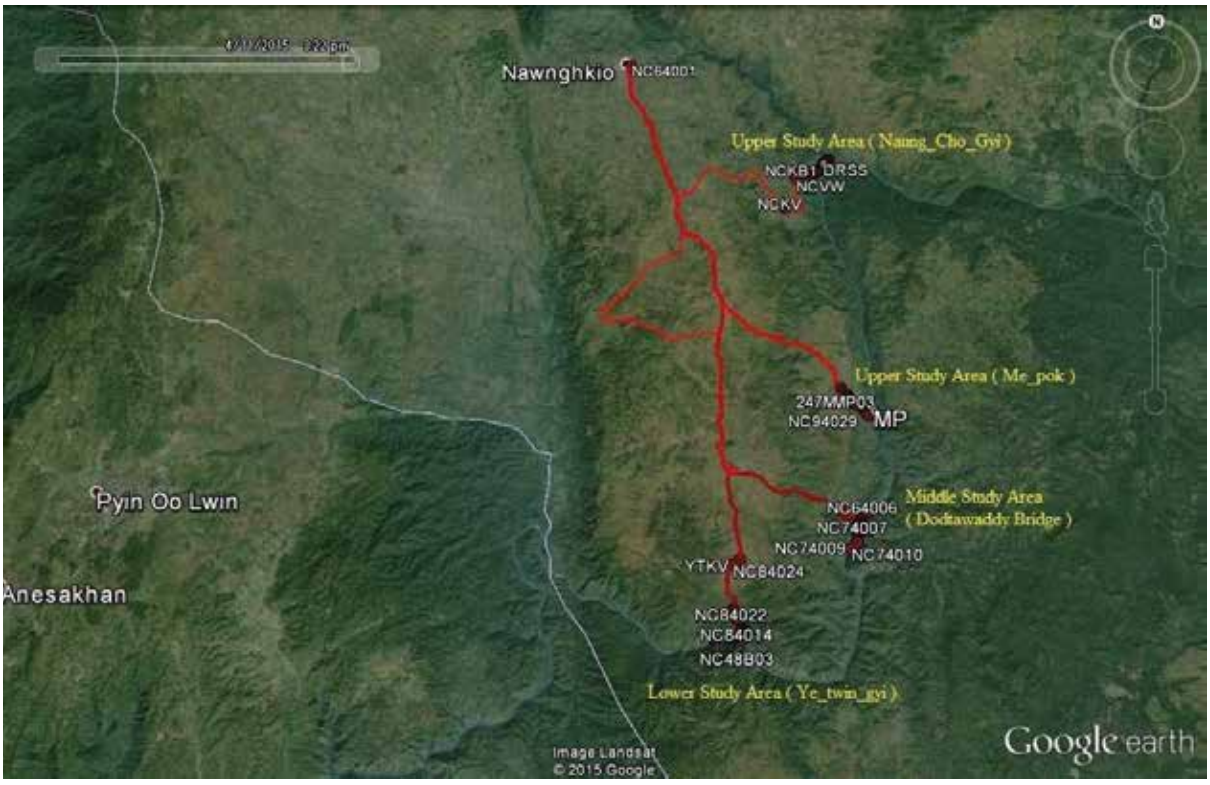
The Middle YeYwar Hydropower Dam project is located between 21° 55'N, 96° 51' E and 21° 55' N, 97° 01' E near Ye-twin-gyi Village in Naung-cho Township, on down stream become confluence with Tha-yet-migauk Stream and Dodtawaddy River.(Map.I)

Map. I



A river with three names, Nantu River, Dodtawaddy River and Myintnge River, which originate from the northern Shan State mountain ranges, flow from east to west in Kyaukme Township, named as Nantu River and continues to flow from north to south and then turns to flow from east to west in Naung-cho Township, named as Dodtawaddy River and then it continues to flow from north east to south west in the low land area of Mandalay Division, named as Myintnge River. Zawgi River and Panlaung River drain into the Myintnge River before it drains into the Ayarwaddy River. Myintnge River flows into the Ayarwaddy River in Tada-u Township and Amayapura Township. The river is 154.4 kilometer long as Nantu, 159 kilometer long as Dodtawaddy and 98.8 kilometer long as Myintnge. (Photo Map I).

Photo Map I. All Study Sites

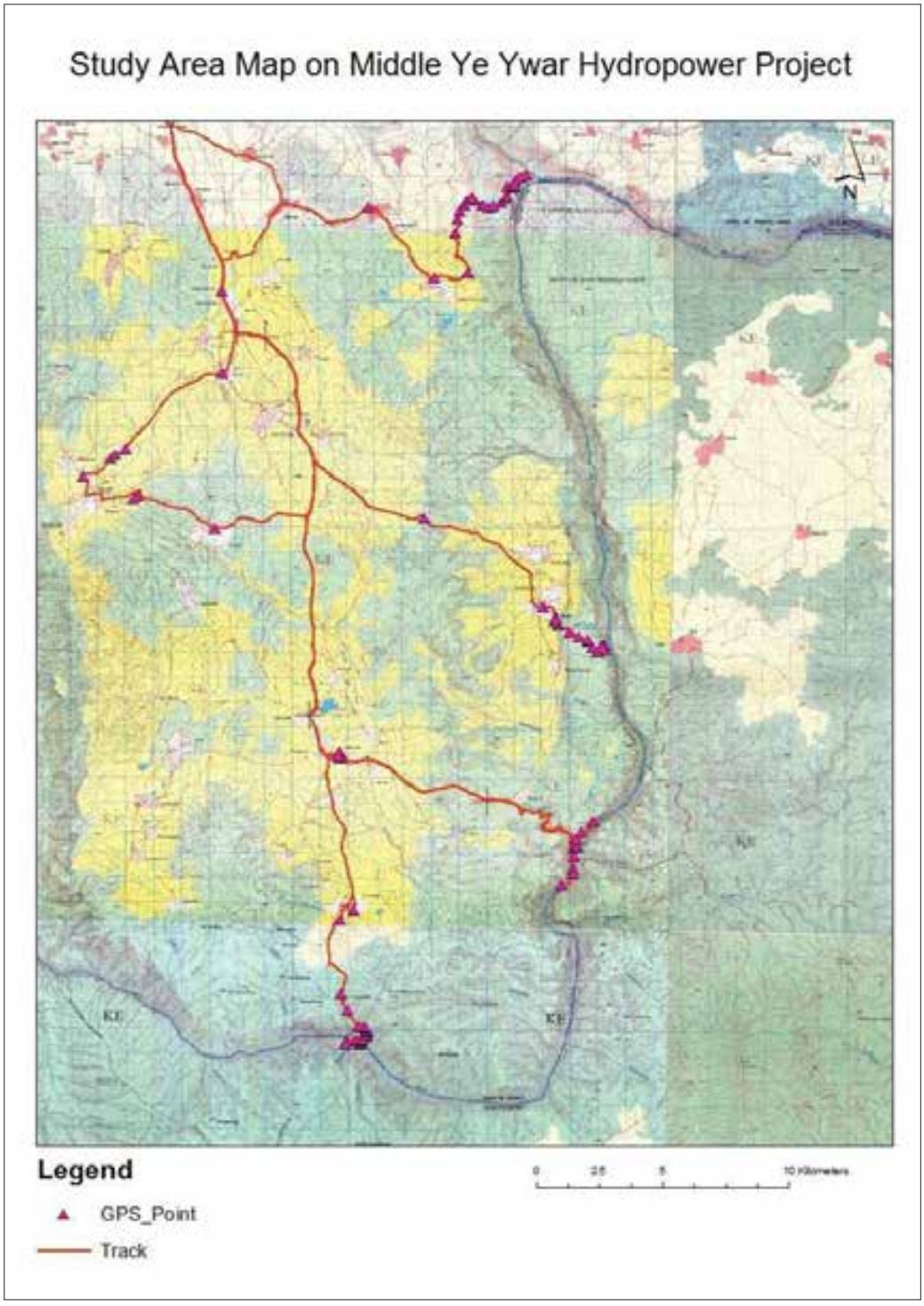


There will be three hydropower dams on Dodtawaddy, the upper YeYwar, Middle YeYwar and Lower YeYwar. The distance between Upper YeYwar dam and Lower YeYwar is 130 kilometer. Upper YeYwar dam and Lower YeYwar dams had been already constructed. The intended Middle YeYwar hydropower dam will be 80.4 kilometer away from lower YeYwar and 49.6 kilometer away from Upper YeYwar. The dam site lies between high mountains and gorges. The elevation of the mountain ranges along the Dodtawaddy River which comprise in the catchment area is 1000 meter**.** The river flows in the narrow V-shaped valley and has steep bank slope. So the flooded area is narrow and long, along the river. Total flooded area along the sloping banks at elevation 320 m is estimated to be about 100 hectare.

1.2 Topography

The Middle YeYwar Dam project site falls 22° 18' N to 21° 55' N Latitude and 96° 51' E to 96° 51' E longitude. The catchment area is 10597.12 km^2 and total flooded area is about 1100 hectare (Map II). The normal pool level will be 320 m. The lowest elevation in the area is 281 m and highest at upstream is 1000 m.

Map II.



1.3 Climate

Generally the climate of Middle YeYwar Hydropower Dam site is monsoon climate with distinct seasons; cool and dry season, hot dry season and warm and wet rainy season. The wet raining season is from May to October. The average annual rain fall is 1312 mm. (According to Naung Cho Twonship data)

1.4 Forest in the context of Ecoregion

The Middle YeYwar Dam area lies in WWF eco-region of Northern Indochina Subtropical forest. The vegetation of this eco-region includes both lowland and mountain forest. The devided habitat within this eco-region from deciduous forest dominated by *Shorea* species and mixed deciduous forest with evergreen tree species like *Quercus* and *Castanopsis* species.

1.5 Local people and their livelihood

The people dwelling this area include Da-nu, Shan and Bamar. Most of them are farmer cultivating rice, vegetables, green tea (*Camellia*), Maize and Sugar cane. A few are traders.

II. AIMS AND OBJECTIVES

1. To collect, indentify the plants and animal species in the area
2. To record the dominant tree species and evaluate the forest types
3. To assess the potential impacts and to suggest the mitigation measure

III. MATERIALS AND METHODS

3.1 Participants

Flora

(1) U Nyo Maung (Retired Professor), Taxonomist

(2) Dr.Win Myint (Associated Professor, ex.), Ecologist

(3) Dr. Ei Ei Phyoe, Taxonomist

(4) U Tun Thura, Botanist & GIS/RS

Fauna

(1) Dr.Yin Win Tun, Lecturer, Zoology Department, Myeik University (Fish specialist)

(2) U Aung Pe Lwin, Assistant Lecturer, Zoology Department, Dagon University; (Herpet specialist)

(3) U Yan Naing Hein, Field Specialist; (Bird specialist)

(4) U Nay Myo Aung, Field specialist; (Insect and Mammal specialist)

3.2 Methodology (Flora)

3.2.1 Method

The floristic data and ecological data collection were conducted by the following methods in the study Area.

3.2.1.1 Sample Plotting

The Global Positioning System was used to navigate and mark the coordinates of the sample plots. In order to obtain essential data for predicting of tree species composition in the forest and vegetation types, 20x20 and 30x30 meter quadrants, were set up and tree species in the plot were collected and population of each species were also counted. For the Bamboo survey, 30x30 meter quadrants were set up and bamboo species were collected and number of clump of each species were also counted. The species identification was carried out by using key to families of flowering plants and appropriate literature and confirmed by matching with herbarium specimens of Department of Botany, University of Yangon.

3.2.1.2 Random Transecting

To get representative checklists of the tree species and bamboo species, plant collection was also carried out by random transect lines along the banks of the river and between one plot and another wherever possible. Specimen collection was made within 10 meter on either sides of the transect line and start from on river bank until the edge of the water in the river to cover the whole riverine forest.

3.2.1.3 Mapping

Location maps are set by the method based on the UTM maps and UTM zone 47 N, WGS 84, coordinate system to determine the forests of the proposed areas.

3.2.2 Materials

Materials used for recording are strings for sample plotting and transecting, digital camera for recording, GPS, maps, heavy duty plastic bags, old newspapers, corrugated paper, alcohol, spray jug (for fixing specimens), 10x lens, permanent marker, field note books, field press, drying press and dryers.

3.2.3 Data Analysis

After field survey, data entry was carried out in excel work sheet. Analysis of population per hectare percentage was conducted using excel work 2007. For identification of threaten species, it is conducted matching with IUCN red data list version 2014.3.

3.2.3.1 Population of Individual Species (per hectare)

The population of species will show not only the composition of species but also the richness of the species in the study area. According to R.He'dl, M Sva'tek, M. Dancak, Rodzay A.W., M. Salleh A.B., Kamariah A.S.(2009), population of individual species (per hectare) is determined by following formula.

$$\text{Population of Individual Species} = \frac{\text{Total Individual species}}{\text{Total Plots Area } (m^2)} \times 10000 m^2 (1ha)$$

3.2.3.2 Relative Density of Tree species

The density of a species refers to the numerical representation of its individual and the availability of space in a unit area. The density index shows not only the richness of the texa but also the relative distribution of the individuals. According to Curtis (1959), the density index is determined by the following formula.

$$\text{Relative Density of Tree species} = \frac{\text{No. of Individual species}}{\text{Total no. of all individual Species}} \times 100$$

3.3 Methodology (Fauna)

Five kinds (Birds, fishes, mammals, herpets and insects) animals were surveyed for the diversity assessment.

3.3.1 Bird survey

Birds were studied using the watching methods with help of the binoculars. Species identification was examined using the field guide books. Counting of bird number and habitat utilization were observed. Species richness and observed frequency were assessed for species diversity.

3.3.2 Fish survey

Fishes were surveyed by two ways, by direct catching method with the help of local fishermen (local fishing gear with two inches mesh which were used in the fast running water) and market survey methods. The local fishes in the markets were categorized.

3.3.3 Mammal survey

Direct count method (especially for squirrels), remains of animal's body parts (skin, spines, antlers, ect.) footprints and interviewed methods were used for mammal survey.

3.3.4 Herpet survey

Snakes, lizards and frogs were caught and taken as voucher species and were identified. Snakes were caught by snake stick, lizards were shot by rubber bands, and frogs were collected in their roosting habitats. Some snakes (king cbra, pythons) were surveyed as interviewed methods.

3.3.5 Insect survey

Insects (butterflies, dragonflies, beetles, and other insects and invertebrates) were caught and taken as voucher specimens. Flying insects as butterflies and dragonflies were caught by insect net (made of nylon sheet and stick); beetles were collected by digging the grounds, peering the tree barks with the knife. Some beetles in the trees were shaken out and fall down on the grounds; these insects were collected by hands and a pairs of forceps.

3.3.6 Diversity of Fauna species

A total of 142 species representing 68 birds, 17 fishes, 14 mammals, 16 herpets and 27 insects were recorded as fauna diversity of the project area for the Middle Ye Ywar Hydropower project in Nyaungcho Township, Shan state **in dry season**.

A total of 131 species representing 43 birds, 27 fishes, 16 mammals, 18 herpets and 27 insects were recorded as fauna diversity of the project area **in wet season.**

IV. OBSERVATION

4.1 FLORA

4.1.1 Studied Site

The area is divided into three parts to cover up the whole flooded area. The first part includes the downstream portion closed to the dam near Ye-twin-gyi on Dodtawaddy River at the lowest elevation level of 218 m.

The second part includes the upstream portion closed to the Dodtawaddy Bridge and its surroundings. The elevation level of this area is 270m above the sea level.

The third part includes the upstream portion near Mepok and Naung-cho-gyi villages. The lowest elevation level in this area is 323 meter above the sea level.

4.1.2 The first part around Ye-twin-gyi Village

Photo Vegetation Profile of Ye-twin-gyi

Photo Map II. Study points

Ye-twin-gyi village (Indaing Forest)

Indaing Forest

4.1.2.1 Species composition

The total number of species collected in this part is 101 species belonging to 86 genera and 52 families.

List of Species in the Study Area

No.	Scientific Name	Common Name	Family Name
1	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae
2	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae
3	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae
4	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae
5	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae
6	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae
7	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae
8	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae
9	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae
10	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae
11	*Bambusa bambos*(L.)Voss.	Kya-khat-wa	Poaceae
12	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae
13	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae
14	*Bidens pilosa*	Hmwe-sok	Asteraceae
15	*Bischofia javanica*	Not known	Euphorbiaceae

No.	Scientific Name	Common Name	Family Name
16	*Blumea balsamifera*	Not known	Asteraceae
17	*Boerhavia diffusa* L.	Pa-yan-na-wa	Nyctaginaceae
18	*Bombax ceiba* L.	Let-pan	Bombacaceae
19	*Bombax insigne* Wall.	De-du	Bombacaceae
20	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae
21	*Buddleja asiatica* Lour	Not known	Buddlejaceae
22	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae
23	*Canscora diffusa* (Vahl) R.Br.	Kyauk-pan	Gentianaceae
24	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae
25	*Cassia fistula* L.	Ngu	Caesalpiniaceae
26	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae
27	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae
28	*Combretum alfredii* Hance	Not known	Combretaceae
29	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae
30	*Curcuma* sp.	Mar-la	Zingiberaceae
31	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae
32	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae
33	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae
34	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae
35	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae
36	*Dendrophthoe pentandra* (L.) Miq.	Kyi-paung	Loranthaceae
37	*Desmodium pulchellum* Benth.	Taung-damin	Fabaceae
38	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae
39	*Dioscorea cylindrica* Burm.	KYwary-thon-ywet	Dioscoreaceae
40	*Dioscorea pentaphylla* L.	KYwary-ngar-ywet	Dioscoreaceae
41	*Diospyros kaki* L.f.	Tae	Ebenaceae
42	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae
43	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae
44	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae
45	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae
46	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae
47	*Erythrina stricta* Roxb.	Ka-thit	Fabaceae
48	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae
49	*Ficus bengalensis* L.	Pyin-nyaung	Moraceae
50	*Ficus hispida* L.	Kha-aung	Moraceae
51	*Ficus pumila* L.	Creeping fig.	Moraceae
52	*Gagea reticulata* (Pall.) Schult.	Not known	Liliaceae
53	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae
54	*Getonia floribunda* Roxb.	Kywet-nwee	Combretaceae
55	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae
56	*Gochnatia decora*	Not known	Asteraceae

No.	Scientific Name	Common Name	Family Name
57	*Grewia eriocarpa*Juss.	Pin-ta-yaw	Tiliaceae
58	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae
59	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae
60	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae
61	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae
62	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae
63	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae
64	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae
65	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae
66	*Mimosa pudica* L.	Hti-ka-yon	Mimosaceae
67	*Ochna integerrima*	Indaing-seni	Ochnaceae
68	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae
69	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae
70	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae
71	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae
72	*Physalis minima* L.	Bauk-thi	Solanaceae
73	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae
74	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae
75	*Pterospermum diversifolium*	Not known	Sterculiaceae
76	*Randia uliginosa* DC.	Hman-ni	Rubiaceae
77	*Rumex crispus* L.	Not known	Polygonaceae
78	*Rumex trisetifer*	Not known	Polygonaceae
79	*Saccharum spontaneum* L.	Kaing	Poaceae
80	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae
81	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae
82	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae
83	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae
84	*Scoparia dulcis* L.	Dana-thu-kha	Scrophulariaceae
85	*Scurrula parasitica* L.	Kyi-paung	Loranthaceae
86	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae
87	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae
88	*Spirogyra* sp.	Algae	Zygnemataceae
89	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae
90	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae
91	*Sterculia villosa*	Shaw	Sterculiaceae
92	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae
93	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae
94	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae
95	*Utricularia caerulea*	Ye-bu-baung	Lentibulariaceae
96	*Uvaria cordata* Schum. & Thonn.	Tha-but-gyi	Annonaceae
97	*Vanda coerulescens* Griff.	Mo-lon-hmying-apyar-	Orchidaceae

No.	Scientific Name	Common Name	Family Name
		lay	
98	*Vangueria spinosa* Roxb.	Ma-gyi-pauk	Rubiaceae
99	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae
100	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae
101	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae

4.1.2.2 Vegetation type in the study area

No.	Sample Quadrant	Vegetation type	Latitude/ Longitude	Altitude	Dominant species
1	Q XV	Indaing Forest	N21 57 56.0 E96 53 25.1	2123 ft	*Shorea siamensis*(Kurz)Miq., *Sterculia foetida* L., *Terminalia alata* (Heyne) Roth, *Erythrina stricta* Roxb. *Schrebera swietenioides* Roxb., *Hiptage benghalensis* (L.) Kurz *Buchanania latifolia* Roxb., *Calycopteris floribunda* Lam.
2	Q XVI	Indaing Forest	N21 57 57.4 E96 53 21.2	2209 ft	
3	Q XVII	Indaing Forest	N21 57 58.9 E96 53 15.0	2301 ft	
4	Q XVIII	Indaing Forest	N21 58 20.0 E96 53 01.8	2716 ft	
5	Q XIX	Indaing Forest	N21 58 40.9 E96 52 52.9	3046 ft	
6	Q XX	Indaing Forest	N22 00 15.3 E96 52 51.0	3289 ft	

The determination of vegetation type (forest type) was carried out in accordance with their species composition and population density. The dominant tree species and rare tree species are determined according to their species composition in sample plots.

4.1.2.3 Floristic composition

The total number of tree species collected in 12 representative sample plots in this area is 30 species belonging to 27 genera. The dominant tree species in this area are *Shorea siamensis* (Kurz) Miq. (In-gyin) followed by *Sterculia foetida* L. (Shaw-phyu) and *Terminalia alata* (Heyne) Roth (Htauk-kyant), *Erythrina stricta* Roxb. (Ka-thit).

4.1.2.4 Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha (%)
1	*Albizia lebbekoides* (DC.) Benth.	1	0.93	0.15
2	*Bombax ceiba* L.	3	2.78	0.45
3	*Buchanania latifolia* Roxb.	23	21.30	3.47
4	*Calycopteris floribunda* Lam.	15	13.89	2.27
5	*Chukrasia velutina* Roem.	1	0.93	0.15
6	*Croton oblongifolius* Roxb.	2	1.85	0.30
7	*Dalbergia cultrata* Grah.	2	1.85	0.30
8	*Dalbergia oliveri* Gamble	9	8.33	1.36
9	*Diospyros kaki* L.f.	3	2.78	0.45
10	*Duabanga grandiflora*	6	5.56	0.91
11	*Ehretia acuminata* R.Br	1	0.93	0.15

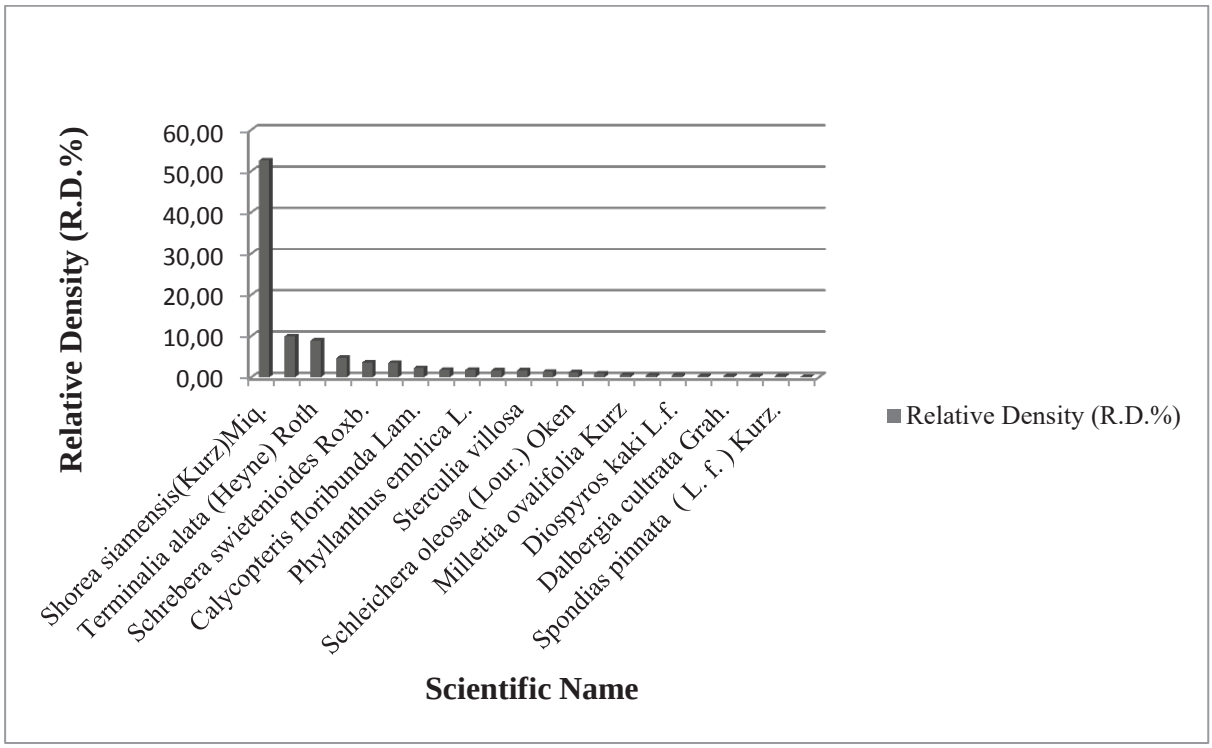
No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha (%)
12	*Erythrina stricta* Roxb.	31	28.70	4.68
13	*Grewia eriocarpaJuss*	1	0.93	0.15
14	*Hiptage benghalensis* (L.) Kurz	12	11.11	1.81
15	*Holarrhena pubescens* Wall. ex G. Don	1	0.93	0.15
16	*Lannea coromandelica* (Houtt.) Merrr.	1	0.93	0.15
17	*Millettia ovalifolia* Kurz	4	3.70	0.60
18	*Phyllanthus emblica* L.	12	11.11	1.81
19	*Pterocarpus indicus*Willd.	11	10.19	1.66
20	*Pterospermum diversifolium*	1	0.93	0.15
21	*Samadera indica* Gaertn.	2	1.85	0.30
22	*Schleichera oleosa* (Lour.) Oken	8	7.41	1.21
23	*Schrebera swietenioides* Roxb.	24	22.22	3.63
24	*Shorea obtusa* Wall.	1	0.93	0.15
25	*Shorea siamensis*(Kurz)Miq.	348	322.22	52.57
26	*Spondias pinnata* (L. f.) Kurz.	2	1.85	0.30
27	*Sterculia foetida* L.	66	61.11	9.97
28	*Sterculia villosa*	11	10.19	1.66
29	*Tectona grandis* L. f.	1	0.93	0.15
30	*Terminalia alata* (Heyne) Roth	59	54.63	8.91
	Total	**662**	**612.96**	**100**

4.1.2.5 Relative density

Among the sample plots species density per hectare varied and the highest density was observed *Shorea siamensis* (Kurz) Miq., *Sterculia foetida* L., *Terminalia alata* (Heyne) Roth followed by *Erythrina stricta* Roxb., *Schrebera swietenioides* Roxb., and *Buchanania latifolia* Roxb.,. This shows that these six species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Shorea siamensis* (Kurz)Miq.	29.00	52.57
2	*Sterculia foetida* L.	5.50	9.97
3	*Terminalia alata* (Heyne) Roth	4.92	8.91
4	*Erythrina stricta* Roxb.	2.58	4.68
5	*Schrebera swietenioides* Roxb.	2.00	3.63
6	*Buchanania latifolia* Roxb.	1.92	3.47
7	*Calycopteris floribunda* Lam.	1.25	2.27
8	*Hiptage benghalensis* (L.) Kurz	1.00	1.81
9	*Phyllanthus emblica* L.	1.00	1.81
10	*Pterocarpus indicus*Willd.	0.92	1.66
11	*Sterculia villosa*	0.92	1.66
12	*Dalbergia oliveri* Gamble	0.75	1.36

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
13	*Schleichera oleosa* (Lour.) Oken	0.67	1.21
14	*Duabanga grandiflora*	0.50	0.91
15	*Millettia ovalifolia* Kurz	0.33	0.60
16	*Bombax ceiba* L.	0.25	0.45
17	*Diospyros kaki* L.f.	0.25	0.45
18	*Croton oblongifolius* Roxb.	0.17	0.30
19	*Dalbergia cultrata* Grah.	0.17	0.30
20	*Samadera indica* Gaertn.	0.17	0.30
21	*Spondias pinnata* (L. f.) Kurz.	0.17	0.30
22	*Albizia lebbekoides* (DC.) Benth.	0.08	0.15
23	*Chukrasia velutina* Roem.	0.08	0.15
24	*Ehretia acuminata* R.Br	0.08	0.15
25	*Grewia eriocarpaJuss*	0.08	0.15
26	*Holarrhena pubescens* Wall. ex G. Don	0.08	0.15
27	*Lannea coromandelica* (Houtt.) Merrr.	0.08	0.15
28	*Pterospermum diversifolium*	0.08	0.15
29	*Shorea obtusa* Wall.	0.08	0.15
30	*Tectona grandis* L. f.	0.08	0.15



4.1.2.6 Threaten Species List

No.	Scientific Name	Common Name	Family Name	IUCN criteria
1	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	LC
2	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT
3	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	EN A 1cd
4	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC
5	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	LC
6	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
7	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
8	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	LC
9	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae	LC
10	*Mimosa pudica* L.	Hti-ka-yon	Mimosaceae	LC
11	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	LC
12	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	VU
13	*Saccharum spontaneum* L.	Kaing	Poaceae	LC
14	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/LC
15	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/LC
16	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	LC

EN=Endangered, LC=Least Concern, LR/LC=Lower Risk/Least Concern, NT=Near Threatened, VU=Vulnerable

Shorea obtusa Wall.

Shorea siamensis (Kurz) Miq.

*Pterocarpus indicus*Willd.

Ludwigia hyssopifolia

4.1.2.7 Bamboo Forest

Bamboo Forest

4.1.2.8 Bamboo Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Dendrocalamus membranaceus* Munro	**3850**	6111.111111	100

4.1.2.9 Relative density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Dendrocalamus membranaceus* Munro	550	100

4.1.3 The second part around Dodtawaddy Bridge

Photo Vegetation Profile of Dokhtawaddy Bridge

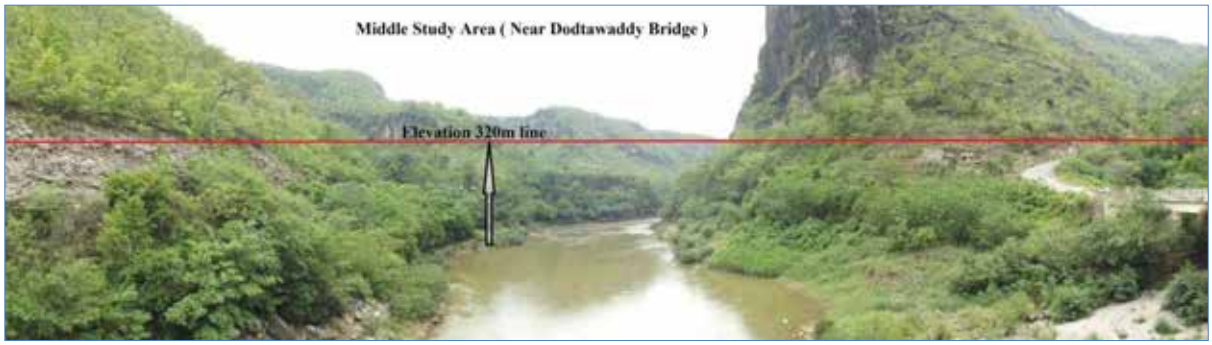
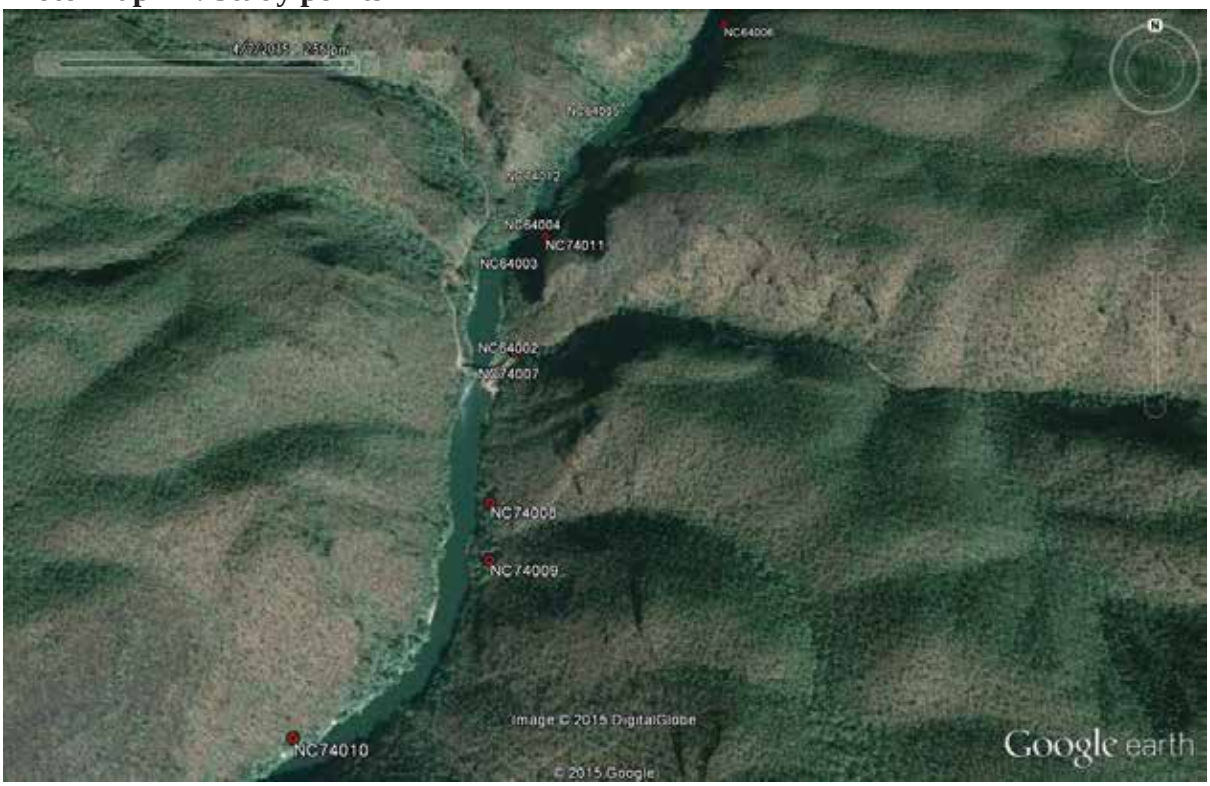


Photo Map III. Study points



Dodtawaddy Bridge (Riverine Forest)

Riverine Forest

4.1.3.1 Species Composition

The total number of species collected in this part is 131 species belonging to 21 genera and 59 families.

List of Species in the study area

No	Scientific Name	Common Name	Family Name
1	*Acacia concinna* (Willd.) DC.	Ka-mon-chin	Mimosaceae
2	*Acacia intsia* Willd.	Su-bok	Mimosaceae
3	*Acer laurinum* Hassk.	Not known	Aceraceae
4	*Acer negunda*	Not known	Aceraceae
5	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae
6	*Adenostemma viscosum*	Not known	Asteraceae
7	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae
8	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae
9	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae
10	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae
11	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae
12	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae
13	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae
14	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae
15	*Anogeissus acuminata* Wall.	Yon	Combretaceae
16	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae
17	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae
18	*Artemisia* sp.	Not known	Asteraceae

No	Scientific Name	Common Name	Family Name
19	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae
20	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae
21	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae
22	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae
23	*Bidens pilosa*	Hmwe-sok	Asteraceae
24	*Blumea balsamifera*	Not known	Asteraceae
25	*Bombax ceiba* L.	Let-pan	Bombacaceae
26	*Bombax insigne* Wall.	De-du	Bombacaceae
27	*Buddleja asiatica* Lour	Not known	Buddlejaceae
28	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae
29	*Cananga latifolia*	Not known	Annonaceae
30	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae
31	*Carissa spinarum* A. DC.	Taw-khan-pin	Apocynaceae
32	*Cassia fistula* L.	Ngu	Caesalpiniaceae
33	*Celosia argentea* L.	Taw-kyet-mauk	Amaranthaceae
34	*Chenopodium acuminatum* subsp. virgatum	Not known	Chenopodiaceae
35	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae
36	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae
37	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae
38	*Clerodendrum villosum* Blume	Phet-kha	Verbenaceae
39	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae
40	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae
41	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae
42	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae
43	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae
44	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae
45	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae
46	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae
47	*Dichanthium caricosum* (L.)A.Camus	Pa-daw-myet	Poaceae
48	*Dichrocephala integrifolia (*L.f.)Kuntze	Not known	Asteraceae
49	*Dicliptera neesii* Trimen.	Not known	Acanthaceae
50	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae
51	*Dioscorea cylindrica* Burm.	KYwary-thon-ywet	Dioscoreaceae
52	*Dioscorea pentaphylla* L.	KYwary-ngar-ywet	Dioscoreaceae
53	*Diospyros kaki* L.f.	Tae	Ebenaceae
54	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae
55	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae
56	*Elaeocarpus hainanensis* Oliv.	Kywe-pan-pin	Elaeocarpaceae
57	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae
58	*Entada scandens* Benth.	Doe-nwee	Mimosaceae
59	*Equisetum hyemale*	Not known	Equisetaceae
60	*Erythrina stricta* Roxb.	Ka-thit	Fabaceae
61	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae
62	*Euphorbia antiquorum* L.	Tazaung-gyi	Euphorbiaceae
63	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae
64	*Ficus pumila* L.	Creeping fig.	Moraceae
65	*Ficus racemosa*	Tha-phan	Moraceae
66	*Ficus variegata*	Kon-tha-phan	Moraceae
67	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae
68	*Getonia floribunda* Roxb.	Kywet-nwee	Combretaceae
69	*Harrisonia perforata*	Su-gyit	Simaroubaceae

No	Scientific Name	Common Name	Family Name
70	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae
71	*Hibiscus ficulneus* L.	Taw-yon-pade	Malvaceae
72	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae
73	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae
74	*Hydrocotyle sibthorpioides* Thunb	Myin-khwa	Apiaceae
75	*Hypericum japonicum* Thunb. ex Murray	Not known	Hypericaceae
76	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma	Lythraceae
77	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae
78	*Leea hirta* Banks	Naga-mauk-aphu	Leeaceae
79	*Leucaena leucocephala* (Lam.) De.Wit	Baw-za-gaing	Mimosaceae
80	*Lithocarpus craibianus* Barnett	Thit-ae	Fagaceae
81	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae
82	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae
83	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae
84	*Merremia vitifolia* (Burm.f.) Hallier. f.	Kyet-hinga-lae-new	Convolvulaceae
85	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae
86	*Mikania micrantha* H.B.K.	Bi-zet-new	Asteraceae
87	*Millettia extensa* Benth.	Win-u	Fabaceae
88	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae
89	*Mimosa pudica* L.	Hti-ka-yon	Mimosaceae
90	*Morus indica* L.	Po-sa	Moraceae
91	*Myriopteron paniculatum* Griff	Ti-lay-nantha	Asclepiadaceae
92	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae
93	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae
94	*Pandanus odoratissimus* L.f.	Sat-tha-phu	Pandanaceae
95	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae
96	*Pennisetum purpureum*	Yon-sa-myet	Poaceae
97	*Persicaria odorata*	Kywe-hna-khaung-gate	Polygonaceae
98	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae
99	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae
100	*Physalis minima* L.	Bauk-thi	Solanaceae
101	*Ploiarium alternifolium*	Not known	Theaceae
102	*Polygonum plebeium*	Not known	Polygonaceae
103	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae
104	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae
105	*Pterospermum diversifolium*	Not known	Sterculiaceae
106	*Rumex crispus* L.	Not known	Polygonaceae
107	*Rumex trisetifer*	Not known	Polygonaceae
108	*Saccharum spontaneum* L.	Kaing	Poaceae
109	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae
110	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae
111	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae
112	*Scoparia dulcis* L.	Dana-thu-kha	Scrophulariaceae
113	*Scurrula parasitica* L.	Kyi-paung	Loranthaceae
114	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae
115	*Senna tora* (L.) Roxb	Dan-gwe	Caesalpiniaceae
116	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae
117	*Solanum aculeatissimum* Jacq.	Not known	Solanaceae
118	*Solanum indicum* L.	Ka-zaw-kha	Solanaceae
119	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae
120	*Spirogyra* sp.	Algae	Zygnemataceae

No	Scientific Name	Common Name	Family Name
121	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae
122	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae
123	*Tanacetum tibeticum* Hook.f. & Thomson	Not known	Asteraceae
124	*Taraxacum officinale*	Not known	Asteraceae
125	*Tectona grandis* L. f.	Kyun	Verbenaceae
126	*Terminalia oliveri* Brandis	Than	Combretaceae
127	*Tetrameles nudiflora* R.Br.	Thit-pok	Datiscaceae
128	*Trametes versicolor*	Hmo	Polyporaceae
129	*Tylophora indica*	Not known	Apocynaceae
130	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae
131	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae

4.1.3.2. Vegetation type in the study area

No.	Sample Quadrant	Vegetation type	Latitude/ Longitude	Altitude	Dominant species
1	Q I	Riverine Forest	N22 01 47.1 E96 57 51.8	940 ft	*Eugenia densiflora* DC., *Schleichera oleosa* (Lour.) Oken, *Homonoia riparia*, *Crateva magna* (Lour.) DC., Albizia lebbekoides (DC.) Benth., *Cananga latifolia, Calycopteris floribunda Lam.*
2	Q II	Riverine Forest	N22 02 08.5 E96 58 00.9	1026 ft	
3	Q III	Riverine Forest	N22 02 21.6 E96 58 16.7	1119 ft	
4	Q IV	Riverine Forest	N22 01 20.7 E96 57 50.7	1017 ft	
5	Q V	Riverine Forest	N22 01 15.4 E96 57 51.0	1005 ft	
6	Q VI	Riverine Forest	N22 01 00.6 E96 57 35.3	973 ft	
7	Q VII	Riverine Forest	N22 01 48.6 E96 57 55.2	926 ft	
8	Q VIII	Riverine Forest	N22 01 59.1 E96 57 53.9	969 ft	

The vegetation type is determined by tree species composition, population density and dominant species.

4.1.3.3. Floristic composition

The total number of tree species collected in 8 representative sample plots in this area is 31 species belonging to 29 genera. The dominant tree species in this area are *Eugenia densiflora* DC. (Kyauk-tha-bye) followed by *Schleichera oleosa* (Lour.) Oken (Gyo) and *Homonoia riparia* (Ye-mo-ma-kha), *Crateva magna* (Lour.) DC. (Ka-det).

4.1.3.4. Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Acer laurinum* Hassk.	4	5.56	2.35
2	*Albizia lebbekoides* (DC.) Benth.	9	12.50	5.29
3	*Anogeissus acuminata* Wall.	2	2.78	1.18
4	*Bombax ceiba* L.	1	1.39	0.59
5	*Bombax insigne* Wall.	5	6.94	2.94
6	*Calycopteris floribunda* Lam.	6	8.33	3.53
7	*Cananga latifolia*	7	9.72	4.12
8	*Cassia fistula* L.	1	1.39	0.59

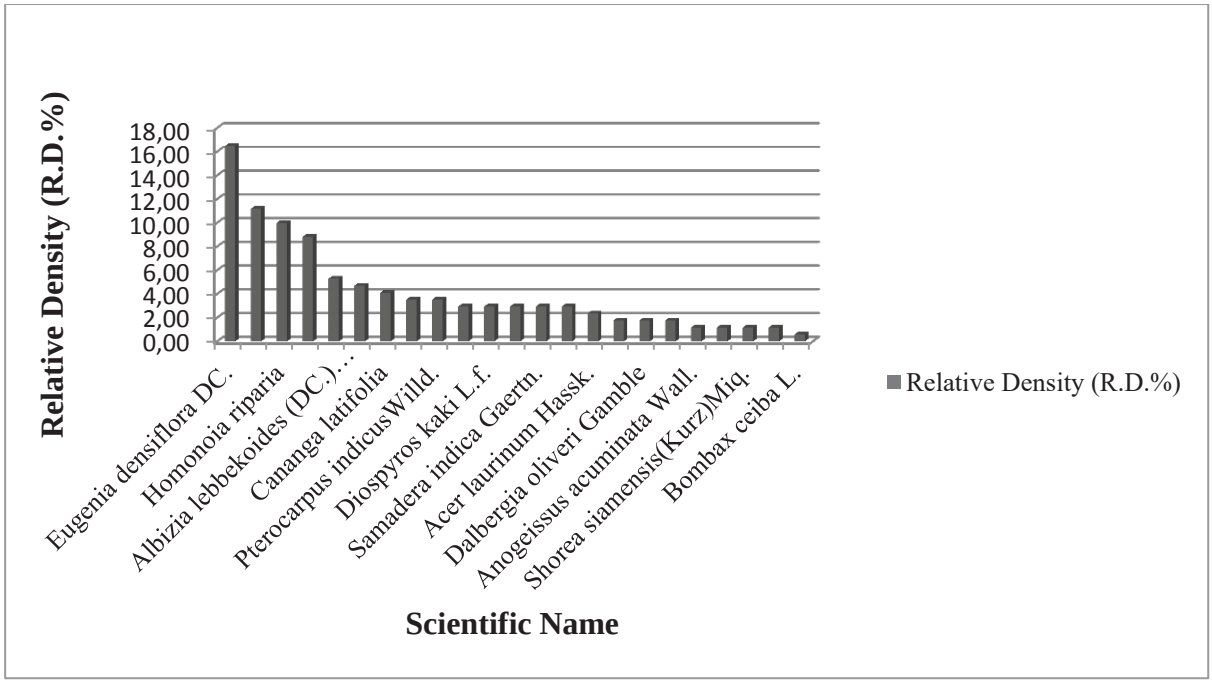
9	*Crateva magna* (Lour.) DC.	15	20.83	8.82
10	*Croton oblongifolius* Roxb.	2	2.78	1.18
11	*Dalbergia fusca* Pierre	3	4.17	1.76
12	*Dalbergia oliveri* Gamble	3	4.17	1.76
13	*Diospyros kaki* L.f.	5	6.94	2.94
14	*Duabanga grandiflora*	1	1.39	0.59
15	*Elaeocarpus hainanensis* Oliv.	1	1.39	0.59
16	*Erythrina stricta* Roxb.	1	1.39	0.59
17	*Eugenia densiflora* DC.	28	38.89	16.47
18	*Ficus variegata*	8	11.11	4.71
19	*Homonoia riparia*	17	23.61	10.00
20	*Lannea coromandelica* (Houtt.) Merrr.	3	4.17	1.76
21	*Mangifera sylvatica* Roxb.	5	6.94	2.94
22	*Millettia ovalifolia* Kurz	1	1.39	0.59
23	*Pterocarpus indicus*Willd.	6	8.33	3.53
24	*Pterospermum diversifolium*	1	1.39	0.59
25	*Samadera indica* Gaertn.	5	6.94	2.94
26	*Schleichera oleosa* (Lour.) Oken	19	26.39	11.18
27	*Schrebera swietenioides* Roxb.	1	1.39	0.59
28	*Shorea siamensis*(Kurz)Miq.	2	2.78	1.18
29	*Stereospermum suaveolens* (Roxb.) DC.	2	2.78	1.18
30	*Terminalia oliveri* Brandis	1	1.39	0.59
31	*Tetrameles nudiflora* R.Br.	5	6.94	2.94
	Total	**170**	**236.11**	**100**

4.1.3.5 Relative density

Among the sample plots species density per hectare varied and the highest density was observed *Eugenia densiflora* DC., *Schleichera oleosa* (Lour.) Oken, *Homonoia riparia* followed by *Crateva magna* (Lour.) DC., *Albizia lebbekoides* (DC.) Benth., and *Ficus variegata*. This shows that these six species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Eugenia densiflora* DC.	3.50	16.47
2	*Schleichera oleosa* (Lour.) Oken	2.38	11.18
3	*Homonoia riparia*	2.13	10.00
4	*Crateva magna* (Lour.) DC.	1.88	8.82
5	*Albizia lebbekoides* (DC.) Benth.	1.13	5.29
6	*Ficus variegata*	1.00	4.71
7	*Cananga latifolia*	0.88	4.12
8	*Calycopteris floribunda* Lam.	0.75	3.53
9	*Pterocarpus indicus*Willd.	0.75	3.53

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
10	*Bombax insigne* Wall.	0.63	2.94
11	*Diospyros kaki* L.f.	0.63	2.94
12	*Mangifera sylvatica* Roxb.	0.63	2.94
13	*Samadera indica* Gaertn.	0.63	2.94
14	*Tetrameles nudiflora* R.Br.	0.63	2.94
15	*Acer laurinum* Hassk.	0.50	2.35
16	*Dalbergia fusca* Pierre	0.38	1.76
17	*Dalbergia oliveri* Gamble	0.38	1.76
18	*Lannea coromandelica* (Houtt.) Merrr.	0.38	1.76
19	*Anogeissus acuminata* Wall.	0.25	1.18
20	*Croton oblongifolius* Roxb.	0.25	1.18
21	*Shorea siamensis*(Kurz)Miq.	0.25	1.18
22	*Stereospermum suaveolens* (Roxb.) DC.	0.25	1.18
23	*Bombax ceiba* L.	0.13	0.59
24	*Cassia fistula* L.	0.13	0.59
25	*Duabanga grandiflora*	0.13	0.59
26	*Elaeocarpus hainanensis* Oliv.	0.13	0.59
27	*Erythrina stricta* Roxb.	0.13	0.59
28	*Millettia ovalifolia* Kurz	0.13	0.59
29	*Pterospermum diversifolium*	0.13	0.59
30	*Schrebera swietenioides* Roxb.	0.13	0.59
31	*Terminalia oliveri* Brandis	0.13	0.59



4.1.3.6 Threaten Species List

No	Scientific Name	Common Name	Family Name	IUCN criteria
1	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae	LR/LC
2	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae	LC
3	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	LC
4	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT
5	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	EN A 1cd
6	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC
7	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	LC
8	*Equisetum hyemale*	Not known	Equisetaceae	LC
9	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
10	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
11	*Hydrocotyle sibthorpioides* Thunb	Myin-khwa	Apiaceae	LC
12	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	LC
13	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae	LC
14	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	LR/LC
15	*Mimosa pudica* L.	Hti-ka-yon	Mimosaceae	LC
16	*Polygonum plebeium*	Not known	Polygonaceae	LC
17	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	VU
18	*Saccharum spontaneum* L.	Kaing	Poaceae	LC
19	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/LC
20	*Tetrameles nudiflora* R.Br.	Thit-pok	Datiscaceae	LR/LC
21	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	LC

EN=Endangered, LC=Least Concern, LR/LC=Lower Risk/Least Concern, NT=Near Threatened, VU=Vulnerable

Dalbergia fusca Pierre

Equisetum hyemale

Polygonum plebeium

Ludwigia octovalvis

4.1.4 The third part around Me-pok and Naung-cho-gyi

4.1.4.1 Me-pok Village Area

Photo Vegetation Profile of Me-pok area

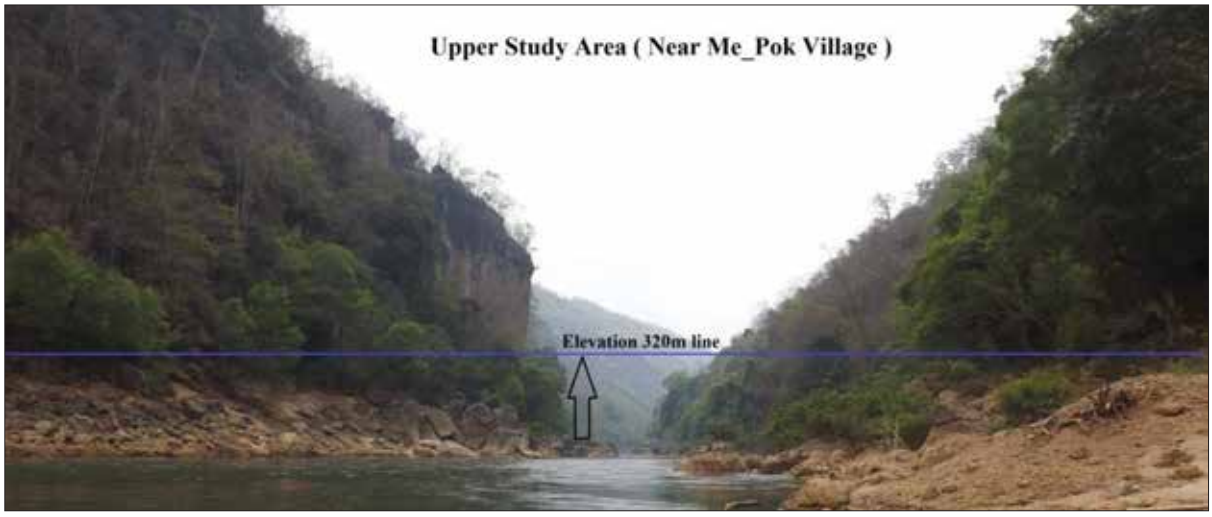
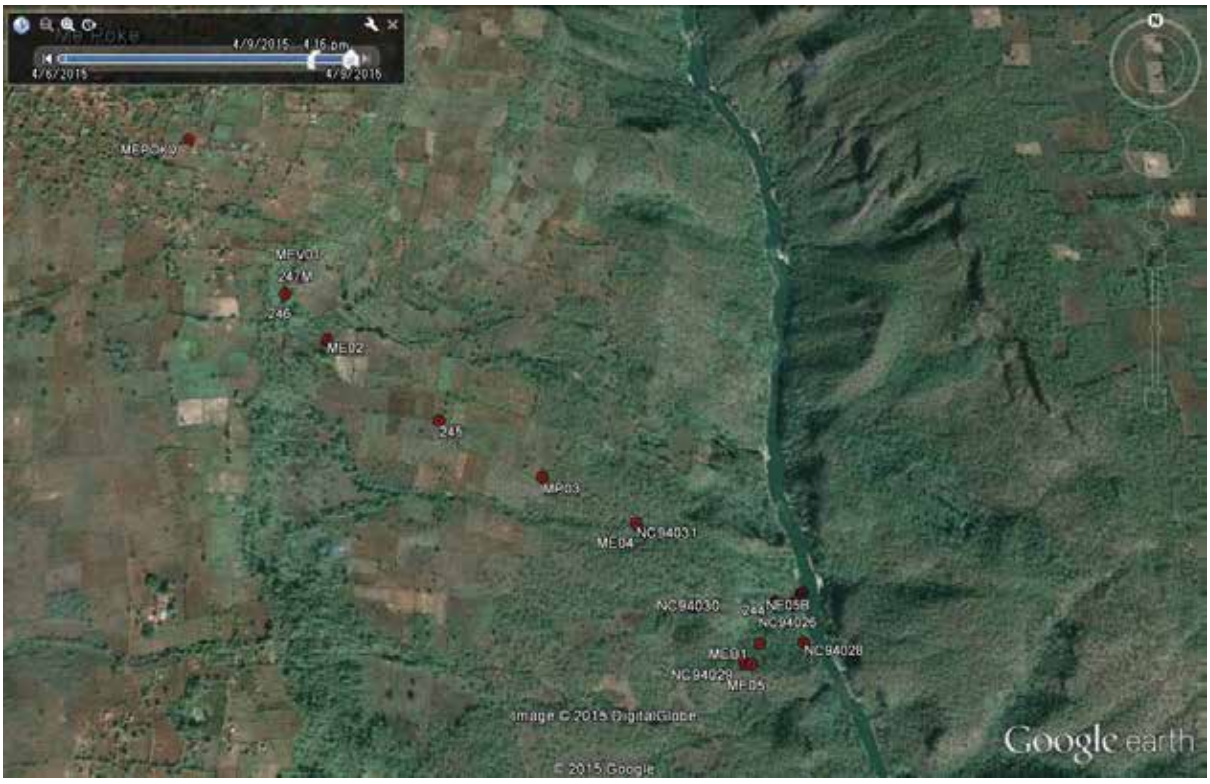


Photo. Map IV. Study points



Me-pok Village (Indaing Forest)

Indaing Forest

4.1.4.1.1 Species Composition

The total number of species collected in this part is 70 species belonging to 12 genera and 37 families.

List of species in the study area

No.	Scientific Name	Common Name	Family Name
1	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae
2	*Adenostemma viscosum*	Not known	Asteraceae
3	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae
4	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae
5	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae
6	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae
7	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae
8	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae
9	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae
10	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae
11	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae
12	*Artemisia* sp.	Not known	Asteraceae
13	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae
14	*Bambusa bambos*(L.)Voss.	Kya-khat-wa	Poaceae
15	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae
16	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae

No.	Scientific Name	Common Name	Family Name
17	*Bidens pilosa*	Hmwe-sok	Asteraceae
18	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae
19	*Buddleja asiatica* Lour	Not known	Buddlejaceae
20	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae
21	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae
22	*Curcuma* sp.	Mar-la	Zingiberaceae
23	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae
24	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae
25	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae
26	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae
27	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae
28	*Dioscorea cylindrica* Burm.	KYwary-thon-ywet	Dioscoreaceae
29	*Dioscorea pentaphylla* L.	KYwary-ngar-ywet	Dioscoreaceae
30	*Diospyros kaki* L.f.	Tae	Ebenaceae
31	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae
32	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae
33	*Gochnatia decora*	Not known	Asteraceae
34	*Grewia eriocarpa*Juss.	Pin-ta-yaw	Tiliaceae
35	*Grewia laevigata* Vahl	Ta-yaw	Tiliaceae
36	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae
37	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae
38	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae
39	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae
40	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae
41	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae
42	*Ochna integerrima*	Indaing-seni	Ochnaceae
43	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae
44	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae
45	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae
46	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae
47	*Pseuderanthemum polyanthum*	Not known	Acanthaceae
48	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae
49	*Pterospermum diversifolium*	Not known	Sterculiaceae
50	*Rumex crispus* L.	Not known	Polygonaceae
51	*Rumex trisetifer*	Not known	Polygonaceae
52	*Saccharum spontaneum* L.	Kaing	Poaceae
53	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae
54	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae
55	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae
56	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae
57	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae

No.	Scientific Name	Common Name	Family Name
58	*Spirogyra* sp.	Algae	Zygnemataceae
59	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae
60	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae
61	*Sterculia villosa*	Shaw	Sterculiaceae
62	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae
63	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae
64	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae
65	*Tanacetum tibeticum* Hook.f. & Thomson	Not known	Asteraceae
66	*Taraxacum officinale*	Not known	Asteraceae
67	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae
68	*Vanda coerulescens* Griff.	Mo-lon-hmying-apyar-lay	Orchidaceae
69	*Vangueria spinosa* Roxb.	Ma-gyi-pauk	Rubiaceae
70	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae

4.1.4.1.2. Vegetation type in the study area

No.	Sample Quadrant	Vegetation type	Latitude/Longitude	Altitude	Dominant species
1	Q XXI	Indaing Forest	N22 06 07.8 E96 58 29.0	976 ft	*Shorea siamensis*(Kurz)Miq., *Terminalia alata* (Heyne) Roth, *Schleichera oleosa* (Lour.) Oken, *Dalbergia oliveri* Gamble, *Shorea obtusa* Wall., *Phyllanthus emblica* L., *Buchanania latifolia* Roxb.,*Grewia laevigata* Vahl
2	Q XXII	Indaing Forest	N22 06 07.7 E96 58 26.6	1125 ft	
3	Q XXIII	Indaing Forest	N22 06 03.3 E96 58 30.0	1287 ft	
4	Q XXIV	Indaing Forest	N22 06 00.2 E96 58 22.0	1618 ft	
5	Q XXV	Indaing Forest	N22 06 05.7 E96 58 16.0	1824 ft	
6	Q XXVI	Indaing Forest	N22 06 14.6 E96 58 09.2	1940 ft	

The vegetation type is determined by tree species composition, population density and dominant species.

4.1.4.1.3. Floristic composition

The total number of tree species collected in 6 representative sample plots in this area is 13 species belonging to 12 genera. The dominant tree species in this area are *Shorea siamensis* (Kurz) Miq. (In-gyin) followed by *Terminalia alata* (Heyne) Roth (Htauk-kyant), *Schleichera oleosa* (Lour.) Oken (Gyo), and *Shorea obtusa* Wall. (Thit-ya).

4.1.4.1.4. Tree Species Population

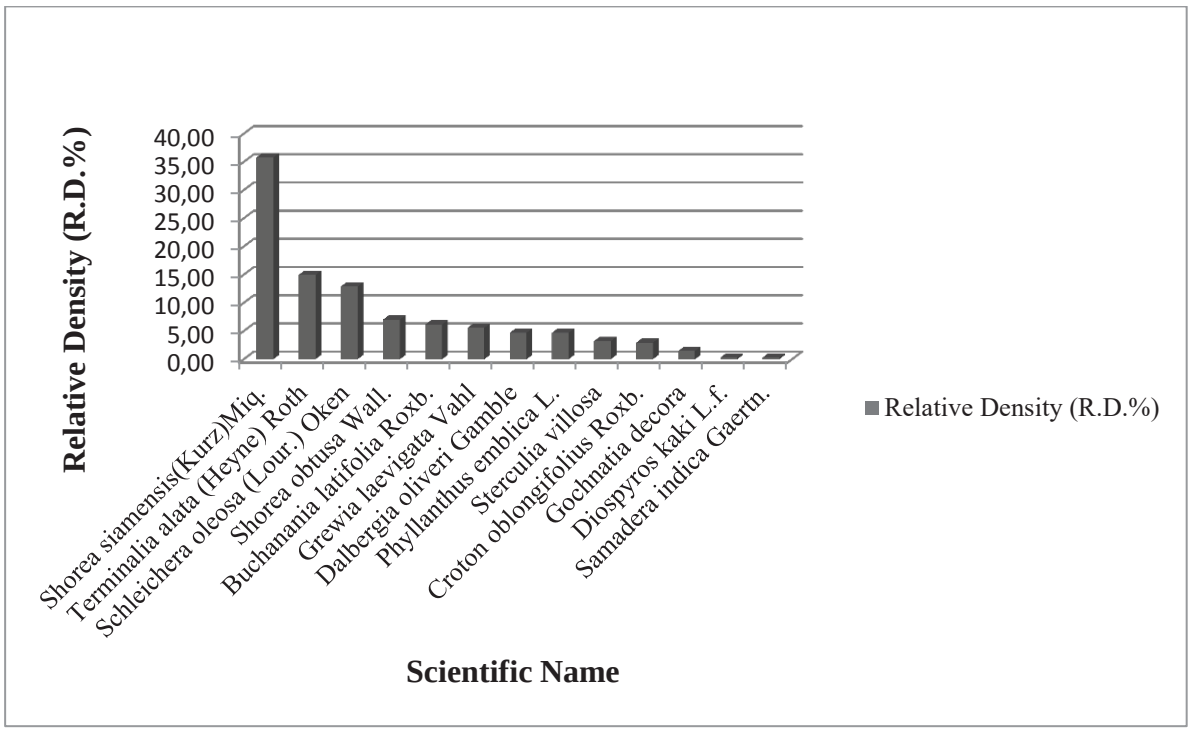
No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Buchanania latifolia* Roxb.	21	38.89	6.16
2	*Croton oblongifolius* Roxb.	10	18.52	2.93
3	*Dalbergia oliveri* Gamble	16	29.63	4.69
4	*Diospyros kaki* L.f.	1	1.85	0.29
5	*Gochnatia decora*	5	9.26	1.47
6	*Grewia laevigata* Vahl	19	35.19	5.57

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
7	*Phyllanthus emblica* L.	16	29.63	4.69
8	*Samadera indica* Gaertn.	1	1.85	0.29
9	*Schleichera oleosa* (Lour.) Oken	44	81.48	12.90
10	*Shorea obtusa* Wall.	24	44.44	7.04
11	*Shorea siamensis*(Kurz)Miq.	122	225.93	35.78
12	*Sterculia villosa*	11	20.37	3.23
13	*Terminalia alata* (Heyne) Roth	51	94.44	14.96
	Total	**341**	**631.48**	**100**

4.1.4.1.5. Relative density

Among the sample plots, species density per hectare varied and the highest density was observed *Shorea siamensis*, *Terminalia alata*, *Schleichera oleosa* followed by *Shorea obtusa*, *Buchanania latifolia* and *Grewia laevigata*. This shows that these six species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Shorea siamensis*(Kurz)Miq.	20.33	35.78
2	*Terminalia alata* (Heyne) Roth	8.50	14.96
3	*Schleichera oleosa* (Lour.) Oken	7.33	12.90
4	*Shorea obtusa* Wall.	4.00	7.04
5	*Buchanania latifolia* Roxb.	3.50	6.16
6	*Grewia laevigata* Vahl	3.17	5.57
7	*Dalbergia oliveri* Gamble	2.67	4.69
8	*Phyllanthus emblica* L.	2.67	4.69
9	*Sterculia villosa*	1.83	3.23
10	*Croton oblongifolius* Roxb.	1.67	2.93
11	*Gochnatia decora*	0.83	1.47
12	*Diospyros kaki* L.f.	0.17	0.29
13	*Samadera indica* Gaertn.	0.17	0.29



4.1.4.1.6 Threaten Species List

No.	Scientific Name	Common Name	Family Name	IUCN criteria
1	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae	LC
2	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	LC
3	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT
4	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	EN A 1cd
5	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC
6	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
7	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
8	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	VU
9	*Saccharum spontaneum* L.	Kaing	Poaceae	LC
10	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/LC
11	*Shorea siamensis* (Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/LC

EN=Endangered, LC=Least Concern, LR/LC=Lower Risk/Least Concern, NT=Near Threatened, VU=Vulnerable

Dendrocalamus membranaceus Munro

Dalbergia oliveri Gamble

Dalbergia cultrata Grah.

Holarrhena pubescens Wall. ex G. Don

4.1.4.2 Naung-cho-gyi Area

Photo Vegetation Profile of Naung-cho-gyi Area

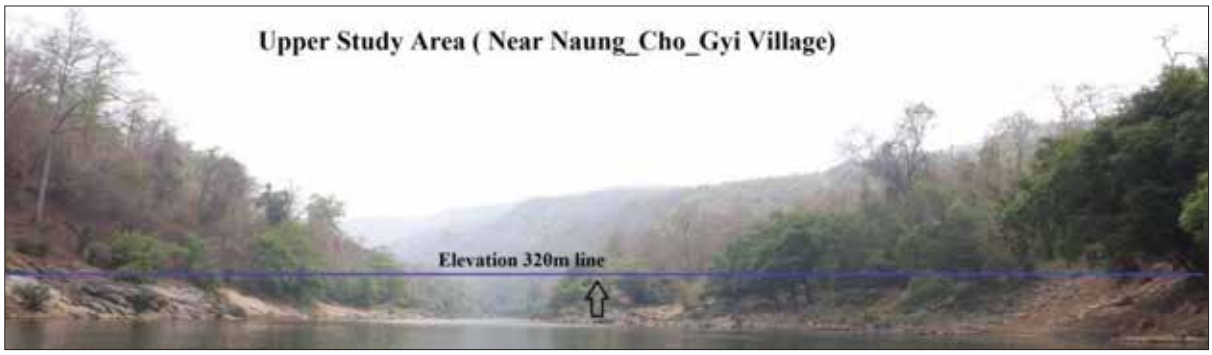


Photo. Map.V Study points

Naung-cho-gyi Village (Indaing Forest)

Indaing Forest

4.1.4.2.1 Species Composition

The total number of species collected in this part is 88 species belonging to 15 genera and 46 families.

List of species in the study area

No.	Scientific Name	Common Name	Family Name
1	*Adenanthera pavonina* L.	Ywe-gyi	Mimosaceae
2	*Adenostemma viscosum*	Not known	Asteraceae
3	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae
4	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae
5	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae
6	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae
7	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae
8	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae
9	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae
10	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae
11	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae
12	*Bambusa bambos*(L.)Voss.	Kya-khat-wa	Poaceae

No.	Scientific Name	Common Name	Family Name
13	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae
14	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae
15	*Bidens pilosa*	Hmwe-sok	Asteraceae
16	*Bischofia javanica*	Not known	Euphorbiaceae
17	*Blumea balsamifera*	Not known	Asteraceae
18	*Boerhavia diffusa* L.	Pa-yan-na-wa	Nyctaginaceae
19	*Bombax ceiba* L.	Let-pan	Bombacaceae
20	*Bombax insigne* Wall.	De-du	Bombacaceae
21	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae
22	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae
23	*Canscora diffusa* (Vahl) R.Br.	Kyauk-pan	Gentianaceae
24	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae
25	*Cassia fistula* L.	Ngu	Caesalpiniaceae
26	*Curcuma* sp.	Mar-la	Zingiberaceae
27	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae
28	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae
29	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae
30	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae
31	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae
32	*Dendrophthoe pentandra* (L.) Miq.	Kyi-paung	Loranthaceae
33	*Desmodium pulchellum* Benth.	Taung-damin	Fabaceae
34	*Dichanthium caricosum* (L.)A.Camus	Pa-daw-myet	Poaceae
35	*Dillenia parviflora* Griff.	Zin-byun	Dilleniaceae
36	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae
37	*Dioscorea cylindrica* Burm.	KYwary-thon-ywet	Dioscoreaceae
38	*Dioscorea pentaphylla* L.	KYwary-ngar-ywet	Dioscoreaceae
39	*Diospyros kaki* L.f.	Tae	Ebenaceae
40	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae
41	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae
42	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae
43	*Elaeocarpus hainanensis* Oliv.	Kywe-pan-pin	Elaeocarpaceae
44	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae
45	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae
46	*Engelhardtia spicata*	Pan-swe-le	Juglandaceae
47	*Erythrina stricta* Roxb.	Ka-thit	Fabaceae
48	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae
49	*Euphorbia antiquorum* L.	Tazaung-gyi	Euphorbiaceae
50	*Ficus bengalensis* L.	Pyin-nyaung	Moraceae
51	*Ficus hispida* L.	Kha-aung	Moraceae
52	*Ficus pumila* L.	Creeping fig.	Moraceae
53	*Ficus racemosa*	Tha-phan	Moraceae

No.	Scientific Name	Common Name	Family Name
54	*Ficus variegata*	Kon-tha-phan	Moraceae
55	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae
56	*Gagea reticulata* (Pall.) Schult.	Not known	Liliaceae
57	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae
58	*Grewia laevigata* Vahl	Ta-yaw	Tiliaceae
59	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae
60	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae
61	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae
62	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae
63	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae
64	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae
65	*Micromelum minutum* (G. Forst.) Wight & Arn.	Pa-le-pan/Pauk-chaung	Rutaceae
66	*Mikania micrantha* H.B.K.	Bi-zet-new	Asteraceae
67	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae
68	*Ochna integerrima*	Indaing-seni	Ochnaceae
69	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae
70	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae
71	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae
72	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae
73	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae
74	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae
75	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae
76	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae
77	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae
78	*Spirogyra* sp.	Algae	Zygnemataceae
79	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae
80	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae
81	*Sterculia villosa*	Shaw	Sterculiaceae
82	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae
83	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae
84	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae
85	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae
86	*Vanda coerulescens* Griff.	Mo-lon-hmying-apyar-lay	Orchidaceae
87	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae
88	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae

4.1.4.2.2. Vegetation type in the study area

No.	Sample Quadrant	Vegetation type	Latitude/Longitude	Altitude	Dominant species
1	Q XXXV	Indaing Forest	N22 15 39.3 E96 55 44.8	2130 ft	*Shorea obtusa* Wall., *Syzygium grande* (Wight) Walp, *Buchanania latifolia* Roxb., *Dalbergia oliveri* Gamble, *Shorea siamensis*(Kurz)Miq.s *Phyllanthus emblica* L., *Schleichera oleosa* (Lour.) Oken, *Terminalia alata* (Heyne) Roth, *Dillenia parviflora* Griff.
2	Q XXXVI	Indaing Forest	N22 15 33.0 E96 55 54.4	2012 ft	
3	Q XXXVII	Indaing Forest	N22 15 29.7 E96 56 01.9	1881 ft	
4	Q XXXVIII	Indaing Forest	N22 15 36.8 E96 56 18.3	1585 ft	
5	Q XXXIX	Indaing Forest	N22 15 42.0 E96 56 23.6	1383 ft	
6	Q XXXX	Indaing Forest	N22 15 45.8 E96 56 25.7	1204 ft	

The vegetation type is determined by tree species composition, population density and dominant species.

4.1.4.2.3. Floristic composition

The total number of tree species collected in 6 representative sample plots in this area is 9 species belonging to 8 genera. The dominant tree species in this area are *Shorea obtusa* Wall. (Thit-ya) followed by *Syzygium grande* (Wight) Walp (Tha-bye), *Buchanania latifolia* Roxb. (Lun-pho), and *Dalbergia oliveri* Gamble (Ta-ma-lan).

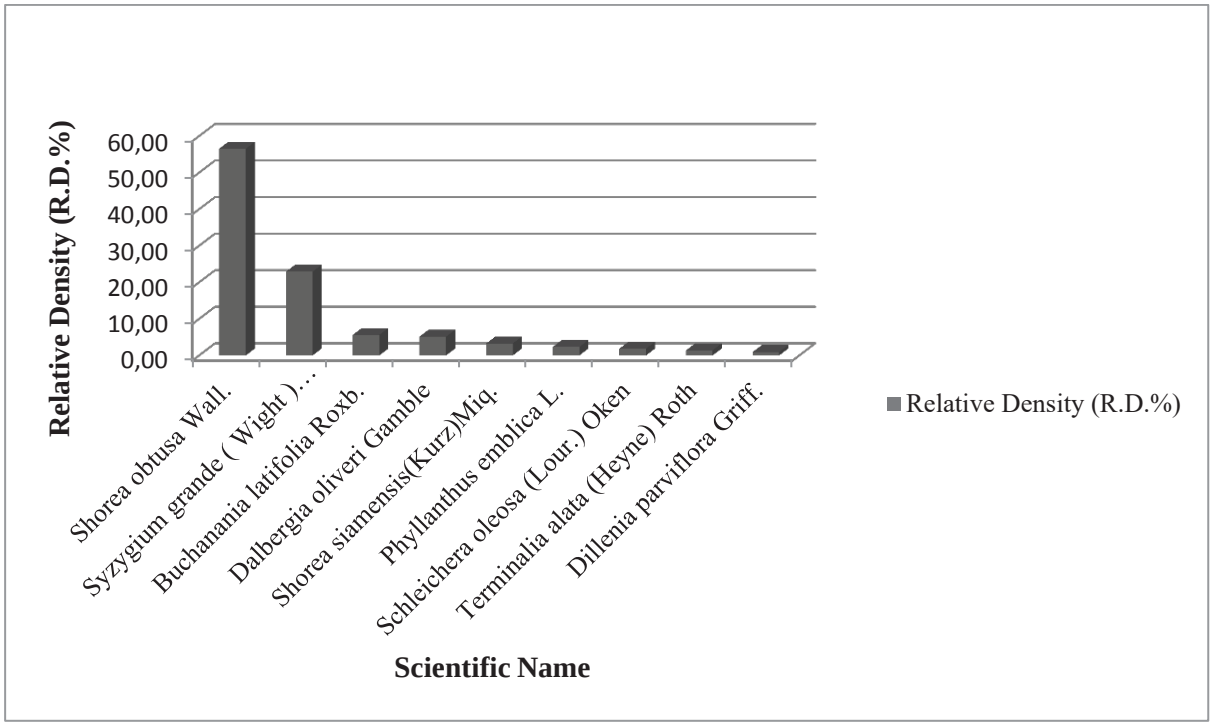
4.1.4.2.4. Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Buchanania latifolia* Roxb.	12	16.67	5.61
2	*Dalbergia oliveri* Gamble	11	15.28	5.14
3	*Dillenia parviflora* Griff.	2	2.78	0.93
4	*Phyllanthus emblica* L.	5	6.94	2.34
5	*Schleichera oleosa* (Lour.) Oken	4	5.56	1.87
6	*Shorea obtusa* Wall.	121	168.06	56.54
7	*Shorea siamensis*(Kurz)Miq.	7	9.72	3.27
8	*Syzygium grande* (Wight) Walp	49	68.06	22.90
9	*Terminalia alata* (Heyne) Roth	3	4.17	1.40
	Total	**214**	**297.22**	**100.00**

4.1.4.2.5. Relative density

Among the sample plots, species density per hectare varied and the highest density was observed *Shorea obtusa* Wall., *Alnus nepalensis* D. Do *Syzygium grande* (Wight) Walp, *Buchanania latifolia* Roxb., followed by *Dalbergia oliveri* Gamble, *Shorea siamensis*(Kurz)Miq., and *Phyllanthus emblica* L. This shows that these six species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Shorea obtusa* Wall.	20.17	56.54
2	*Syzygium grande* (Wight) Walp	8.17	22.90
3	*Buchanania latifolia* Roxb.	2.00	5.61
4	*Dalbergia oliveri* Gamble	1.83	5.14
5	*Shorea siamensis*(Kurz)Miq.	1.17	3.27
6	*Phyllanthus emblica* L.	0.83	2.34
7	*Schleichera oleosa* (Lour.) Oken	0.67	1.87
8	*Terminalia alata* (Heyne) Roth	0.50	1.40
9	*Dillenia parviflora* Griff.	0.33	0.93



4.1.4.2.6. Threaten Species List

No.	Scientific Name	Common Name	Family Name	IUCN criteria
1	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	LC
2	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT
3	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	EN A 1cd
4	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC
5	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	LC
6	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
7	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
8	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	LC
9	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	VU
10	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/LC
11	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/LC

12	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	LC

EN=Endangered, LC=Least Concern, LR/LC=Lower Risk/Least Concern, NT=Near Threatened, VU=Vulnerable

Homonoia riparia

Alternanthera sessilis (L.) R.Br.

Eleusine indica Gaertn.

Ziziphus jujuba Lam.

4.2 Fauna (Dry season)

Table 2. List of fauna recorded from Middle Ye Ywar Hydropwer Project site

Fauna	No. of orders	No. of families	No. of species
Birds	13	37	68
Fish	1	2	17
Mammals	7	11	14
Herpets	4	11	16
Insects	7	14	27
Total	32	75	142

Table 3. List of fish fauna recorded from Middle Ye Ywar Hydropower Project, Naung- cho Township

Order	Family	Species	Common Name	Local Name
Cypriniformes	Cyprinidae	1. *Burbus hexastichus*	Nga Kyaung	Nga kyaung
Cypriniformes	Cyprinidae	2. *Morulius calbasu*	Orangefin labeo	Nga net ma
Cypriniformes	Cyprinidae	*3. Folifer brevifilis*	Burbus Brevifilis	Kyaut Ngalu
Cypriniformes	Cyprinidae	*4. Puntius amphibious*	Pool barb	Nga khone ma
Cypriniformes	Cyprinidae	*5.Puntius oligolipis*	Checker barb	Nga khonema wah
Cypriniformes	Cyprinidae	*6. Puntius sp.*	Barb	Nga khone ma
Cypriniformes	Cyprinidae	*7. Danio kaerri*	Hikari danio	Nga Pyat
Cypriniformes	Cyprinidae	*8.Danio aequipinnutus*	Giant danio	Yay Pawe Nga
Cypriniformes	Cyprinidae	*9.Garra lamta*	Stone sucker	Nga Kyauk Kat
Cypriniformes	Cyprinidae	*10.Crossochelius burmanicus*	Burmese latia	Nga dinlone
Cypriniformes	Cyprinidae	*11. Cabdio moror*	-	Kyaw yoseir
Cypriniformes	Cyprinidae	*12.Barilius sp.*	-	Nga Lettu
Cypriniformes	Cyprinidae	*13. Labeo stoliczkae*	-	Nga lu
Cypriniformes	Cyprinidae	*14. Labeo dyocheilus*	Carp	Nga Me Kyut
Cypriniformes	Cyprinidae	*15. Amblypharyngodon mola*	-	Nga Be

Cypriniformes	Amblycipitidae	*16.Hemibagrus microphthalmus*	Dwarf cat fish	Nga Mote Sai
Cypriniformes	Cyprinidae	*17. Glyptothorax trilineatus*	Yellow cat fish	Nga thinbau

Table 4. Habitat types of fishes, recorded from Middle Ye Ywar Hydropower Project, Naung-cho Township

Species	Number	Data source	Habitat types	Remarks
1. *Burbus hexastichus*	-	IS	Shallow water with dandy bottom	Endemic
2. *Morulius calbasu*	6	VS	Large river but juvenile nurse in flood	
3. Folifer brevifilis	1	VS	Clear water with rocky bottom riparian forest	Uncommon
4. Puntius amphibious	20	VS	Sandy bottom & riparian forest	Common
5.Puntius oligolipis	3	VS	Sandy bottom & riparian water plants	Uncommon
6. Puntius sp.	30	VS	Sandy bottom & riparian water plants	Endemic
7. Danio kaerri	20	VS	Well planted and upper level of stream	Endemic
8.Danio aequipinnutus	15	VS	Sandy and gravel beds in dense ripiarian vegetation	Endemic
9.Garra lamta	6	VS	Torrent rivers and streams with rocky and gravel bottoms	Endemic
10.Crossochelius burmanicus	30	VS	Torrent rivers with rocky bottom	Locally Uncommon
11. Cabdio moror	20	VS	Main stream of large rivers	Occasionalyy
12.Barilius sp.	30	VS	Torrent rivers and streams with rocky bottom	Common
13. Labeo stoliczkae	22	VS	Large rivers and flooded plains	Common
14. Labeo dyocheilus	25	VS	Large rivers with rocky rapids	Uncommon
15. Amblypharyngodon mola	52	VS	Marsh land and flood plain	Common
16.Hemibagrus microphthalmus	6	IS	Rivers and larger streams to suck the rocks	Seasonal common
17. Glyptothorax trilineatus	3	VS	Torrent streams with rocky rapids	Rare

IS = interview survey, VS = voucher specimen collected

Table 5. Numbers of fishes recorded from survey sites of Middle Ye-Ywar Hydropower Project, Naung-cho Township

Species	site I	site 2	site 3	site 4	site 5	Total
1. *Burbus hexastichus*	-	-	-	-	-	
2. *Morulius calbasu*	1	-	4	-	-	
3. Folifer brevifilis	-	-	1	-	-	
4. Puntius amphibious	-	2	6	10	2	20
5.Puntius oligolipis	-	--	2	-	-	2
6. Puntius sp.	-	5	20	5	5	30
7. Danio kaerri	4	2	6	3	2	20
8.Danio aequipinnutus	3	-	7	3	-	15
9.Garra lamta	-	5	6	-	-	6
10.Crossochelius burmanicus	3	6	8	9	5	30
11. Cabdio moror	5	5	5	3	1	20
12.Barilius sp.	16	1	3	4	2	30
13. Labeo stoliczkae	2	1	8	5	6	22
14. Labeo dyocheilus	0	7	20	4	-	25
15. Amblypharyngodon mola	20	-	15	7	3	45
16.Hemibagrus microphthalmus	-	-	-	-	-	-
17. Glyptothorax trilineatus	-	1	3	-	-	3

Site 1 = Dodtawaddy bridge Downstream
Site 2 = Dodtawaddy bridge Upstream
Site 3 =Ye-twin-gyi
Site 4 = Me-pok
Site 5 = Gote-twin junction river (Naung-cho-gyi)

Table 6. List of Recorded Bird species from Middle Ye Ywar Hydropower Project Area

No.	Order / Family	Scientific Name	Common Name	Remark
I.	**Galliformes**			
1.	Megapodiidae	*Francolinus pintadeanus*	Chinese francolin	T
2.	Megapodiidae	*Cotumix chinensis*	Blue Breasted Quail	T
3.	Phasianidae	*Pavo muticus*	Green Peafowl	T / (QS)
4.	Phasianidae	*Gallus gallus*	Red Jungle fowl	T
II.	**Ciconiiformes**			
5.	Ardeidae	*Egretta casmerodius*	Great Egret	W
6.	Ardeidae	*Bubulcus ibis*	Cattle Egret	W
III.	**Anseriformes**			
7.	Anatidae	*Dendrocygna bicolor*	Fulvous Whistling Duck	W
IV.	**Gruiformes**			
8.	Rallidae	*Gallinula chloropus*	Common Moorhen	W
V.	**Strigiformes**			
9.	Tytonidae	*Tyto alba*	Barn Owl	T
VI.	**Falconiformes**			
10.	Accipitridae	*Milvus migrans*	Black Kite	T
11.	Accipitridae	*Spilornis cheela*	Crested Serpent Eagle	T
12.	Accipitridae	*Accipiter badius*	Shikra	T
13.	Falconidae	*Falco tinnunculus*	Common Kestrel	T
VII.	**Columbiformes**			
14.	Columbidae	*Treron phoenicoptera*	Yellow Footed Green Pigeon	T
15.	Columbidae	*Streptopelia chinensis*	Spotted Dove	T
16.	Columbidae	*Streptopelia orientalis*	Oriental Turtle-Dove	T
VII I.	**Cuculiformes**			
17.	Cuculidae	*Clamator coromandus*	Chestnut Winged Cuckoo	T
18.	Cuculidae	*Eudynamys scolopaceus*	Asian koel	T
19.	Centropodidae	*Centropus sinensis*	Greater Coucal	T
IX.	**Apodiformes**			
20.	Apopidae	*Cypsiurus balasiensis*	Asian Palm Swift	T
21.	Apopidae	*Apus pacificus*	Fork-Tailed Swift	T
22.	Apopidae	*Apus affinis*	House Swift	T
X.	**Coraciiformes**			
23.	Coraciidae	*Coracias benghalensis*	Indian Roller	T
24.	Bucerotidae	*Anthracoceros albirostris*	Oriental Pied Hornbill	T / (QS)
25.	Megalaimidae	*Megalaima haemacephala*	Coppersmith Barbet	T
26.	Megalaimidae	*Megalaima lineate*	Lineated Barbet	T
27.	Alcedinidae	*Halcyon smymensis*	White-Throated Kingfisher	T
28.	Meropidae	*Merops orientalis*	Green Bee-Eater	T

29.	Meropidae	*Merops philippinus*	Blue Tail Bee-Eater	T
30.	Upupidae	*Upupa apops*	Common Hoopoe	T
XI.	**Paciformes**			
31.	Campephagidae	*Pericrocotus flammeus*	Scarlet Minivet	T
32.	Campephagidae	*Pericrocotus solaris*	Grey Chinned Minivet	T
33.	Picidae	*Dinopium javanense*	Common flameback	T
XII.	**Psittaciformes**			
34.	Psittacidae	*Psittacula eupatria*	Alexandrine Parakeet	T
35.	Psittacidae	*Psittacula finschii*	Grey- Headed Parakeet	T
XIII.	**Passeriformes**			
36.	Oriolidae	*Oriolus xanthomus*	Black-Hooded Oriole	T
37.	Dicruridae	*Dicrurus remifer*	Lesser Racket-Tailed Drongo	T
38.	Dicruridae	*Dicrurus macrocercus*	Black Drongo	T
39.	Dicruridae	*Dicrurus Ieucophaeus*	Ashy Drongo	T
40.	Dicruridae	*Dicrurus aeneus*	Bronzed Drongo	T
41.	Corvidae	*Hypothymis azurea*	Black Naped Monarch	T
42.	Corvidae	*Corvus macrorhynchos*	Large-Billed Crow	T
43.	Chloropseidae	*Chloropsis cochinchinensis*	Blue-Winged Leafbird	T
44.	Irenidae	*Irena puella*	Asian Fairy Bluebird	T
45.	Eupylaimidae	*Serilophus lunatus*	Sliver Breasted Broadbill	T
46.	Passeridae	*Motacilla alba*	White Wagtail	T
47.	Passeridae	*Anthus rufulus*	Paddy Field Pipit	T
48.	Passeridae	*Anthus cervinus*	Red throated pipit	T
49.	Muscicapidae	*Copsychus saularis*	Oriental Magpie Robin	T
50.	Muscicapidae	*Copsychus malabaricus*	White Rumped Shama	T
51.	Muscicapidae	*Saxicola caprata*	Pied Bushchat	T
52.	Muscicapidae	*Myophonus caeruleus*	Blue Whistling Thrush	T
53.	Sturnidae	*Acridotheres fuscus*	Jungle Myna	T
54.	Sturnidae	*Sturnus philippensis*	Chestnut Cheeked Starling	T
55.	Pycnonotidae	*Pycnonotus atriceps*	Black Headed Bulbul	T
56.	Pycnonotidae	*Pycnonotus cafer*	Red-Vented Bulbul	T
57.	Pycnonotidae	*Pycnonotus blanfordi*	Streak-Eared Bulbul	T
58.	Pycnonotidae	*Pycnonotus jocosus*	Red-Whiskered Bulbul	T
59.	Pycnonotidae	*Pycnonotus melanicterus*	Black-Crested Bulbul	T
60.	Hirundinidae	*Hirundo rustica*	Barn Swallow	T
61.	Hirundinidae	*Artamus fuscus*	Ashy Wood Swallow	T
62.	Aegithinidae	*Aegithina tiphia*	Common Iora	T
63.	Cisticolidae	*Orthotomus sutorius*	Common Tailorbird	T
64.	Cisticolidae	*Orthotomus cuculatus*	Mountain Tailorbird	T
65.	Nectarinidae	*Nectarinia jugularis*	Olive Backed Sunbird	T
66.	Nectarinidae	*Nectarinia asiatica*	Purple Sunbird	T

67.	Sylviidae	*Acrocephalus aedon*	Thick Billed Warbler	T	Where, T
68.	Tamaliidae	*Pteruthius flaviscapis*	White-Browed Shrike Babbler	T	

= Terrestrial Bird; W = Water Bird; QS = Questionaries' Survey

Table 7. Estimated number of Bird species from Middle Ye Ywar Hydropower Project Area

No.	Scientific Name	Common Name	Estimated No.	CS	Status
1.	*Francolinus pintadeanus*	Chinese francolin	1	LC	Resident
2.	*Cotumix chinensis*	Blue Breasted Quail	1	LC	Resident
3.	*Pavo muticus*	Green Peafowl	1	EN	Resident
4.	*Gallus gallus*	Red Jungle fowl	1	LC	Resident
5.	*Egretta casmerodius*	Great Egret	4	LC	Resident
6.	*Bubulcus ibis*	Cattle Egret	15	LC	Resident
7.	*Dendrocygna bicolor*	Fulvous Whistling Duck	10	LC	Resident
8.	*Gallinula chloropus*	Common Moorhen	10	LC	Resident
9.	*Tyto alba*	Barn Owl	1	LC	Resident
10.	*Milvus migrans*	Black Kite	2	LC	Resident
11.	*Spilornis cheela*	Crested Serpent Eagle	1	LC	Resident
12.	*Accipiter badius*	Shikra	4	LC	Resident
13.	*Falco tinnunculus*	Common Kestrel	2	LC	Resident
14.	*Treron phoenicoptera*	Yellow Footed Green Pigeon	4	LC	Resident
15.	*Streptopelia chinensis*	Spotted Dove	20	LC	Resident
16.	*Streptopelia orientalis*	Oriental Turtle-Dove	1	LC	Resident
17.	*Clamator coromandus*	Chestnut Winged Cuckoo	1	LC	Resident
18.	*Eudynamys scolopaceus*	Asian koel	4	LC	Resident
19.	*Centropus sinensis*	Greater Coucal	4	LC	Resident
20.	*Cypsiurus balasiensis*	Asian Palm Swift	30	LC	Resident
21.	*Apus pacificus*	Fork-Tailed Swift	6	LC	Resident
22.	*Apus affinis*	House Swift	20	LC	Resident
23.	*Coracias benghalensis*	Indian Roller	2	LC	Resident
24.	*Anthracoceros albirostris*	Oriental Pied Hornbill	1	VU	Resident
25.	*Megalaima haemacephala*	Coppersmith Barbet	3	LC	Resident
26.	*Megalaima lineate*	Lineated Barbet	2	LC	Resident
27.	*Halcyon smymensis*	White-Throated Kingfisher	4	LC	Resident
28.	*Merops orientalis*	Green Bee-Eater	10	LC	Resident
29.	*Merops philippinus*	Blue Tail Bee-Eater	5	LC	Breeding visitor
30.	*Upupa apops*	Common Hoopoe	2	LC	Breeding visitor
31	*Pericrocotus flammeus*	Scarlet Minivet	3	LC	Resident

32.	*Pericrocotus solaris*	Grey Chinned Minivet	2	LC	Resident
33.	*Dinopium javanense*	Common flameback	1	LC	Resident
34.	*Psittacula eupatria*	Alexandrine Parakeet	4	LC	Resident
35.	*Psittacula finschii*	Grey- Headed Parakeet	15	LC	Resident
36.	*Oriolus xanthomus*	Black-Hooded Oriole	2	LC	Resident
37.	*Dicrurus remifer*	Lesser Racket-Tailed Drongo	1	LC	Resident
38.	*Dicrurus macrocercus*	Black Drongo	5	LC	Resident
39.	*Dicrurus Ieucophaeus*	Ashy Drongo	10	LC	Resident
40.	*Dicrurus aeneus*	Bronzed Drongo	3	LC	Resident
41.	*Hypothymis azurea*	Black Naped Monarch	1	LC	Resident
42.	*Corvus macrorhynchos*	Large-Billed Crow	10	LC	Resident
43.	*Chloropsis cochinchinensis*	Blue-Winged Leafbird	2	LC	Resident
44.	*Irena puella*	Asian Fairy Bluebird	1	LC	Resident
45.	*Serilophus lunatus*	Sliver Breasted Broadbill	1	LC	Resident
46.	*Motacilla alba*	White Wagtail	20	LC	Resident
47.	*Anthus rufulus*	Paddy Field Pipit	1	LC	Resident
48.	*Anthus cervinus*	Red throated pipit	1	LC	Resident
49.	*Copsychus saularis*	Oriental Magpie Robin	10	LC	Resident
50.	*Copsychus malabaricus*	White Rumped Shama	1	LC	Resident
51.	*Saxicola caprata*	Pied Bushchat	4	LC	Resident
51.	*Myophonus caeruleus*	Blue Whistling Thrush	1	LC	Winter visitor
53.	*Acridotheres fuscus*	Jungle Myna	12	LC	Resident
54.	*Sturnus philippensis*	Chestnut Cheeked Starling	2	LC	Resident
55.	*Pycnonotus atriceps*	Black Headed Bulbul	1	LC	Resident
56.	*Pycnonotus cafer*	Red-Vented Bulbul	20	LC	Resident
57.	*Pycnonotus blanfordi*	Streak-Eared Bulbul	5	LC	Resident
58.	*Pycnonotus jocosus*	Red-Whiskered Bulbul	10	LC	Resident
59.	*Pycnonotus melanicterus*	Black-Crested Bulbul	4	LC	Resident
60.	*Hirundo rustica*	Barn Swallow	10	LC	Resident
61.	*Artamus fuscus*	Ashy Wood Swallow	2	LC	Resident
62.	*Aegithina tiphia*	Common Iora	4	LC	Resident
63.	*Orthotomus sutorius*	Common Tailorbird	8	LC	Resident
64.	*Orthotomus cuculatus*	Mountain Tailorbird	2	LC	Resident
65.	*Nectarinia jugularis*	Olive Backed Sunbird	2	LC	Resident
66.	*Nectarinia asiatica*	Purple Sunbird	1	LC	Resident
67.	*Acrocephalus aedon*	Thick Billed Warbler	6	LC	Winter visitor
68.	*Pteruthius flaviscapis*	White-Browed Shrike Babbler	1	LC	Resident

Where, CS = Conservation Status; EN = Endangered; VU = Vulnerable; LC = Least Concern

Table 8. Survey site and Habitat type of Recorded Bird species from Middle Ye Ywar Project Area

Sr No.	Species	Number	Habitat	Survey Site
1.	*Francolinus pintadeanus*	1	Shrub and bushes	4
2.	*Cotumix chinensis*	1	Shrub and bushes	3
3.	*Pavo muticus*	1	Near river bank	1
4.	*Gallus gallus*	1	Near river bank	1
5.	*Egretta casmerodius*	4	Near river bank	6
6.	*Bubulcus ibis*	15	Near leach and river	2,5
7.	*Dendrocygna bicolor*	10	Wetland (in leach)	5
8.	*Gallinula chloropus*	10	Wetland (in leach)	5
9.	*Tyto alba*	1	Grass land	2
10.	*Milvus migrans*	2	Top canopy / On sky	3
11.	*Spilornis cheela*	1	On sky	6
12.	*Accipiter badius*	4	Cultivation	4, 5
13.	*Falco tinnunculus*	2	On Sky	6
14.	*Treron phoenicoptera*	4	Top Canopy	5
15.	*Streptopelia chinensis*	20	Cultivation / Tree	1,2,3,4,5,6
16.	*Streptopelia orientalis*	1	Cultivation / Tree	5
17.	*Clamator coromandus*	1	Middle Canopy	5
18.	*Eudynamys scolopaceus*	4	Tree	4,5
19.	*Centropus sinensis*	4	Shrub and bushes	4,5,6
20.	*Cypsiurus balasiensis*	30	Tree / On sky	1,2,4,5,6
21.	*Apus pacificus*	6	Tree / On sky	5,6
22.	*Apus affinis*	20	On Sky	1,4,5,6
23.	*Coracias benghalensis*	2	Tree / Cultivation	4,5
24.	*Anthracoceros albirostris*	1	Tree	3
25.	*Megalaima haemacephala*	3	Middle canopy	3,5,6
26.	*Megalaima lineate*	2	Top canopy	5
27.	*Halcyon smymensis*	4	Tree / Near river bank	1,2
28.	*Merops orientalis*	10	Tree / Cultivation	4,5,6
29.	*Merops philippinus*	5	Tree / Cultivation	2,3,6
30.	*Upupa apops*	2	Cultivation	5,
31.	*Pericrocotus flammeus*	3	Top canopy	3,6
32.	*Pericrocotus solaris*	2	Middle canopy	3
33.	*Dinopium javanense*	1	Tree	1
34.	*Psittacula eupatria*	4	Tree	3
35.	*Psittacula finschii*	15	Tree	3,4,5,6
36.	*Oriolus xanthomus*	2	Middle canopy	1,2
37.	*Dicrurus remifer*	1	Tree	6
38.	*Dicrurus macrocercus*	5	Tree	4
39.	*Dicrurus Ieucophaeus*	10	Tree	5,6
40.	*Dicrurus aeneus*	3	Tree	4
41.	*Hypothymis azurea*	1	Tree	6
42.	*Corvus macrorhynchos*	10	Tree / Cultivation	4,5,6

43.	*Chloropsis cochinchinensis*	2	Middle canopy	2
44.	*Irena puella*	1	Lower canopy	5
45.	*Serilophus lunatus*	1	Tree	6
46.	*Motacilla alba*	20	River bank / Marshes / Cultivation	1,2,3,4,5,6
47.	*Anthus rufulus*	1	Paddy field	4
48.	*Anthus cervinus*	1	Cultivation	5
49.	*Copsychus saularis*	10	Tree / Cultivation	1,4,5,6
50.	*Copsychus malabaricus*	1	Tree	1
51.	*Saxicola caprata*	4	Tree / Cultivation	4,5
52.	*Myophonus caeruleus*	1	River Bank	2
53.	*Acridotheres fuscus*	12	Tree / Cultivation	1,3,4,5,6
54.	*Sturnus philippensis*	2	Tree	6,
55.	*Pycnonotus atriceps*	1	Tree, Canopy	2
56.	*Pycnonotus cafer*	20	Tree/ Cultivation/ River bank	1,2,3,4,5,6
57.	*Pycnonotus blanfordi*	5	Tree / Cultivation	4,5
58.	*Pycnonotus jocosus*	10	Tree / Cultivation	2,4,5
59.	*Pycnonotus melanicterus*	4	Tree, Canopy	2,3
60.	*Hirundo rustica*	10	Tree / Cultivation	4,5,6
61.	*Artamus fuscus*	2	Tree	6
62.	*Aegithina tiphia*	4	Canopy	1,2,5
63.	*Orthotomus sutorius*	8	Tree/ Shrub and Bushes	2,3,4,5,6
64.	*Orthotomus cuculatus*	2	Tree	3
65.	*Nectarinia jugularis*	2	Tree	2
66.	*Nectarinia asiatica*	1	Middle canopy	3
67.	*Acrocephalus aedon*	6	Shrub and Bushes	5
68.	*Pteruthius flaviscapis*	1	Shrub and Bushes	4

Where,Survey Site 1 = Down Stream, at the environ of Dodtawaddy bridge
Survey Site 2 = Up Stream, at the environ of Dodtawaddy bridge
Survey Site 3 = Environ of Dodtawaddy river at Ye-twin-gyi village
Survey Site 4 = Environ of Dodtawaddy river at Me-Pok village
Survey Site 5 = Environ of Mam Maw village, Naung Taw village (1) and (2)
Survey Site 6 = Environ of Dodtawaddy river at Naung-cho-gyi village

Table 9. List of Mammal species recorded from Middle Ye Ywar Hydropower Project, Naung Cho Township

No.	Order	Family/ Sub-family	Scientific name	Common name
I	Insectivora	Erinaceidae	1.*Talpa sp*	Eastern Mole
II	Primate	Lorisidae	2. *Macaca sp.*	Pig Tailed Macaque
			3. *Macaca mulatta*	Rhesus Macaque
III	Pholidota	Manidae	4. *Mnanis pentadactyla*	Chinese Pangolin
			5. Lepus peguensis	Siamese Hare
IV	Rodentia	Sciurinae	6.*Callosciurus erythraeus*	Pallas's Squirrel
			7. Tamiops mcclellandii	Myanmar striped Squirrel
		Histricidae	8. *Hystrix brachyura*	Eastern Asian Porcupine
V	Carnivora	Ursidae	9. *Ursus* sp	Bear
		Herpestidae	10. Herpestes sp	Small AsianMongoose
		Felidae	11. *Felis chaus*	Jungle Cat
VI	Artiodactyla	Suidae	12. *Sus scrofa*	Eurasian wild Pig
		Cervidae	13. *Muntiacus muntjak*	Red Muntjac
VII	Chiroptera	Emballonuridae	14. *Taphozous longimanus*	Tomb Bat

Table 10. Habitat types and conservation status of mammal species in project area

Species	Habitat type	Data source	IUCN Redlist/ CITES
1.*Talpa sp*	Ground hole	QS	-
2. *Macaca sp.*	Tree	VS	VL/Appendix II
3. *Macaca mulatta*	Tree	VS	VL/Appendix II
4. *Mnanis pentadactyla*	Forest	QS	NT/ Appendix I
5. Lepus peguensis	Forest	QS	-
6.*Callosciurus erythraeus*	Teak tree	VS	-
7. Tamiops mcclellandii	Teak tree	VS	-
8. *Hystrix brachyuran*	Forest	Spine	VL/Appendix I
9. *Ursus* sp	Forest	QS	VL/Appendix I
10. Herpestes sp	Forest	QS	-
11. *Felis chaus*	Forest	Footprint	Appendix II
12. *Sus scrofa*	Forest	Qs	-
13. *Muntiacus muntjak*	Forest	Horn	-
14. *Taphozous longimanus*	Limestone Cave	VS	-

QS = Questionaries' survey, VS = voucher specimen collected

Table 11. List of Herpet species collected from Middle Ye Ywar Hydropower Project, Naung Cho Township

Order	Family	Scientific Name	Common Name
I.Anura	Bufonidae	1. *Duttaphrynus melanostictus*	Common Toad
	Ranidae	2. *Fejervarya limnocharis limnocharis*	Paddy Frog/ Swamp Frog
II. Lacertilia	Agamidae	3. *Calotes versicolor*	Garden Fence Lizard
		4. *Calotes mystaceus*	Blue crested lizard
		5. *Pseudoclotes microlepis*	Small-Scaled Forest Lizard
	Gekkonidae	6. *Gekko gecko*	Tockay
		7. *Hemidactylus frenatus*	Common House Gecko
	Scincidae	8. *Sphenomorphus sp*	Spotted Forest Skink
	Varanidae	9.*Varanus sp.*	Monitor
III. Serpentes	Colubridae	10. *Ptyas sp.*	Rat Snake
		11. *Ahaetulla nasuta*	Long-nosed Whip Snake
	Elapidae	12. *Naja sp.*	Cobra
		13. *Ophiophagus Hannah*	King Cobra
	Natricidae	14. *Amphiesma sp*	Keelback
	Pythonidae	15. *Python moluras*	Burmese Python
IV. Testudines	Testudinidae	16. *Indotestudo elongata*	Yellow Tortoise

Table 12. Habitat types and conservation status of mammal species in project area

Species	Habitat type	Data source	IUCN Redlist/ CITES
1. *Duttaphrynus melanostictus*	In grass	VS	-
2. *Fejervarya limnocharis limnocharis*	Riverbank, under rock	VS	-
3. *Calotes versicolor*	Garden fence	VS	-
4. *Calotes mystaceus*	tree	VS	-
5. *Pseudoclotes microlepis*	tree	VS	-
6. *Gekko gecko*	Tree hole	VS	-
7. *Hemidactylus frenatus*	Dwelling house	VS	-
8. *Sphenomorphus sp*	Bush	VS	-
9.*Varanus sp.*	Forest	QS	-
10. *Ptyas sp.*	Forest	QS	-
11. *Ahaetulla nasuta*	Tree	VS	-
12. *Naja sp.*	Forest	Qs	-
13. *Ophiophagus Hannah*	Forest	QS	Endanger
14. *Amphiesma sp*	Grass	VS	-
15. *Python moluras*	Forest	QS	Near Threatened
16. *Indotestudo elongata*	Forest	VS	Endanger/Appendix II

VS= voucher speciemen collected, QS = Questionaries' survey

Table 13. List of Insect species collected from Middle Ye Ywar Hydropower Project, Naung-cho Township

Order	Family	Species	Common Name
I.Lepidoptera	1. Papilionidae	1. *Papilio polite romulus*	Butterfly
		2. *Papilio memnon agenor*	Butterfly
		3. Graphium nomius	Butterfly
	2. Danaidae	4. *Danaus limniace limniace*	Butterfly
	3. Nymphalidae	5. *Junoniaiphita ocyale*	Butterfly
		6. Phalanta Phalanta	Butterfly
		7. *Neptis hylas kamarupa*	Butterfly
		8. Junonia almana almana	Butterfly
		9. Lassipa viraja viraja	Butterfly
	4. Pieridae	10. *Eurema hecabe contubernalis*	Butterfly
		11. Artogenia naganum naganum	Butterfly
		12. Delias descombi descombi	Butterfly
	5. Danaidae	13. *Danaus chrysippus*	Butterfly
		14. *Danaus melanippus*	Butterfly
	6. Satyridae	*15. Melanitis zitenius auletes*	Butterfly
II. Odonata	7.Coenagrionidae	*16. Coeliccia sp*	Damselflies
III. Orthoptera	8. Phasmidae	17. *Anisomorpha sp*.	Walking Stick
		18. *Gryllus sp*	Cricket
		19. *Dissosteira longipenis*	Grasshopper
IV.Hymenoptera	9. Xylocopidae	20. *Apis mellifera*	Honey bee
	10. Formicidae	21. *Camponotus sp*	Carpenter ant
V. Hemiptera	11. Nepidae	22. *Ranatra sp*	Water scorpion
	12. Psyllidae	23. Paratriozn	Psyllid
	13. Coreidae	24. Anasa sp	Squash bug
VI. Pterygota	-	25. Vespa orientalis	Wasp
VII. Araneida	-	26. Aranea sp	Spider
	14. Mantidae	27. Paratenedera	Praying mantis

4.3 Fauna (Wet season)

Table 2. List of fauna recorded from Middle Ye Ywar Hydropwer Project site

Fauna	No. of orders	No. of families	No. of species
Birds	10	26	43
Fish & invertebrates	6	7	27
Mammals	6	11	16
Herpets	4	11	18
Insects	7	14	27
Total	33	69	131

Table 3. List of fish fauna recorded from Middle Ye-Ywar Hydropower Project, Naung-cho Township

Order	Family	Species	Common Name	Local Name
Cypriniformes	Cyprinidae	1. *Burbus hexastichus*	Nga Kyaung	Nga kyaung
Cypriniformes	Cyprinidae	2. *Morulius calbasu*	Orangefin labeo	Nga net ma
Cypriniformes	Cyprinidae	*3. Folifer brevifilis*	Burbus Brevifilis	Kyaut Ngalu
Cypriniformes	Cyprinidae	*4. Puntius amphibious*	Pool barb	Nga khone ma
Cypriniformes	Cyprinidae	*5.Puntius oligolipis*	Checker barb	Nga khonema wah
Cypriniformes	Cyprinidae	*6. Puntius sp.*	Barb	Nga khone ma
Cypriniformes	Cyprinidae	*7. Danio kaerri*	Hikari danio	Nga Pyat
Cypriniformes	Cyprinidae	*8.Danio aequipinnutus*	Giant danio	Yay Pawe Nga
Cypriniformes	Cyprinidae	*9.Garra lamta*	Stone sucker	Nga Kyauk Kat
Cypriniformes	Cyprinidae	*10.Crossochelius burmanicus*	Burmese latia	Nga dinlone
Cypriniformes	Cyprinidae	*11. Cabdio moror*	-	Kyaw yoseir
Cypriniformes	Cyprinidae	*12.Barilius sp.*	-	Nga Lettu
Cypriniformes	Cyprinidae	*13. Labeo stoliczkae*	-	Nga lu
Cypriniformes	Cyprinidae	*14. Labeo dyocheilus*	Carp	Nga Me Kyut
Cypriniformes	Cyprinidae	*15. Amblypharyngodon mola*	-	Nga Be
Cypriniformes	Cyprinidae	*16.Hemibagrus microphthalmus*	Dwarf cat fish	Nga Mote Sai

Cypriniformes	Cyprinidae	*17. Glyptothorax trilineatus*	Yellow cat fish	Nga thinbau
Perciformes	Cobitidae	*18. Botia rostrata*	Golden loach	Nga Sin pyawt
Perciformes	Cobitidae	*19. Botia berdmorei*	Loach	Nga Sinpyawt kyar
Perciformes	Cobitidae	*20. Lepidocephalichthys Berdmori*	Loach	Nga thale htoe
Perciformes	Cobitidae	*21. Neonoemacheilus Labeosus*	Loach	Ngatha le htoe
Perciformes	Channidae	*22. Channa aurolineata*	Channa	Nga yant
Siluriformes	Claridae	*23. Clarias batrachus*	Walking catfish	Nga khue
Anguilliformes	Anguilldae	*24.Anguilla bicolor*	Level finned fish	Nga Myae
Decapoda	Palaemonidae	*25. Cryphiops sp.*	Palaemon	Puzon
Decapoda	Portunidae	*26. Charybdis sp.*	Crab	Ganan Lone
Gastropoda	-	*27. Bufonaria sp.*	Frog shell	Khayu phin chon

Table 4. Habitat types fishes recorded from Middle Ye-Ywar Hydropower Project, Naung Cho Township

Species	Number	Data source	Habitat types	Season	Remarks
1. *Burbus hexastichus*	-	IS	Shallow water with dandy bottom	DS	Endemic
2. *Morulius calbasu*	6	VS	Large river but juvenile nurse in flood	DS	
3. Folifer brevifilis	1	VS	Clear water with rocky bottom riparian forest	DS	Uncommon
4. Puntius amphibious	20	VS	Sandy bottom & riparian forest	DS	Common
5.Puntius oligolipis	3	VS	Sandy bottom & riparian water plants	DS	Uncommon
6. Puntius sp.	30	VS	Sandy bottom & riparian water plants	DS	Endemic
7. Danio kaerri	20	VS	Well planted and upper level of stream	WS	Endemic
8.Danio aequipinnutus	15	VS	Sandy and gravel beds in dense ripiarian vegetation	WS	Endemic
9.Garra lamta	6	VS	Torrent rivers and streams with rocky and gravel bottoms	WS	Endemic
10.Crossochelius burmanicus	30	VS	Torrent rivers with rocky bottom	HS	Locally Uncommon

11. Cabdio moror	20	VS	Main stream of large rivers	WS	Occasionalyy
12.Barilius sp.	30	VS	Torrent rivers and streams with rocky bottom	WS	Common
13. Labeo stoliczkae	22	VS	Large rivers and flooded plains	WS	Common
14. Labeo dyocheilus	25	VS	Large rivers with rocky rapids	WS	Uncommon
15. Amblypharyngodon mola	52	VS	Marsh land and flood plain	WS	Common
16.Hemibagrus microphthalmus	6	IS	Rivers and larger streams to suck the rocks	WS	Seasonal common
17. Glyptothorax trilineatus	3	VS	Torrent streams with rocky rapids	WS	Rare
18. Botia rostrata	4	VS	Main stream with rocky rapids	DS	Occasionally
19. Botia berdmorei	3	VS	Rapids and hill stream	DS	Occasionally
20. Lepidocephalichthys Berdmori	3	VS	Stream with hill to low land	DS	Seasonal
21. Neonoemacheilus Labeosus	2	VS	Rocky rapid and hill stream	DS	Uncommon
22. Channa aurolineata	1	VS	Rivers and streams with riparian forests	DS	Uncommon
23. Clarias batrachus	7	VS	Rivers and marshland	DS	Common
24.Anguilla bicolor	-	IS	Adult inhabit upper rich & main stream	DS	Seasonal common
25. Cryphiops sp.	50	VS	Clean water with sandy and rocky bottom	DS	Common
26. Charybdis sp.	10	VS	Sandy and rocky bottom	DS	Common
27. Bufonaria sp.	70	VS	Main rivers with sandy and rocky bottom	DS	Common

DS = Dry Season; WS = Wet Season

Table 5. Numbers of fishes recorded from survey sites of Middle Ye Ywar Hydropower Project, Naung-cho Township

Species	site I	site 2	site 3	site 4	site 5	Total
1. *Burbus hexastichus*	-	-	-	-	-	
2. *Morulius calbasu*	1	-	4	-	-	
3. Folifer brevifilis	-	-	1	-	-	
4. Puntius amphibious	-	2	6	10	2	20
5.Puntius oligolipis	-	--	2	-	-	2
6. Puntius sp.	-	5	20	5	5	30

7. Danio kaerri	4	2	6	3	2	20
8.Danio aequipinnutus	3	-	7	3	-	15
9.Garra lamta	-	5	6	-	-	6
10.Crossochelius burmanicus	3	6	8	9	5	30
11. Cabdio moror	5	5	5	3	1	20
12.Barilius sp.	16	1	3	4	2	30
13. Labeo stoliczkae	2	1	8	5	6	22
14. Labeo dyocheilus	0	7	20	4	-	25
15. Amblypharyngodon mola	20	-	15	7	3	45
16.Hemibagrus microphthalmus	-	-	-	-	-	-
17. Glyptothorax trilineatus	-	1	3	-	-	3
18. Botia rostrata	-	-	2	1	-	4
19. Botia berdmorei	-	-	2	1	-	3
20. Lepidocephalichthys berdmori	-	-	1	1	-	2
21. Neonoemacheilus labeosus	-	-	2	-	-	2
22. Channa aurolineata	-	-	-	2	-	2
23. Clarias batrachus	1	1	1	2	2	7
24.Anguilla bicolor	-	-	-	-	-	-
25. Cryphiops sp.	5	2	10	15	18	50
26. Charybdis sp.	-	1	5	2	2	10
27. Bufonaria sp.	10	25	5	10	10	60

Site 1 = Dodtawaddy bridge downstream
Site 2 = Dodtawaddy bridge Upstream
Site 3 = Me-pok village &Dodtawaddy
Site 4 = Ye-twin-gyi village & Dodtawaddy
Site 5 = Gote twin junction river (Naung-cho-gyi)

Table 6. List of Recorded Bird species from Middle Ye Ywar Hydropower Project Area

No.	Order / Family	Scientific Name	Common Name	Wet season	Remark
I.	**Galliformes**				
1.	Megapodiidae	*Francolinus pintadeanus*	Chinese francolin		T
2.	Megapodiidae	*Cotumix chinensis*	Blue Breasted Quail		T
3.	Phasianidae	*Pavo muticus*	Green Peafowl		T / (QS)
4.	Phasianidae	*Gallus gallus*	Red Jungle fowl		T

II.	**Ciconiiformes**				
5.	Ardeidae	*Egretta casmerodius*	Great Egret		W
6.	Ardeidae	*Bubulcus ibis*	Cattle Egret		W
III.	**Falconiformes**				
7.	Accipitridae	*Milvus migrans*	Black Kite		T
8.	Accipitridae	*Accipiter badius*	Shikra		T
IV.	**Columbiformes**				
9.	Columbidae	*Streptopelia chinensis*	Spotted Dove		T
10.	**Columbidae**	***Treron curvirostra***	**Thick billed green pigeon**	**Wet only**	**T**
V.	**Cuculiformes**				
11.	Cuculidae	*Clamator coromandus*	Chestnut Winged Cuckoo		T
12.	Cuculidae	*Eudynamys scolopaceus*	Asian koel		T
13.	Centropodidae	*Centropus sinensis*	Greater Coucal		T
VI.	**Apodiformes**				
14.	Apopidae	*Cypsiurus balasiensis*	Asian Palm Swift		T
15.	Apopidae	*Apus pacificus*	Fork-Tailed Swift		T
16.	Apopidae	*Apus affinis*	House Swift		T
VII.	**Coraciiformes**				
17.	Coraciidae	*Coracias benghalensis*	Indian Roller		T
18.	Bucerotidae	*Anthracoceros albirostris*	Oriental Pied Hornbill		T / (QS)
19.	Megalaimidae	*Megalaima haemacephala*	Coppersmith Barbet		T
20.	**Megalaimidae**	***Megalaima asiatica***	**Blue throat Barbet**	**Wet only**	**T**
21.	Alcedinidae	*Halcyon smymensis*	White-Throated Kingfisher		T
22.	Meropidae	*Merops orientalis*	Green Bee-Eater		T
23.	Meropidae	*Merops philippinus*	Blue Tail Bee-Eater		T
VII I.	**Paciformes**				
24.	Picidae	*Dinopium javanense*	Common flameback		T
IX.	**Psittaciformes**				
25.	Psittacidae	*Psittacula eupatria*	Alexandrine Parakeet		T
26.	Psittacidae	*Psittacula finschii*	Grey- Headed Parakeet		T
X.	**Passeriformes**				
27.	Oriolidae	*Oriolus xanthomus*	Black-Hooded Oriole		T
28.	Dicruridae	*Dicrurus macrocercus*	Black Drongo		T
29.	Dicruridae	*Dicrurus Ieucophaeus*	Ashy Drongo		T
30.	Corvidae	*Corvus macrorhynchos*	Large-Billed Crow		T
31.	Passeridae	*Motacilla alba*	White Wagtail		T
32.	Muscicapidae	*Copsychus saularis*	Oriental Magpie Robin		T
33.	Muscicapidae	*Saxicola caprata*	Pied Bushchat		T
34.	Sturnidae	*Acridotheres fuscus*	Jungle Myna		T
35.	Pycnonotidae	*Pycnonotus atriceps*	Black Headed Bulbul		T
36.	Pycnonotidae	*Pycnonotus cafer*	Red-Vented Bulbul		T
37.	Pycnonotidae	*Pycnonotus blanfordi*	Streak-Eared Bulbul		T
38.	Pycnonotidae	*Pycnonotus jocosus*	Red-Whiskered Bulbul		T

39.	Pycnonotidae	*Pycnonotus melanicterus*	Black-Crested Bulbul		T
40.	Hirundinidae	*Hirundo rustica*	Barn Swallow		T
41.	**Charadriidae**	***Vamellus indicus***	**Red wattled lapwing**	**Wet only**	**T**
42.	**Nectariniidae**	***Aethopyga siparaja***	**Cromson sun bird**	**Wet only**	**T**
43.	**Cisticolidae**	***Prinia hodgsonii***	**Grey breasted prinia**	**Wet only**	**T**

Where, T = Terrestrial Bird; W = Water Bird; QS = Questionaries' Survey

Table 9. List of Mammal species recorded from Middle Ye Ywar Hydropower Project, Naung-cho Township

No.	**Order**	**Family/ Sub-family**	**Scientific name**	**Common name**	
I	Insectivora	Erinaceidae	1.*Talpa sp*	Eastern Mole	
			2. *Macaca sp.*	Pig Tailed Macaque	
			3. *Macaca mulatta*	Rhesus Macaque	
II	Pholidota	Manidae	4. *Mnanis pentadactyla*	Chinese Pangolin	
			5. *Lepus peguensis*	Siamese Hare	
III	Rodentia	Sciurinae	6.*Callosciurus erythraeus*	Pallas's Squirrel	
			7. *Tamiops mcclellandii*	Myanmar striped Squirrel	
			8. *Petaurista elegans*	**Lesser Giant flying Squirrel**	**Wet season**
		Histricidae	9. *Hystrix brachyura*	Eastern Asian Porcupine	
IV	Carnivora	Ursidae	10. *Ursus* sp	Bear	
		Herpestidae	11. *Herpestes* sp	Small AsianMongoose	
		Felidae	12. *Felis chaus*	Jungle Cat	
V	Artiodactyla	Suidae	13. *Sus scrofa*	Eurasian wild Pig	
		Cervidae	14. *Muntiacus muntjak*	Red Muntjac	
		Bovidae	**15. *Naemorhedus baileyi***	**Red goral**	**Wet season**
VI	Chiroptera	Emballonuridae	16. *Taphozous longimanus*	Tomb Bat	

Table 10. Habitat types and conservation status of mammal species in project area

Species	Habitat type	Data source	IUCN Redlist/ CITES
1.*Talpa sp*	Ground hole	QS	-
2. *Macaca sp.*	Tree	VS	VL/Appendix II
3. *Macaca mulatta*	Tree	VS	VL/Appendix II
4. *Mnanis pentadactyla*	Forest	QS	NT/ Appendix I
5. Lepus peguensis	Forest	QS	-
6.*Callosciurus erythraeus*	Teak tree	VS	-
7. Tamiops mcclellandii	Teak tree	VS	-
8. *Petaurista elegans*	Tree	QS	-
9. *Hystrix brachyuran*	Forest	Spine	VL/Appendix I
10. *Ursus* sp	Forest	QS	VL/Appendix I
11. Herpestes sp	Forest	QS	-
12. *Felis chaus*	Forest	Footprint	Appendix II
13. *Sus scrofa*	Forest	Qs	-
14. *Muntiacus muntjak*	Forest	Horn	-
15. *Naemorhedus baileyi*	**Red goral**	**QS**	VL/Appendix I
16. *Taphozous longimanus*	Limestone Cave	VS	-

QS = Questionaries' survey VS= voucher specimen collected

Table 11. List of Herpet species collected from Middle Ye Ywar Hydropower Project, Naung-cho Township

Order	Family	Scientific Name	Common Name
Anura	Bufonidae	1. *Duttaphrynus melanostictus*	Common Toad
	Ranidae	2. *Fejervarya limnocharis limnocharis*	Paddy Frog/ Swamp Frog
Lacertilia	Agamidae	3. *Calotes versicolor*	Garden Fence Lizard

		4. *Calotes mystaceus*	Blue crested lizard
		5. *Pseudoclotes microlepis*	Small-Scaled Forest Lizard
	Gekkonidae	6. *Gekko gecko*	Tockay
		7. *Hemidactylus frenatus*	Common House Gecko
	Scincidae	8. *Sphenomorphus sp*	Spotted Forest Skink
	Varanidae	9.*Varanus sp.*	Sight
Serpentes	Colubridae	10. *Ptyas sp.*	Rat Snake
		11. *Ahaetulla nasuta*	Long-nosed Whip Snake
		12. *Chrysopelia ornate*	**Golden tree Snake**
		13. *Dendrelaphis caudolineatus*	**Striped-bronze Back Snake**
	Elapidae	14. *Naja sp.*	Cobra
		15. *Ophiophagus Hannah*	King Cobra
	Natricidae	16. *Amphiesma sp*	Keelback
	Pythonidae	17. *Python moluras*	Burmese Python
Testudines	Testudinidae	18. *Indotestudo elongata*	Yellow Tortoise

Table 12. Habitat types and conservation status of mammal species in project area

Species	Habitat type	Data source	IUCN Redlist/ CITES
1. *Duttaphrynus melanostictus*	In grass	VS	-
2. *Fejervarya limnocharis limnocharis*	Riverbank, under rock	VS	-
3. *Calotes versicolor*	Garden fence	VS	-
4. *Calotes mystaceus*	Tree	VS	-
5. *Pseudoclotes microlepis*	Tree	VS	-
6. *Gekko gecko*	Tree hole	VS	-
7. *Hemidactylus frenatus*	Dwelling house	VS	-
8. *Sphenomorphus sp*	Bush	VS	-
9.*Varanus sp.*	Forest	QS	-
10. *Ptyas sp.*	Forest	QS	-

Species	Habitat type	Data source	IUCN Redlist/ CITES
11. *Ahaetulla nasuta*	Tree	VS	-
12. *Chrysopelia ornata*	Road in the forest	VS	-
13. *Dendrelaphis caudolineatus*	Under log	VS	-
14. *Naja sp.*	Forest	Qs	-
15. *Ophiophagus Hannah*	Forest	QS	Endangered
16. *Amphiesma sp*	Grass	VS	-
17. *Python moluras*	Forest	QS	Near Threatened
18. *Indotestudo elongata*	Forest	VS	Endangered/Appendix II

VS = voucher specimen collected, QS = Questionaries' survey

Table 13 . List of Insect species collected from Middle Ye Ywar Hydropower Project, Naung-cho Township

Order	Family	Species	Common Name
I.Lepidoptera	1. Papilionidae	1. *Papilio polite romulus*	Butterfly
		2. *Papilio memnon agenor*	Butterfly
		3. Graphium nomius	Butterfly
	2. Danaidae	4. *Danaus limniace limniace*	Butterfly
	3. Nymphalidae	5. *Junoniaiphita ocyale*	Butterfly
		6. Phalanta Phalanta	Butterfly
		7. *Neptis hylas kamarupa*	Butterfly
		8. Junonia almana almana	Butterfly
		9. Lassipa viraja viraja	Butterfly
	4. Pieridae	10. *Eurema hecabe contubernalis*	Butterfly
		11. Artogenia naganum naganum	Butterfly
		12. Delias descombi descombi	Butterfly
	5. Danaidae	13. *Danaus chrysippus*	Butterfly
		14. *Danaus melanippus*	Butterfly
	6. Satyridae	*15. Melanitis zitenius auletes*	Butterfly
II. Odonata	7.Coenagrionidae	*16. Coeliccia sp*	Damselflies

Order	Family	Species	Common Name
III. Orthoptera	8. Phasmidae	17. *Anisomorpha sp*.	Walking Stick
		18. *Gryllus sp*	Cricket
		19. *Dissosteira longipenis*	Grasshopper
IV.Hymenoptera	9. Xylocopidae	20. *Apis mellifera*	Honey bee
	10. Formicidae	21. *Camponotus sp*	Carpenter ant
V. Hemiptera	11. Nepidae	22. *Ranatra sp*	Water scorpion
	12. Psyllidae	23. Paratriozn	Psyllid
	13. Coreidae	24. Anasa sp	Squash bug
VI. Pterygota	-	25. Vespa orientalis	Wasp
VII. Araneida	-	26. Aranea sp	Spider
	14. Mantidae	27. Paratenedera	Praying mantis

Morulius calbasu

Crossocheilus burmanicus

Folifer brevifilis

Botia rostrata

Botia sp.

Lepidocephalichtys berdmorei

Neonoemacheilus labeosus

Channa aurolineata Cryphiops sp.

Plate 1. Fish species recorded from Middle Ye Ywar Hydropower project area

Bufonaria sp.

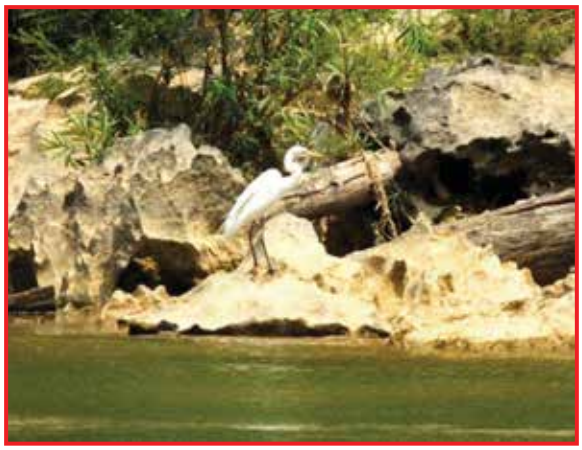
Fishing Type

Fishing Type

Fishing Net

Gallinula chloropus

Dendrocygna bicolor



Casmerodius albus

Halcyon smymensis

Treron curvirostra

Pycnonotus jocosus

Plate 3. Bird species recorded from Middle YeYwar Hydropower Project Area

Spine of Porcupine
Hystrix brachyura

Long-winged Tomb bat
Taphozous longimanus

Skull and antla of Muntjac
Muntiacus muntjak

Macaca assamensis
Assamese Macaque

Foot print of Muntjac

Muntiacus muntjak

Pallas's Squirrel

Callosciurus erythraeus

Plate 4. Mammal species recorded from Middle Ye Ywar Hydropower project area

Calotes versicolar

Calotes emma

Fejervarya limnocharia limnocharis

Ahaetulla nasuta

Sphenomorphus sp

Indotestudo elongata

Plate 5. Herpet species recorded from Middle Ye Ywar Hydropower project area

Neptis hylas kamarupa

Graphium nomius swinhoei

Lassipa viraja virija

Papilio polytes romulus

Phalanta phalanta

Melanatis zitenius auletes

Plate 6. Insect species recorded from Middle Ye Ywar Hydropower project area

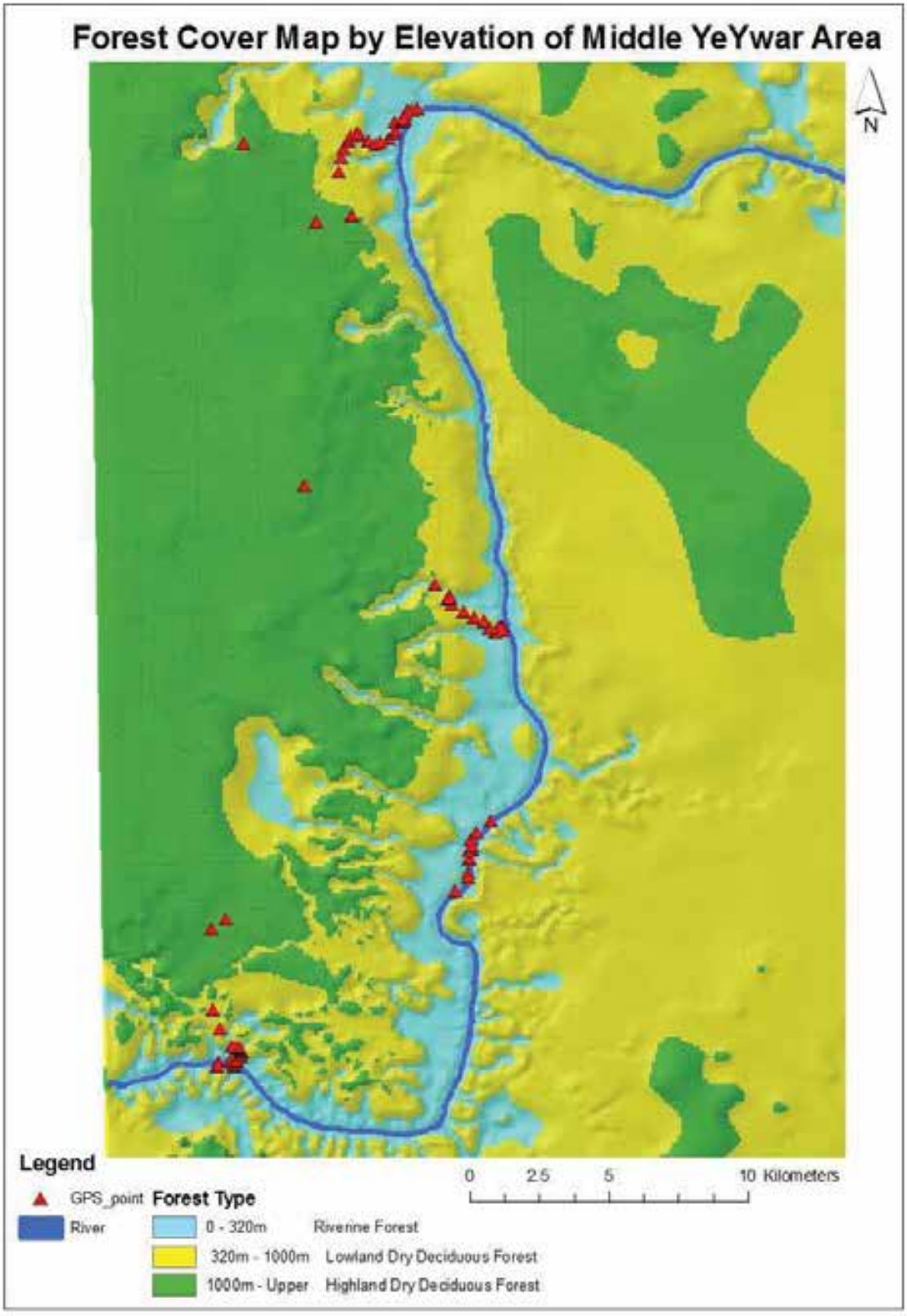
V. DISCUSSION AND CONCLUSION

The assessment was preliminary survey so that the existing environment in the direct impact zone (potential inundated area) had been studied. However for full environmental assessment, the indirect impact zone especially the catchment area of the river and the downstream ecology must be included. Because there may be the impacts in downstream especially the nutrient transport, the flow pattern of the river and dissolved oxygen concentration (DOC). Nutrient transport of the river is vital for both the aquatic organisms and river basin agriculture. It should be examined the threads to the forests in the catchment area since the maintainance of constant water level in the dam depend on the forest ecosystem services of the forests in the catchment area.

In the present survey, the tree species which are dominant in the riverine forest are *Eugenia densiflora* DC., *Schleichera oleosa* (Lour.) Oken, *Homonoia riparia* and *Crateva magna* (Lour.) DC.,. The 55% of the tree species are <40cm to 40-60cm in girth and <10m in height. This riverine forest is degraded due to logging. At present the illegal logging is practiced to get fire wood for the fuel of limestone kilns and brick kilns.

Some of the degraded indaing forest will be inundated after the dam is constructed. The loss of riverine forest may be seen in the photos of vegetation profile along the Dodtawaddy River.

Map III.


Forest Cover Map by Elevation of Middle YeYwar Area
N
0
2.5
5
10 Kilometers
Legend
GPS_point
River
Forest Type
0 - 320m
Riverine Forest
320m - 1000m
Lowland Dry Deciduous Forest
1000m - Upper
Highland Dry Deciduous Forest

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ANNEX 2B

Biodiversity Impact Assessment of Middle Yeywa Hydropower Project, Left Bank of Myitnge River

Biodiversity Impact Assessment of Middle Yeywa Hydropower Project, Left Bank of Myitnge River

Prepared By: The Myanmar Institute for Integrated Development (MIID)

14 September 2016

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1. INTRODUCTION

From March to May of 2015 and from September to October of the same year, stage one of the Environmental Impact Assessment (EIA) was conducted along the right bank of the Myitnge River in the project area of the Middle Yeywa Hydropower Project. In July and August of 2016 stage two of the EIA was conducted along the left bank of the Myitnge River using the same methodology. In both stages, the survey consisted of a series of point quadrants, line transects and wandering transects. Vegetation patterns and habitat types in each ecosystem were recorded. Habitats surveyed include, area along road sides, steep slopes of river banks and catchment areas. Data was collected via visual observations and supported by GPS positioning, photographs and taking physical specimens of plants and animals.

The following annex contains the findings from the left bank EIA and compares them to the findings from the right bank EIA. It is also important to note that the right bank EIA was conducted in dry season (March to May) and after rainy season (September to October) and the left bank EIA was conducted in rainy season. This allows for a better understanding of the change in vegetation coverage from season to season.

1.1. Objectives

The fieldwork conducted for the left bank EIA has four main objectives.

1. To collect and identify the plants and animal species in the area
2. To record the dominant tree species and evaluate the forest types
3. Compare data from the left bank and right bank EIA.
4. To assess the potential impacts and to suggest appropriate mitigation measures

1.2. Research Area, Topography and Surrounding Environs

The EIA research area falls between 22° 18' N to 21° 55' N Latitude and 96° 51' E to 96° 51' E longitude. This includes not only the proposed construction site of the dam but also the length of the dam reservoir. The elevation of the mountain ranges along the Myitnge River which comprise the catchment area is 1,000 meter in height. The river flows in a narrow V-shaped valley and has steep sloping banks. Therefore, the flooded area of the dam will be narrow and long, along the river. The catchment area is 10597.12 km2 and total flooded area is estimated to be approximately 1100 hectares. The normal pool level will be 320 masl. The river serves as the North Western boarder of Lawksawk Township. Consequently, the left bank EIA was conducted entirely in Lawksawk Township. Reserve forests in the Lawksawk total 473,293 acres. This includes North Lawksawk Reserve at 2,715 acres, Nantlan Reserve at 101,242 acres, Zawgyi Reserve at 153,156 acres, Indaw Reserve at 77,760 acres, Naung-Aoe Reserve at 46,720 acres and Naung-lone Reserve at 66,700 acres. (Source; Forest department)

The Lower Yeywa Dam is located 80.4 km downstream of the proposed Middle Yeywa HPP site. This dam was completed in 2010 and is currently in operation. The Upper Yeywa HPP is

currently under construction, 49.6 km upstream of the proposed Middle Yeywa HPP site. Therefore, the tail of Lower Yeywa Dam will reach to the Middle Yeywa Dam and the tail of Middle Yeywa dam will also reach close to the Upper Yeywa Dam.

The lowest elevation of the river in the studied area is 218 masl near Yae Twin Gyi Village and highest is 325 masl near Naung Cho Gyi Village. The Middle Yeywa project area exists in a monsoon climate with three distinct seasons, cool, hot and wet. The average annual rain fall is 1,312mm. The geology of the project area is lime stone covered by Terra-rosa soil. Terra-rosa soil is derived from the weathering of lime stone. It is red in colour and has the consistency of silty clay. It favours the growing of teak and *Dipterocarpus tuberculatus*.

2. MATERIALS AND METHODOLOGY

2.1. EIA Team

From an operational perspective the EIA team can be divided into two sub-teams, flora and fauna. The teams were accompanied by an International Research Coordinator, Bart Robertson.

Flora

(1) U Nyo Maung (Retired Professor), Taxonomist

(2) Dr.Win Myint (Associated Professor, ex.), Ecologist

(3) Dr. Ei Ei Phyoe, Taxonomist

(4) U Tun Thura, Botanist & GIS/RS

(5) U Thein Phyo Aung, Assistant Botanist

Fauna

(1) U Nay Myo Aung, Field leader, Mammal and Insect Specialist

(2) Saw Aung Kyaw Htet, Reptile and Amphibian Specialist

(3) U Htet Hlaing Oo, Bird Specialist

(4) Ko Zin Ko Latt, Fish Specialist

2.2. Methodology (Flora)

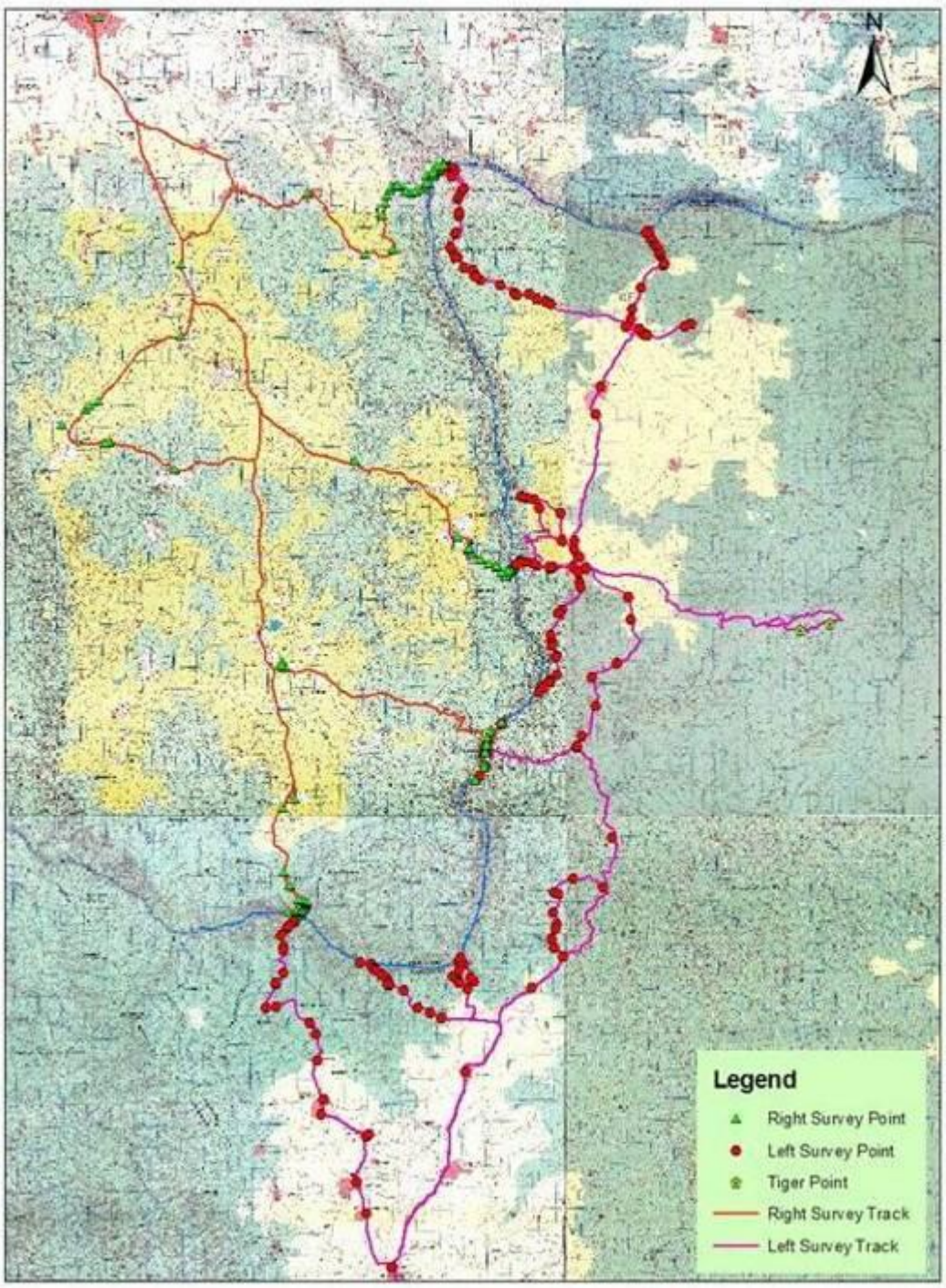
The EIA on the left bank of the river was divided into four research areas for the flora survey. Research area one includes the forested area close to the dam site near Phet Yin Kone Village. This is opposite to Yae Twin Gyi Village on the right bank. The lowest elevation of the river in this area is 218 masl. There were four study points in this area, namely near Kyauk Hson Village (opposite to Yae Twin Gyi), near the confluence of Nan-kan Stream and Myitnge Tu River, near Phet Yin Kone Village and near Naung Lone Reserve Forest.

Research area two includes the upstream portion of the river close to Nam Tu Bridge and its surrounding. The lowest elevation in this area is 270 masl. The third research area includes the portion of the river running North to South. This is upstream of Nam Tu Bridge and downstream of the confluence between Myitnge River and Gohteik Stream. The study points in this area are on the left bank opposite to Ma Gyi Yae Village, Meh Poke Village and Naung Lone Village.

The fourth research area includes the portion of the river running East to West upstream from the confluence of Myitnge River and Gohteik Stream and downstream of the Upper Yeywa HPP. The lowest elevation in this area is 325 masl. This is slightly above the estimated

elevation of the reservoir water level for the Middle Yeywa HPP. This means that the water level in the reservoir will not be higher than the existing water level in rainy season. The first study point in the area is near the confluence of Gohteik stream and MyitngeRiver. The second study point in this area is on the right side of the river opposite to Pone Na Sate Village.

Map 1: Left and Right Bank of Project Area Transect Walks



2.2.1. Sample Plotting

The flora team conducted a total of 38 sample plots on the left bank. The Global Positioning System (GPS) was used to navigate and mark the coordinates of the sample plots. Lists of

sample plots are given in the findings section of this report. In order to obtain essential data for predicting tree species composition in the forest and vegetation types, 20x20 and 30x30 meter quadrants were set up and tree species in the plots were recorded as well as total number (population) of each species and their circumference. In Bamboo forests, 30x30 meter quadrants were set up and bamboo species were recorded. The total clumps of each species were recorded. Species identification in the field was carried out by using keys to families of flowering plants and appropriate literature and later confirmed by matching with herbarium specimens of Department of Botany, University of Yangon. It is important to note that the water level in the Middle Yeywa Reservoir is anticipated to be 320 masl. As such, the team conducted several sample plots near 320 masl to understand the flora composition of the area that will be inundated if the project proceeds. As indicated in the map above, several transect walks and sample plots were taken directly across the river from where the right bank survey took place, allowing for more comparable data.

2.2.2. Random Transecting

To get representative checklists of flora species, specimen collection was also carried out by random transect lines along the banks of the river and between one sample plot and another wherever possible. Specimen collection was carried out within 10 meters of either sides of the transect line. Along the river, specimen collection was conducted from the edge of the water to the river bank to accurately capture the riverine forests. Much of the transecting was done below 320 masl to understand the flora composition of the area that will be inundated if the project proceeds.

2.2.3. Mapping

Location maps are based on Google Earth Map and UTM maps (UTM zone 47 N) coordinate system to determine the forests in the area.

2.2.4. Materials

Materials used for collecting data include strings for sample plotting and transecting, digital cameras, GPS, maps, heavy duty plastic bags, old newspapers, corrugated paper, alcohol, spray jug (for fixing specimens), 10x lens, permanent markers, field note books, field press, drying press and dryers.

2.2.5. Data Analysis

After the field survey, data entry was carried out in EXCEL. The IUCN Red List data version 2016.1 was compared to the collected data to identify any threatened species.

2.2.5.1. Population of Individual Tree Species (per hectare)

The population of species will show not only the composition of species but also the richness of the species in the study area. Data analysis used the following formula to determine the population of individual species per hectare.[1]

[1] This formula was developed by R.He'dl, M Sva'tek, M. Dancak, Rodzay A.W., M. Salleh A.B., Kamariah A.S.(2009)

$$\text{Population of Individual Species} = \frac{\text{Total Individual species}}{\text{Total Plots Area } (m^2)} \times 10000 m^2 (1ha)$$

2.2.5.2. Relative Density of Tree Species

The density of a species refers to the numerical representation of its individual and the availability of space in a unit area. The density index shows not only the richness of the species but also the relative distribution of the individuals. Data analysis used the following formula to determine the population of individual species per hectare. [2]

$$\text{Relative Density of Tree species} = \frac{\text{No. of Individual species}}{\text{Total no. of all individual Species}} \times 100$$

2.2.5.3. Relative Frequency of Tree Species

The relative frequency of a species refers to the percentage occurrence of its individuals and shows the frequency of different species growing in the study area. The species which fall in high frequency class can be considered as the most common species in the study area. According to Curtis (1959), the relative frequency is determined by the following formula.

$$\text{Relative frequency of Tree species} = \frac{\text{No. of sample plot occurs}}{\text{Total no. of all species occur}} \times 100$$

2.3. Methodology (Fauna)

The fauna team identified and recorded fauna species from the five main animal groups; mammals, birds, herpetiles, fishes and insects including other invertebrates. More detailed information on how data were collected on each of these animal groups is given in the following subsection. The fauna team travelled with the flora team, conducting the same transect walks noted in the map above. They also looked for locally caught wildlife in the local market (Kyauk Ku Market)[3] and at the fish caught by several fishermen along the river. The fauna team identified fauna species in the area using several methods. These include visual observation (VO) of the animals themselves and traces of the animal such as rubbings on trees or footprints. Voucher specimens (VS) were also a means of identification. This includes the whole animal itself in the case of insects and small animals (i.e. frogs, snakes, bats) and shed parts of animals such as skin or quills. The fauna team also conducted an interview survey (IS) with local hunters and fishermen to identify some species. A list of people interviewed is given below. Although this method was useful for identifying more commonly known species (i.e. king cobra, python, wild goats, leopards, certain fish, etc.), it should be noted that this method only indicates the possible existence of a given species' presence. Direct visual observations or collection of a voucher specimen by the fauna team confirm the presence of a given species in the area. Second-hand accounts are prone to human error and do not confirm the presence of a given species. The IUCN Red List data version

[2] This formula was developed by Curtis (1959).

[3] The team found no local wildlife being sold in Kyauk Ku Market. Fish sold in the market came from Yangon Region.

2016.1 was compared to the collected data to identify any threatened species. The list classifies species by conservation status. These are listed below in order of most to least severe.

Table 1: IUCN Red List Conservation Status[4]

Conservation Status	Abbreviation
Extinct	EX
Extinct in the Wild	EW
Critically Endangered	CR
Endangered	EN
Vulnerable	VU
Near Threatened	NT
Least Concern	LC
Data Deficient	DD
Not Evaluated	NE

2.3.1. People Interviewed

Interviewee	Village
U Tun Chaing	Kyauk Hson Village
U Sein Win	Kyauk Hson Village
U Myint Win	Phet Yin Kone Village
U Ba Win	Phet Yin Kone Village
Ko Kyaw Ye Aung	Phet Yin Kone Village
U Kyaw Lin	Phet Yin Kone Village
U Aik Lin	Ma Gyi Kone Village
U Ohn Lwin	Htaung Kham Village
U Shwe Than	Thazi Village

[4] No species were found in the survey with EX, EW or CR conservation status.

2.3.2. Data collection for each animal group

Mammals: Mammal data were recorded from four main methods, taking voucher specimens (VS) (for small mammals), visual observation (VO) (for monkeys, squirrels, that can be seen but are difficult to catch), collecting animal remains or observing the markings of animals (skin, footprints, animal rubbings on trees, porcupine quills, etc.). Mammal data were also recorded view interviews. During fieldwork, researchers used the 'Field guide to large mammals of Myanmar' as a reference.

Bird: Bird species were identified via visual observation (VO) as well as bird call recognition. During fieldwork, researchers used the 'Field guide book of Birds of Southeast Asia' as a reference.

Amphibians/Reptiles: The amphibians (frogs and toads, and salamanders) and reptiles were mainly collected via voucher specimens, and for some species that are well-known Pythons, king cobra etc.,) were identified via interview survey (IS).

Fish: Voucher specimens of fish were taken from the Myitnge River with the help of local fishermen, and some fish species that are well known, like snakehead or butterfish were identified via interview survey (IS). No locally caught fish were found in the local markets.

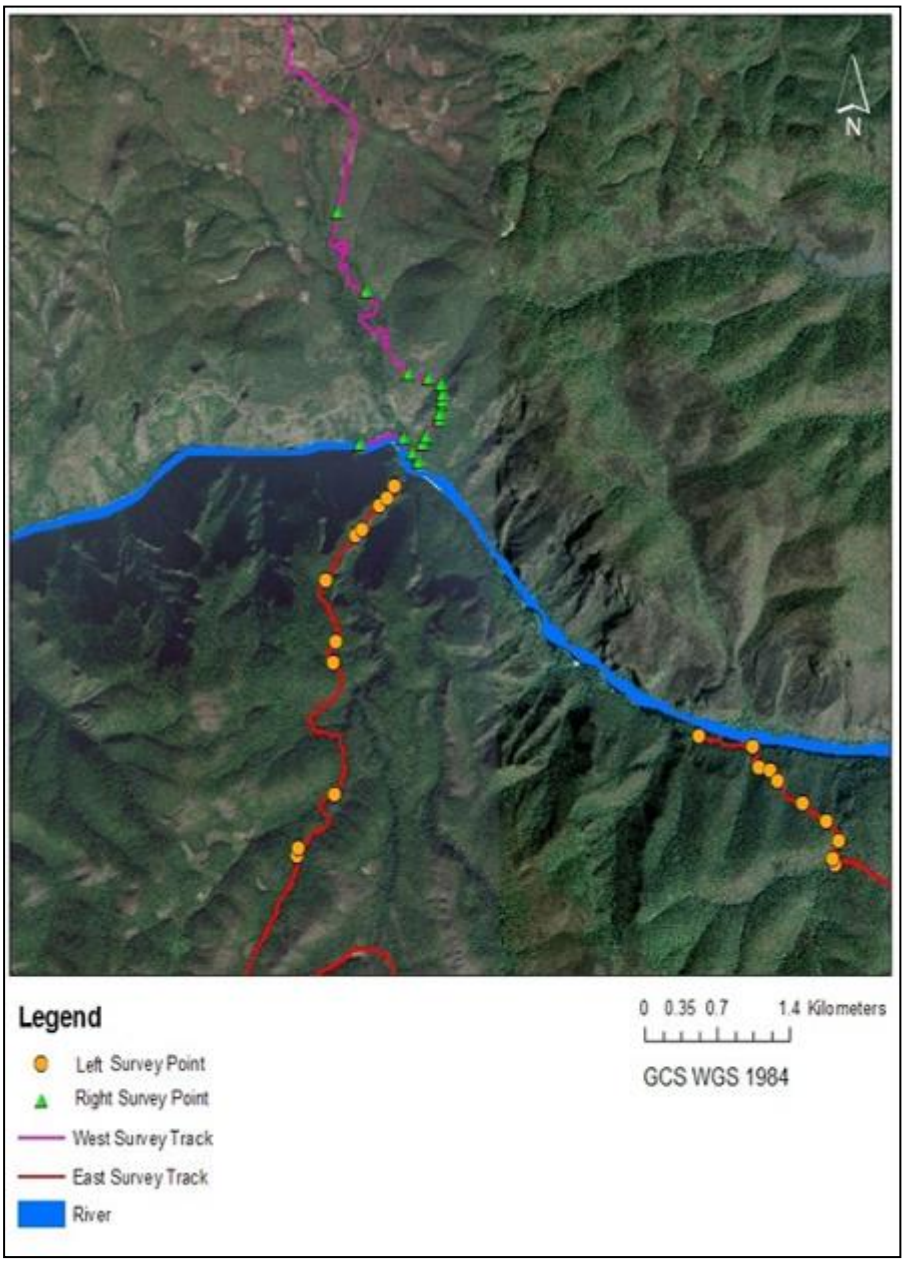
Insect and other invertebrates: Voucher specimens were taken of insects and other invertebrates. Some species were also identified via visual observation.

3. FLORA

As previously discussed in the methodology section, the fauna team divided the research area into four parts. Consequently, the 'Findings Flora' section below is also divided into four sections. Each section provides information regarding the flora species present in its respective research area including, total fauna species, a comparison of left bank and right bank species, detailed information on tree, orchid, mushroom and bamboo species and a list of species found on the IUCN Red List.

3.1 Research Area One

Map 2: Research Area One



Map 3: Reservoir Elevation Line

(Right Bank Forest)

(Left Bank Forest)

3.1.1. Quadrant Location and Vegetation Type

A total of 10 sample plots were taken on the left bank, research area one. In each plot the vegetation type was Indine Forest. A summary of the sample plots is given below.

Table 2: Research Area One Sample Plots

No.	Sample Quadrant	Vegetation type	Latitude/Longitude	Altitude(m)	Dominant species
1	KGQ I	Indine Forest	N21 56 16.2 E96 55 04.6	368	*Shorea obtusa* Wall., *Shorea siamensis*(Kurz)Miq., *Buchanania latifolia* Roxb.,
2	KGQ II	Indine Forest	N21 56 15.6 E96 55 08.1	409	

3	KGQ III	Indine Forest	N21 56 12.7 E96 55 10.5	455	*Dalbergia oliveri* Gamble, *Emblica officinalis* Gaertn., *Terminalia alata* (Heyne) Roth, *Dipterocarpus tuberculatus* Roxb., *Tectona grandis* L. f., *Bridelia retusa* (L.) A. Juss., *Phyllanthus emblica* L., *Schrebera swietenioides* Roxb., *Spondias pinnata* (L. f.) Kurz., *Lagerstroemia villosa* Wall. ex Kurz
4	KGQ IV	Indine & Bamboo Forest	N21 55 56.9 E96 55 29.5	624	
5	KGQ V	Indine Forest	N21 56 17.6 E96 57 14.8	390	
6	KGQ VI	Indine & Bamboo Forest	N21 56 12.0 E96 57 13.1	465	
7	KGQ VII	Indine & Bamboo Forest	N21 56 00.2 E96 57 08.9	600	
8	KGQ X	Indine Forest	N21 57 05.0 E96 52 49.3	928	
9	KGQ XI	Indine Forest	N21 57 18.3 E96 53 00.6	691	
10	KGQ XII	Indine Forest	N21 57 14.9 E96 59 36.6	732	

3.1.2. Flora Species on Left and Right Banks

A total of 318 species were identified on both left and right banks combined. 161 of these species were found only on the left bank while 58 of these species were found only on the right bank. One-hundred of these species were found on both banks.

Table 3: Flora Species in Left Bank Research Area One

No.	Scientific Name	Common Name	Family Name	Habit
1	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	S
2	*Acacia catechu* Willd.	Sha	Mimosaceae	T
3	*Acacia intsia* Willd.	Su-bok	Mimosaceae	CL
4	*Acacia pennata* (L.)Willd.	Su-yit	Mimosaceae	CL
5	*Adiantum latifolium*	Not known	Pteridaceae	F
6	*Aegiceras corniculatum* (L.) Blanco	Bu-ta-let	Myrsinaceae	ST
7	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	H
8	*Albizia procera* (Roxb.) Benth.	Thit-phyu	Mimosaceae	T
9	*Alocasia macrorrhizos*	Pein-gyi	Araceae	H
10	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae	ST
11	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	H
12	*Amalocalyx microlobus*	Not known	Apocynaceae	CL
13	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae	H
14	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae	H
15	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae	H
16	*Ampelocissus barbata* Planch.	Not known	Vitaceae	CL
17	*Anogeissus acuminata* Wall.	Yon	Combretaceae	T
18	*Antidesma bunius*	Kin-ba-lin	Euphorbiaceae	S
19	*Aporusa dioica* (Roxb.) Mull.Arg.	Thit-khauk	Euphorbiaceae	ST
20	*Argyreia nervosa*	Ka-zun-nwee	Convolvulaceae	CL
21	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	CL
22	*Artemisia vulgaris*	Not known	Asteraceae	H
23	*Artocarpus lakoocha*	Taung-pein-ne	Moraceae	T
24	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae	CL
25	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae	H
26	*Atalantia monopyhlla* A.DC.	Yin-kya\ Taw shuk-kha	Rutaceae	ST
27	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae	Mu

No.	Scientific Name	Common Name	Family Name	Habit
28	*Bambusa teres* Buch.-Ham. ex Wall.	Ta-bin-taing-wa	Poaceae	B
29	*Bambusa tulda* Roxb.	Theik-wa	Poaceae	B
30	*Barleria strigosa* Willd.	Not known	Acanthaceae	H
31	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae	CL
32	*Bauhinia ornata* Kurz	Myauk-hle-ga	Caesalpiniaceae	CL
33	*Bauhinia racemosa* Lam.	Pha-lan/Hta-la	Caesalpiniaceae	ST
34	*Bauhinia* sp.	Swe-daw-thay	Caesalpiniaceae	CL
35	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae	H
36	*Bidens pilosa*	Hmwe-sok	Asteraceae	H
37	*Bischofia javanica*	Ye-pa-done	Euphorbiaceae	T
38	*Bliospermum axillare* Blume	Hnut-cho	Euphorbiaceae	S
39	*Blumea balsamifera* (L.) DC.	Phon-ma-thein	Asteraceae	ST
40	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	H
41	*Bombax ceiba* L.	Let-pan	Bombacaceae	T
42	*Brachycorythis galeandra* (Rchb.f.) Summerh.	Not known	Orchidaceae	E
43	*Brachycorythis helferi* (Rchb.f.) Summerh.	Not known	Orchidaceae	E
44	*Bridelia retusa* (L.) A. Juss.	Myauk-zi/Seik-chi	Euphorbiaceae	T
45	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae	T
46	*Butea parviflora* L.	Pauk-home	Fabaceae	CL
47	*Butea superba* Roxb.	Pauk-nwee	Fabaceae	CL
48	*Callicarpa formosana*	Not known	Verbenaceae	ST
49	*Cananga latifolia*	Not known	Annonaceae	T
50	*Canavalia cathartica*	Not known	Fabaceae	CL
51	*Cantharellus aurantiacus* (Wulf.)Fr.	Not known	Cantharelleae	Mu
52	*Canthium parvifolium* Roxb.	Say-than-baya	Rubiaceae	ST
53	*Carex brizoides* L.	Taw-kyet-le-hlee	Cyperaceae	H
54	*Cassia fistula* L.	Ngu	Caesalpiniaceae	T
55	*Castanopsis diversifolia* King	Pa-phyu/Castanopsis	Fagaceae	T
56	*Celastrus monospermus* Roxb.	Not known	Celastracae	CL
57	*Chamaesyce thymifolia*	Not known	Euphorbiaceae	H
58	*Chenopodium acuminatum* subsp. *virgatum*	Not known	Chenopodiaceae	H
59	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	S
60	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	ST
61	*Cinnamomum parthenoxylon* Meissner	Ka-ra-way-yaing	Lauraceae	T
62	*Cissus discolor* Blume	Wa-yaung-chin	Vitaceae	CL
63	*Claoxylon indicum* Hassk.	Not known	Euphorbiaceae	S
64	*Clerodendrum serratum* L.	Yin-bya-net	Verbenaceae	S
65	*Clerodendrum villosum* Blume	Phet-kha	Verbenaceae	S
66	*Clitocybe caespitosa* Pk.	Wa-yin-hmo	Tricholomataceae	Mu
67	*Codonopsis lanceolata*	Ba-la-cheik	Campanulaceae	CL
68	*Colocasia esculenta*	Pein-yaing	Araceae	H

No.	Scientific Name	Common Name	Family Name	Habit
69	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae	ST
70	*Commelina diffusa* Burm.f.	Myet-kyut	Commelinaceae	H
71	*Coprinus disseminatus*	Not known	Psathyrellaceae	Mu
72	*Coprinus plicatilis* (Curt.) Fr.	Not known	Psathyrellaceae	Mu
73	*Costus specious* Sm.	Pha-lan-taung-hmwe	Costaceae	H
74	*Crassocephalum crepidioides*	Pan-zauk-htoe	Asteraceae	H
75	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae	ST
76	*Cratoxylum neriifolium* Kurz	Bae-bya	Hypericaceae	ST
77	*Cratoxylum polyanthum*Korth.	Bae-bya	Hypericaceae	ST
78	*Crotalaria multiflora* L.	Taw-paik-san	Fabaceae	H
79	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	ST
80	*Curculigo orchioides* Gaertn.	Kywet-ma-lut-ohn	Hypoxidaceae	H
81	*Curcuma longa* L.	Na-nwin	Zingiberaceae	H
82	*Curcuma petiolata* Roxb.	Ma-lar	Zingiberaceae	H
83	*Cycas siamensis* Miq.	Mon-daing	Cycadaceae	ST
84	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae	E
85	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	G
86	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	T
87	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	ST
88	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	T
89	*Desmodium rufihirsutum* Craib	Not known	Fabaceae	S
90	*Desmodium triangulare* (Retz.) Merr.	Not known	Fabaceae	S
91	*Desmodium umbellatum* DC.	Kyee-hmi-apho	Fabaceae	S
92	*Dichrocephala integrifolia* (L.f.)Kuntze	Not known	Asteraceae	H
93	*Dillenia indica* L.	Tha-byu	Dilleniaceae	T
94	*Dillenia parviflora* Griff.	Phet-set/Zin-byun	Dilleniaceae	ST
95	*Dioscorea alata*	Myauk-u	Dioscoreaceae	CL
96	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	CL
97	*Dioscorea cylindrica* Burm.	Kyway-thon-ywet	Dioscoreaceae	CL
98	*Dioscorea pentaphylla* L.	Kyway-ngar-ywet	Dioscoreaceae	CL
99	*Dioscorea sativa* L.	Kyauk-yin-nwee	Dioscoreaceae	CL
100	*Diospyros kaki* L.f.	Tae	Ebenaceae	T
101	*Dipterocarpus tuberculatus* Roxb.	In	Dipterocarpaceae	T
102	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	F
103	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	T
104	*Dunbaria punctata*	Not known	Fabaceae	CL
105	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae	T
106	*Elaeocarpus hainanensis* Oliv	Not known	Elaeocarpaceae	T
107	*Elatostema reticulatum*	Wet-sa	Urticaceae	H
108	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	G
109	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae	ST

No.	Scientific Name	Common Name	Family Name	Habit
110	*Engelhardtia spicata*	Pan-swe-le	Juglandaceae	T
111	*Entada scandens* Benth.	Doe-nwee	Mimosaceae	CL
112	*Equisetum hyemale*	Not known	Equisetaceae	H
113	*Erythrina stricta* Roxb.	Ka-di\Ka-thit	Fabaceae	T
114	*Eugenia balsama* Wight	Ye-tha-bye	Myrtaceae	T
115	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae	T
116	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae	H
117	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae	H
118	*Ficus auriculata*	Sin-tha-phan	Moraceae	T
119	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae	T
120	*Ficus hispida* L.	Kha-aung	Moraceae	ST
121	*Ficus pumila* L.	Kyauk-kat-nyaung	Moraceae	CL
122	*Ficus racemosa*	Not known	Moraceae	T
123	*Ficus semicordata*	Ka-dut	Moraceae	T
124	*Ficus variegate*	Kon-tha-phan	Moraceae	T
125	*Fimbristylis sieboldii*	Not known	Cyperaceae	H
126	*Flacourtia cataphracta* Roxb.	Na-ywe	Flacourtiaceae	T
127	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae	ST
128	*Ganoderma australe*	Not known	Ganodermataceae	Mu
129	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae	ST
130	*Garuga pinnata* Roxb.	Chin-yoke	Burseraceae	T
131	*Globba patens*	Pa-dein-ngo	Zingiberaceae	H
132	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae	H
133	*Glochidion* sp.	Hta-min-sok	Euphorbiaceae	ST
134	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	T
135	*Gochnatia decora*	Not known	Asteraceae	ST
136	*Gonostegia hirta*	Not known	Rubiaceae	H
137	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	ST
138	*Grewia laevigata*	Not known	Tiliaceae	S
139	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	S
140	*Hedyotis auricularia*	Not known	Rubiaceae	H
141	*Helicia erratica* Hook. f.	Dauk-yat	Proteaceae	ST
142	*Helicteres angustifolia* L.	Not known	Sterculiaceae	S
143	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae	H
144	*Heteropanax fragrans* (Roxb. ex DC.) Seem.	Kyaung-dauk/La-ka-du	Araliaceae	ST
145	*Heterophragma adenophylla* (Wall.) Seem. ex Benth. & Hook.	Phet-than	Bignoniaceae	T
146	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae	ST
147	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	ST
148	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	S
149	*Hydrocotyle sibthorpioides* Thunb	Myin-khwa	Apiaceae	H
150	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-than	Rubiaceae	T

No.	Scientific Name	Common Name	Family Name	Habit
151	*Impatiens chinensis* L.	Dan-pan	Balsaminaceae	H
152	*Imperata cylindrica* (L.) P. Beauv.	Thet-kae	Poaceae	G
153	*Inonotus hispidus*	Not known	Hymenochaetaceae	Mu
154	*Jasminum multiflorum*	Taw-sa-bei	Oleaceae	S
155	*Kyllinga brevifolia*	Not known	Cyperaceae	H
156	*Lactarius volemus* Fr.	Not known	Russulaceae	Mu
157	*Lagerstroemia macrocarpa* Kurz	Pyin-ma-ywet-gyi	Lythraceae	T
158	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae	T
159	*Lagerstroemia villosa* Wall. ex Kurz	Zaung-palae	Lythraceae	T
160	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae	T
161	*Lantana camara* L.	Sein-na-pan	Verbenaceae	S
162	*Leea hirta* Banks	Na-ga-mauk-phyu	Leeaceae	S
163	*Leea macrophylla* Roxb.	Na-ga-mauk-gyi	Leeaceae	S
164	*Leea rubra*	Na-ga-mauk-ni	Leeaceae	S
165	*Lenzites betulina*	Not known	Polyporaceae	Mu
166	*Lepiota cristata*	Not known	Agaricaceae	Mu
167	*Litsea glutinosa*	On-don	Lauraceae	T
168	*Mallotus philippensis*	Taw-thi-din	Euphorbiaceae	T
169	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	T
170	*Markhamia stipulata* (Wall.) Seem. Ex K.Schum.	Ma-hlwa	Bignoniaceae	T
171	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae	T
172	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae	T
173	*Michelia baillonii* (Pierr)Finet & Gagnep.	Sa-ga-phyu	Magnoliaceae	T
174	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL
175	*Millettia extensa* Benth.	Win-u	Fabaceae	CL
176	*Millettia ovalifolia* Kurz	Thin-win-pho	Fabaceae	T
177	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
178	*Mitragyna rotundifolia* (Roxb.) Kuntze	Bin-ga	Rubiaceae	T
179	*Morus indica* L.	Po-sa	Moraceae	T
180	*Mucuna pruriens* (L.)DC.	Khwe-la-ya	Fabaceae	CL
181	*Murdannia bracteata*	Not known	Commelinaceae	H
182	*Musa* sp.	Taw-nga-pyaw	Musaceae	H
183	*Mussaenda calycina* Wall. ex Kurz	Pwint-tu-ywet-tu	Rubiaceae	ST
184	*Myriopteron paniculatum* Griff	Ti-lay-na-tha	Asclepiadaceae	CL
185	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae	H
186	*Operculina turpethum* (L.) Silva Mansa	Kyar-hin-nwee	Convolvulaceae	CL
187	*Oroxylum indicum* (L.)Kurz	Kyaung-sha	Bignoniaceae	ST
188	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae	H
189	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	B
190	*Panus tigrinus*	Not known	Polyporaceae	Mu
191	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae	CL

No.	Scientific Name	Common Name	Family Name	Habit
192	*Pennisetum purpureum*	Yon-sa-myet	Poaceae	G
193	*Peristylus affinis* (D.Don)Seidenf.	Not known	Orchidaceae	H
194	*Peristylus goodyeroides* (D.Don)Lindl.	Simidauk	Orchidaceae	H
195	*Persicaria odorata*	Kywe-hna-khaung-gyate	Polygonaceae	H
196	*Phaseolus velutina* Grah.	Pauk-net	Fabaceae	CL
197	*Phoenix loureiri* Kunth	Thin-baung	Arecaceae	ST
198	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae	H
199	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	ST
200	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	H
201	*Physalis minima* L.	Bauk-thi	Solanaceae	H
202	*Pilea scripta* Langtang	Phet-ya	Urticaceae	H
203	*Piper cubebe* L. f.	Peik-chin	Piperaceae	CL
204	*Pogostemon auricularius*	Not known	Lamiaceae	H
205	*Polyalthia viridis*	Not known	Annonaceae	T
206	*Polyporus ovinus* (Schaeff.)Fr.	Not known	Polyporaceae	Mu
207	*Pouzolzia zeylanica*	Not known	Urticaceae	H
208	*Premna amplectens* Wall	Yin-bya-phyu	Verbenaceae	S
209	*Pseuderanthemum polyanthum*	Not known	Acanthaceae	H
210	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	T
211	*Pterospermum acerifolium* (L.) Willd.	Taung-phet-wun	Sterculiaceae	T
212	*Pterospermum diversifolium*	Not known	Sterculiaceae	T
213	*Quercus mespilifolia* Wall.	Yin-gu	Fagaceae	T
214	*Randia uliginosa* DC.	Hman-ni	Rubiaceae	ST
215	*Rumex crispus* L.	Not known	Polygonaceae	H
216	*Rumex trisetiferus* Stokes	Not known	Polygonaceae	H
217	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	ST
218	*Sapium baccata*	Aw-le	Euphorbiaceae	T
219	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	T
220	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae	ST
221	*Scoparia dulcis* L.	Dana-thu-kha	Scrophulariaceae	H
222	*Selaginella willdenowii*	Not known	Selaginellaceae	F
223	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae	S
224	*Senna tora* (L.) Roxb	Dan-gwe	Caesalpiniaceae	S
225	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	T
226	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	T
227	*Sida rhombifolia* L.	Ta-byet-se-ywet-waing	Malvaceae	S
228	*Smilax aspericaulis* Wall ex A. D.C.	Sein-na-baw-thay	Smilacaceae	CL
229	*Smilax china* L.	Not known	Smilacaceae	CL
230	*Smilax macrophylla* Roxb.	Sein-na-baw-gyi	Smilacaceae	CL
231	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae	S
232	*Solanum verbascifolium*	Not known	Solanaceae	ST

No.	Scientific Name	Common Name	Family Name	Habit
233	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	T
234	*Stemona tuberosa*	Tha-mya	Stemonaceae	CL
235	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae	ST
236	*Sterculia villosa*	Shaw	Sterculiaceae	T
237	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	T
238	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	CL
239	*Strychnos nux-blanda* A.W.Hill	Kha-baung	Loganiaceae	ST
240	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae	T
241	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae	T
242	*Tectona grandis* L. f.	Kyun	Verbenaceae	T
243	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	T
244	*Terminalia chebula* Retz.	Phan-kha	Combretaceae	T
245	*Terminalia tripteroides* Craib	Than-bae	Combretaceae	T
246	*Termitomyces albuminosa*	Taung-po-hmo	Agaricaceae	Mu
247	*Tetrastigma leucostaphylum*	Not known	Vitaceae	CL
248	*Thespesia lampas* Dalzell & A.Gibson	Taw-wa	Malvaceae	S
249	*Thunbergia fragrans* Roxb.	Pan-ye-sut	Acanthaceae	CL
250	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae	B
251	*Trema orientalis* (L.) Blume	Khwe-sha	Ulmaceae	ST
252	*Triumfetta bartramia* L.	Kat-se-nae-thay	Tiliaceae	S
253	*Urena sinuata*	Kat-se nae-gyi	Malvaceae	S
254	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae	ST
255	*Verpa cornica*	Not known	Morchellaceae	Mu
256	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	ST
257	*Vitex vestita* Wall.	Tauk-sha	Verbenaceae	ST
258	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	ST
259	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae	ST
260	*Xylia xylocarpa* (Roxb.) Taub.	Pyin-ka-doe	Mimosaceae	T
261	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	ST
B=Bamboo,CL=Climber,E=Epiphyte,F=Fern, G=Grass,H=Herbs,Mu=Mushroom,S=Shrubs,ST=Small Tree, T=Tree				

Table 4: Right Bank and Left Bank Species

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
1	*Abelmoschus esculentus*	Not known	Malvaceae	√	
2	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	√	√
3	*Acacia catechu* Willd.	Sha	Mimosaceae		√
4	*Acacia intsia* Willd.	Su-bok	Mimosaceae		√
5	*Acacia pennata* (L.)Willd.	Su-yit	Mimosaceae		√
6	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae	√	
7	*Adiantum latifolium*	Not known	Pteridaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
8	*Adiantum peruvianum*	Not known	Pteridaceae	√	
9	*Aegiceras corniculatum* (L.) Blanco	Bu-ta-let	Myrsinaceae		√
10	*Aeginetia indica* L.	Kauk-hlaing-di	Orobanchaceae	√	
11	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	√	√
12	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae	√	
13	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	√	
14	*Albizia procera* (Roxb.) Benth.	Thit-phyu	Mimosaceae		√
15	*Alocasia macrorrhizos*	Pein-gyi	Araceae		√
16	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae		√
17	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	√	√
18	*Alysicarpus vaginalis* (L.) Dc.	Than-ma-naing-kyauk-ma-naing	Fabaceae	√	
19	*Amalocalyx microlobus*	Not known	Apocynaceae		√
20	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae	√	√
21	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae	√	√
22	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae	√	√
23	*Ampelocissus barbata* Planch.	Not known	Vitaceae		√
24	*Anogeissus acuminata* Wall.	Yon	Combretaceae		√
25	*Antidesma bunius*	Kin-ba-lin	Euphorbiaceae		√
26	*Aporusa dioica* (Roxb.) Mull.Arg.	Thit-khauk	Euphorbiaceae		√
27	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae	√	
28	*Argyreia nervosa*	Ka-zun-nwee	Convolvulaceae	√	√
29	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	√	√
30	*Artemisia vulgaris*	Not known	Asteraceae	√	√
31	*Artocarpus lakoocha*	Taung-pein-ne	Moraceae		√
32	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae	√	√
33	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae		√
34	*Atalantia monopyhlla* A.DC.	Yin-kya\ Taw shuk-kha	Rutaceae		√
35	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae		√
36	*Bambusa bambos*(L.)Voss.	Kya-khat-wa	Poaceae	√	
37	*Bambusa teres* Buch.-Ham. ex Wall.	Ta-bin-taing-wa	Poaceae		√
38	*Bambusa tulda* Roxb.	Theik-wa	Poaceae		√
39	*Barleria strigosa* Willd.	Not known	Acanthaceae	√	√
40	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae	√	√
41	*Bauhinia ornata* Kurz	Myauk-hle-ga	Caesalpiniaceae		√
42	*Bauhinia racemosa* Lam.	Pha-lan/Hta-la	Caesalpiniaceae		√
43	*Bauhinia* sp.	Swe-daw-thay	Caesalpiniaceae	√	√
44	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae		√
45	*Bidens pilosa*	Hmwe-sok	Asteraceae	√	√
46	*Bischofia javanica*	Ye-pa-done	Euphorbiaceae	√	√
47	*Bliospermum axillare* Blume	Hnut-cho	Euphorbiaceae		√
48	*Blumea balsamifera* (L.) DC.	Phon-ma-thein	Asteraceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
49	*Boerhavia chinensis* (L.) Asch. & Schw.	Not known	Nyctaginaceae	√	
50	*Boerhavia diffusa* L.	Pa-yan-na-wa	Nyctaginaceae	√	
51	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae		√
52	*Bombax ceiba* L.	Let-pan	Bombacaceae	√	√
53	*Bombax insigne* Wall.	De-du	Bombacaceae	√	
54	*Brachycorythis galeandra* (Rchb.f.) Summerh.	Not known	Orchidaceae		√
55	*Brachycorythis helferi* (Rchb.f.) Summerh.	Not known	Orchidaceae		√
56	*Bridelia retusa* (L.) A. Juss.	Myauk-zi/Seik-chi	Euphorbiaceae		√
57	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae	√	√
58	*Buddleja asiatica* Lour	Not known	Buddlejaceae	√	
59	*Butea parviflora* L.	Pauk-home	Fabaceae		√
60	*Butea superba* Roxb.	Pauk-nwee	Fabaceae		√
61	*Callicarpa formosana*	Not known	Verbenaceae		√
62	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae	√	
63	*Cananga latifolia*	Not known	Annonaceae		√
64	*Canavalia cathartica*	Not known	Fabaceae	√	√
65	*Canscora diffusa* (Vahl) R.Br.	Kyauk-pan	Gentianaceae	√	
66	*Cantharellus aurantiacus* (Wulf.)Fr.	Not known	Cantharelleae		√
67	*Canthium parvifolium* Roxb.	Say-than-baya	Rubiaceae		√
68	*Carex brizoides* L.	Taw-kyet-le-hlee	Cyperaceae		√
69	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae	√	
70	*Cassia fistula* L.	Ngu	Caesalpiniaceae	√	√
71	*Castanopsis diversifolia* King	Pa-phyu/Castanopsis	Fagaceae		√
72	*Celastrus monospermus* Roxb.	Not known	Celastracae		√
73	*Centratherum punctatum*	Not known	Asteraceae	√	
74	*Chamaesyce hypericifolia*	Not known	Euphorbiaceae	√	
75	*Chamaesyce thymifolia*	Not known	Euphorbiaceae		√
76	*Chenopodium acuminatum* subsp. *virgatum*	Not known	Chenopodiaceae		√
77	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	√	√
78	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	√	√
79	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae	√	
80	*Cinnamomum parthenoxylon* Meissner	Ka-ra-way-yaing	Lauraceae		√
81	*Cissus discolor* Blume	Wa-yaung-chin	Vitaceae	√	√
82	*Cissus hastata* Miq.	Sa-pyit-yaing	Vitaceae	√	
83	*Claoxylon indicum* Hassk.	Not known	Euphorbiaceae		√
84	*Clerodendrum serratum* L.	Yin-bya-net	Verbenaceae	√	√
85	*Clerodendrum villosum* Blume	Phet-kha	Verbenaceae		√
86	*Clitocybe caespitosa* Pk.	Wa-yin-hmo	Tricholomataceae	√	√
87	*Codonopsis lanceolata*	Ba-la-cheik	Campanulaceae		√
88	*Colocasia esculenta*	Pein-yaing	Araceae	√	√
89	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
90	*Combretum alfredii* Hance	Not known	Combretaceae	√	
91	*Commelina diffusa* Burm.f.	Myet-kyut	Commelinaceae		√
92	*Coprinus disseminatus*	Not known	Psathyrellaceae		√
93	*Coprinus plicatilis* (Curt.) Fr.	Not known	Psathyrellaceae		√
94	*Costus speciosus* Sm.	Pha-lan-taung-hmwe	Costaceae		√
95	*Crassocephalum crepidioides*	Pan-zauk-htoe	Asteraceae		√
96	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae		√
97	*Cratoxylum neriifolium* Kurz	Bae-bya	Hypericaceae		√
98	*Cratoxylum polyanthum*Korth.	Bae-bya	Hypericaceae		√
99	*Crotalaria multiflora* L.	Taw-paik-san	Fabaceae	√	√
100	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	√	√
101	*Curculigo orchioides* Gaertn.	Kywet-ma-lut-ohn	Hypoxidaceae		√
102	*Curcuma longa* L.	Na-nwin	Zingiberaceae		√
103	*Curcuma petiolata* Roxb.	Ma-lar	Zingiberaceae		√
104	*Curcuma* sp.	Mar-la	Zingiberaceae	√	
105	*Cycas siamensis* Miq.	Mon-daing	Cycadaceae		√
106	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae		√
107	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	√	√
108	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	√	√
109	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	√	√
110	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	√	√
111	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	√	
112	*Dendrophthoe pentandra* (L.) Miq.	Kyi-paung	Loranthaceae	√	
113	*Desmodium gangeticum* L.	Not known	Fabaceae	√	
114	*Desmodium pulchellum* Benth.	Taung-damin	Fabaceae	√	
115	*Desmodium rufihirsutum* Craib	Not known	Fabaceae	√	√
116	*Desmodium triangulare* (Retz.) Merr.	Not known	Fabaceae		√
117	*Desmodium triflorum*	Not known	Fabaceae	√	
118	*Desmodium umbellatum* DC.	Kyee-hmi-apho	Fabaceae	√	√
119	*Dichrocephala integrifolia* (L.f.)Kuntze	Not known	Asteraceae		√
120	*Dillenia indica* L.	Tha-byu	Dilleniaceae		√
121	*Dillenia parviflora* Griff.	Phet-set/Zin-byun	Dilleniaceae		√
122	*Dioscorea alata*	Myauk-u	Dioscoreaceae	√	√
123	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	√	√
124	*Dioscorea cylindrica* Burm.	KYwary-thon-ywet	Dioscoreaceae	√	√
125	*Dioscorea pentaphylla* L.	KYwary-ngar-ywet	Dioscoreaceae	√	√
126	*Dioscorea sativa* L.	Kyauk-yin-nwee	Dioscoreaceae	√	√
127	*Diospyros kaki* L.f.	Tae	Ebenaceae	√	√
128	*Dipterocarpus tuberculatus* Roxb.	In	Dipterocarpaceae		√
129	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	√	√
130	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
131	*Dunbaria punctata*	Not known	Fabaceae	√	√
132	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae	√	√
133	*Elaeocarpus hainanensis* Oliv	Not known	Elaeocarpaceae		√
134	*Elatostema reticulatum*	Wet-sa	Urticaceae		√
135	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	√	√
136	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae	√	√
137	*Engelhardtia spicata*	Pan-swe-le	Juglandaceae		√
138	*Entada scandens* Benth.	Doe-nwee	Mimosaceae		√
139	*Equisetum hyemale*	Not known	Equisetaceae		√
140	*Erythrina stricta* Roxb.	Ka-di\Ka-thit	Fabaceae	√	√
141	*Eugenia balsama* Wight	Ye-tha-bye	Myrtaceae		√
142	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae	√	√
143	*Euphorbia antiquorum* L.	Tazaung-gyi	Euphorbiaceae	√	
144	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae		√
145	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae		√
146	*Ficus auriculata*	Sin-tha-phan	Moraceae		√
147	*Ficus bengalensis* L.	Pyin-nyaung	Moraceae	√	
148	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae		√
149	*Ficus hispida* L.	Kha-aung	Moraceae	√	√
150	*Ficus pumila* L.	Creeping fig.	Moraceae	√	√
151	*Ficus racemosa*	Not known	Moraceae		√
152	*Ficus semicordata*	Ka-dut	Moraceae		√
153	*Ficus variegate*	Kon-tha-phan	Moraceae		√
154	*Fimbristylis sieboldii*	Not known	Cyperaceae		√
155	*Flacourtia cataphracta* Roxb.	Na-ywe	Flacourtiaceae		√
156	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae		√
157	*Gagea reticulata* (Pall.) Schult.	Not known	Liliaceae	√	
158	*Ganoderma australe*	Not known	Ganodermataceae		√
159	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae	√	√
160	*Garuga pinnata* Roxb.	Chin-yoke	Burseraceae		√
161	*Getonia floribunda* Roxb.	Kywet-nwee	Combretaceae	√	
162	*Globba patens*	Pa-dein-ngo	Zingiberaceae	√	√
163	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae		√
164	*Glochidion* sp.	Hta-min-sok	Euphorbiaceae		√
165	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	√	√
166	*Gochnatia decora*	Not known	Asteraceae	√	√
167	*Gonostegia hirta*	Not known	Rubiaceae		√
168	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	√	√
169	*Grewia laevigata*	Not known	Tiliaceae		√
170	*Habenaria chlorina* Par. & Rchb.f.	Not known	Orchidaceae	√	
171	*Habenaria hosseusii* Schltr.	Not known	Orchidaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
172	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae		√
173	*Hedyotis auricularia*	Not known	Rubiaceae		√
174	*Hedyotis diffusa*	Not known	Rubiaceae	√	
175	*Helicia erratica* Hook. f.	Dauk-yat	Proteaceae		√
176	*Helicteres angustifolia* L.	Not known	Sterculiaceae	√	√
177	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae		√
178	*Heteropanax fragrans* (Roxb. ex DC.) Seem.	Kyaung-dauk/La-ka-du	Araliaceae		√
179	*Heterophragma adenophylla* (Wall.) Seem. ex Benth. & Hook.	Phet-than	Bignoniaceae		√
180	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae	√	√
181	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	√	√
182	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	√	√
183	*Hydrocotyle sibthorpioides* Thunb	Myin-khwa	Apiaceae		√
184	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-than	Rubiaceae		√
185	*Impatiens chinensis* L.	Dan-pan	Balsaminaceae		√
186	*Imperata cylindrica* (L.) P. Beauv.	Thet-kae	Poaceae		√
187	*Indigofera tinctoria*	Me-yaing	Fabaceae	√	
188	*Inonotus hispidus*	Not known	Hymenochaetaceae		√
189	*Ipomoea cairica*	Ka-zun	Convolvulaceae	√	
190	*Ipomoea cordatotriloba*	Ka-zun	Convolvulaceae	√	
191	*Isachne albens* Trin.	Myet	Poaceae	√	
192	*Ischaemum ciliare*	Not known	Poaceae	√	
193	*Ischnoderma benzoinum*	Hmo	Fomitopsidaceae	√	
194	*Jasminum multiflorum*	Taw-sa-bei	Oleaceae		√
195	*Kyllinga brevifolia*	Not known	Cyperaceae		√
196	*Lactarius volemus* Fr.	Not known	Russulaceae		√
197	*Lagerstroemia macrocarpa* Kurz	Pyin-ma-ywet-gyi	Lythraceae		√
198	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae		√
199	*Lagerstroemia villosa* Wall. ex Kurz	Zaung-palae	Lythraceae		√
200	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae	√	√
201	*Lantana camara* L.	Sein-na-pan	Verbenaceae		√
202	*Leea hirta* Banks	Na-ga-mauk-phyu	Leeaceae		√
203	*Leea macrophylla* Roxb.	Na-ga-mauk-gyi	Leeaceae		√
204	*Leea rubra*	Na-ga-mauk-ni	Leeaceae		√
205	*Lenzites betulina*	Not known	Polyporaceae		√
206	*Lepiota cristata*	Not known	Agaricaceae		√
207	*Litsea glutinosa*	On-don	Lauraceae		√
208	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	√	
209	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae	√	
210	*Mallotus philippensis*	Taw-thi-din	Euphorbiaceae		√
211	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae		√
212	*Markhamia stipulata* (Wall.) Seem. Ex K.Schum.	Ma-hlwa	Bignoniaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
213	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae	√	√
214	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae		√
215	*Michelia baillonii* (Pierr)Finet & Gagnep.	Sa-ga-phyu	Magnoliaceae		√
216	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae		√
217	*Millettia extensa* Benth.	Win-u	Fabaceae		√
218	*Millettia ovalifolia* Kurz	Thin-win-pho	Fabaceae	√	√
219	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	√	√
220	*Mitragyna rotundifolia* (Roxb.) Kuntze	Bin-ga	Rubiaceae		√
221	*Morus indica* L.	Po-sa	Moraceae		√
222	*Mucuna pruriens* (L.)DC.	Khwe-la-ya	Fabaceae	√	√
223	*Murdannia bracteata*	Not known	Commelinaceae	√	√
224	*Musa* sp.	Taw-nga-pyaw	Musaceae		√
225	*Mussaenda calycina* Wall. ex Kurz	Pwint-tu-ywet-tu	Rubiaceae		√
226	*Myriopteron paniculatum* Griff	Ti-lay-na-tha	Asclepiadaceae	√	√
227	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae		√
228	*Ochna integerrima*	Indaing-seni	Ochnaceae	√	
229	*Operculina turpethum* (L.) Silva Mansa	Kyar-hin-nwee	Convolvulaceae		√
230	*Oroxylum indicum* (L.)Kurz	Kyaung-sha	Bignoniaceae	√	√
231	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae	√	√
232	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	√	√
233	*Paederia foetida*	Pe-bok-nwee-thay	Rubiaceae	√	
234	*Paederia scandens* Lour.	Pe-bok-nwee-gyi	Rubiaceae	√	
235	*Panus tigrinus*	Not known	Polyporaceae		√
236	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae		√
237	*Pennisetum purpureum*	Yon-sa-myet	Poaceae		√
238	*Peristylus affinis* (D.Don)Seidenf.	Not known	Orchidaceae		√
239	*Peristylus goodyeroides* (D.Don)Lindl.	Simidauk	Orchidaceae		√
240	*Persicaria odorata*	Kywe-hna-khaung-gyate	Polygonaceae		√
241	*Phaseolus sp.*	Not known	Fabaceae	√	
242	*Phaseolus velutina* Grah.	Pauk-net	Fabaceae	√	√
243	*Phoenix loureiri* Kunth	Thin-baung	Arecaceae		√
244	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae	√	√
245	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	√	√
246	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	√	√
247	*Physalis minima* L.	Bauk-thi	Solanaceae	√	√
248	*Pilea scripta* Langtang	Phet-ya	Urticaceae		√
249	*Piper cubebe* L. f.	Peik-chin	Piperaceae		√
250	*Pogostemon auricularius*	Not known	Lamiaceae	√	√
251	*Polyalthia viridis*	Not known	Annonaceae		√
252	*Polyporus ovinus* (Schaeff.)Fr.	Not known	Polyporaceae		√
253	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
254	*Pouzolzia zeylanica*	Not known	Urticaceae		√
255	*Premna amplectens* Wall	Yin-bya-phyu	Verbenaceae		√
256	*Pseuderanthemum polyanthum*	Not known	Acanthaceae		√
257	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	√	√
258	*Pterospermum acerifolium* (L.) Willd.	Taung-phet-wun	Sterculiaceae		√
259	*Pterospermum diversifolium*	Not known	Sterculiaceae	√	√
260	*Pycnoporus sanguineus*	Hmo	Polyporaceae	√	
261	*Quercus mespilifolia* Wall.	Yin-gu	Fagaceae		√
262	*Randia uliginosa* DC.	Hman-ni	Rubiaceae	√	√
263	*Rumex crispus* L.	Not known	Polygonaceae	√	√
264	*Rumex trisetiferus* Stokes	Not known	Polygonaceae	√	√
265	*Saccharum spontaneum* L.	Kaing	Poaceae	√	
266	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	√	√
267	*Sapium baccata*	Aw-le	Euphorbiaceae		√
268	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae	√	
269	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	√	√
270	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae	√	√
271	*Scoparia dulcis* L.	Dana-thu-kha	Scrophulariaceae	√	√
272	*Scurrula parasitica* L.	Kyi-paung	Loranthaceae	√	
273	*Selaginella willdenowii*	Not known	Selaginellaceae	√	√
274	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae		√
275	*Senna tora* (L.*)* Roxb	Dan-gwe	Caesalpiniaceae		√
276	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	√	√
277	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	√	√
278	*Sida rhombifolia* L.	Ta-byet-se-ywet-waing	Malvaceae		√
279	*Smilax aspericaulis* Wall ex A. D.C.	Sein-na-baw-thay	Smilacaceae		√
280	*Smilax china* L.	Not known	Smilacaceae		√
281	*Smilax macrophylla* Roxb.	Sein-na-baw-gyi	Smilacaceae		√
282	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae		√
283	*Solanum verbascifolium*	Not known	Solanaceae		√
284	*Spirogyra* sp.	Algae	Zygnemataceae	√	
285	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	√	√
286	*Stemona tuberosa*	Tha-mya	Stemonaceae	√	√
287	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae	√	√
288	*Sterculia villosa*	Shaw	Sterculiaceae	√	√
289	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	√	√
290	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	√	√
291	*Strychnos nux-blanda* A.W.Hill	Kha-baung	Loganiaceae	√	√
292	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae		√
293	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae		√
294	*Tectona grandis* L. f.	Kyun	Verbenaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
295	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	√	√
296	*Terminalia chebula* Retz.	Phan-kha	Combretaceae		√
297	*Terminalia tripteroides* Craib	Than-bae	Combretaceae		√
298	*Termitomyces albuminosa*	Taung-po-hmo	Agaricaceae		√
299	*Tetrastigma leucostaphylum*	Not known	Vitaceae		√
300	*Thespesia lampas* Dalzell & A.Gibson	Taw-wa	Malvaceae	√	√
301	*Thunbergia fragrans* Roxb.	Pan-ye-sut	Acanthaceae		√
302	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae		√
303	*Tithonia diversifolia* A. Gray	Nay-kyar-yaing	Asteraceae	√	
304	*Trema orientalis* (L.) Blume	Khwe-sha	Ulmaceae		√
305	*Triumfetta bartramia* L.	Kat-se-nae-thay	Tiliaceae		√
306	*Tylophora ovata*	Not known	Asclepiadaceae	√	
307	*Urena sinuata*	Kat-se nae-gyi	Malvaceae		√
308	*Utricularia caerulea*	Ye-bu-baung	Lentibulariaceae	√	
309	*Uvaria cordata* Schum. & Thonn.	Tha-but-gyi	Annonaceae	√	
310	*Vanda coerulescens* Griff.	Mo-lon-hmying-apyar-lay	Orchidaceae	√	
311	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae	√	√
312	*Verpa cornica*	Not known	Morchellaceae		√
313	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	√	√
314	*Vitex vestita* Wall.	Tauk-sha	Verbenaceae	√	√
315	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	√	√
316	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae		√
317	*Xylia xylocarpa* (Roxb.) Taub.	Pyin-ka-doe	Mimosaceae		√
318	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	√	√

3.1.3. Tree Species

A total of 37 tree species belonging to 34 genera were collected in the left bank research area one. The dominant tree species in this area are *Shorea obtusa* Wall. (Thit-ya) followed by *Shorea siamensis* (Kurz)Miq. (In-gyin) and *Buchanania latifolia* Roxb. (Lun-pho), *Dalbergia oliveri* Gamble (Ta-ma-lan), and *Emblica officinalis* Gaertn. (Sha-phyu).

Table 5: Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha (%)
1	*Albizia procera* (Roxb.) Benth.	2	2.17	0.36
2	*Anogeissus acuminata* Wall.	1	1.09	0.18
3	*Antidesma bunius*	2	2.17	0.36
4	*Bombax ceiba* L.	2	2.17	0.36
5	*Bridelia retusa* (L.) A. Juss.	12	13.04	2.17
6	*Buchanania latifolia* Roxb.	54	58.70	9.75

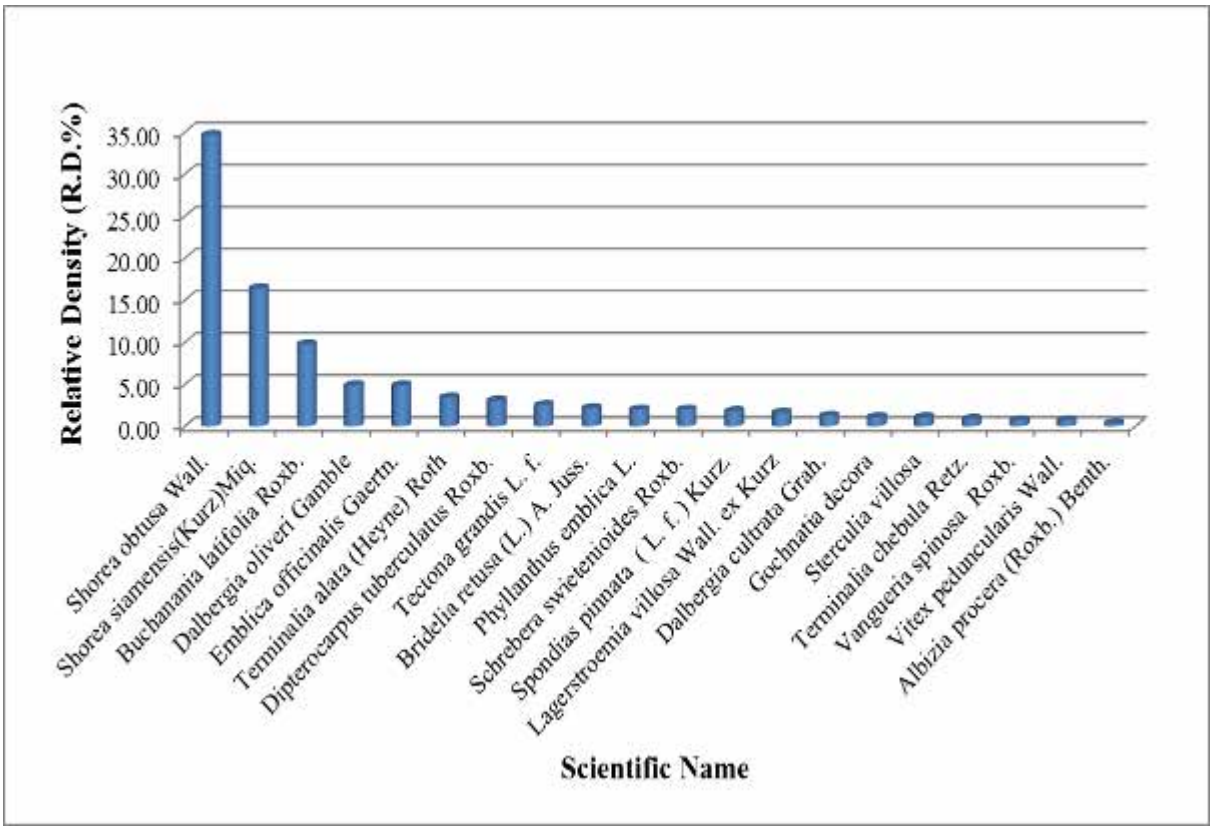
7	*Chukrasia velutina* Roem.	2	2.17	0.36
8	*Croton oblongifolius* Roxb.	2	2.17	0.36
9	*Dalbergia cultrata* Grah.	7	7.61	1.26
10	*Dalbergia oliveri* Gamble	27	29.35	4.87
11	*Dipterocarpus tuberculatus* Roxb.	17	18.48	3.07
12	*Emblica officinalis* Gaertn.	27	29.35	4.87
13	*Erythrina stricta* Roxb.	2	2.17	0.36
14	*Flacourtia cataphracta* Roxb.	2	2.17	0.36
15	*Flueggea leucopyrus* Willd	1	1.09	0.18
16	*Gochnatia decora*	6	6.52	1.08
17	*Grewia eriocarpa Juss.*	1	1.09	0.18
18	*Harrisonia perforata* Merr.	1	1.09	0.18
19	*Lagerstroemia villosa* Wall. ex Kurz	9	9.78	1.62
20	*Melanorrhoea usitata* Wall.	2	2.17	0.36
21	*Phyllanthus emblica* L.	11	11.96	1.99
22	*Pterocarpus indicus*Willd.	1	1.09	0.18
23	*Quercus mespilifolia* Wall.	1	1.09	0.18
24	*Schleichera oleosa* (Lour.) Oken	2	2.17	0.36
25	*Schrebera swietenioides* Roxb.	11	11.96	1.99
26	*Shorea obtusa* Wall.	192	208.70	34.66
27	*Shorea siamensis*(Kurz)Miq.	91	98.91	16.43
28	*Spondias pinnata* (L. f.) Kurz.	10	10.87	1.81
29	*Sterculia villosa*	6	6.52	1.08
30	*Syzygium grande* (Wight) Walp	2	2.17	0.36
31	*Tectona grandis* L. f.	14	15.22	2.53
32	*Terminalia alata* (Heyne) Roth	19	20.65	3.43
33	*Terminalia chebula* Retz.	5	5.43	0.90
34	*Vangueria spinosa* Roxb.	4	4.35	0.72
35	*Vitex peduncularis* Wall.	4	4.35	0.72
36	*Vitex vestita* Wall.	1	1.09	0.18
37	*Xylia xylocarpa* (Roxb.) Taub.	1	1.09	0.18
	Total	**554**	**602.17**	**100.00**

Among the sample plots species density per hectare varied. The highest density was observed *Shorea obtuse* Wall., *Shorea siamensis* (Kurz) Miq., *Buchanania latifolia* Roxb., *Dalbergia oliveri* Gamble and *Emblica officinalis* Gaertn., followed by *Terminalia alata* (Heyne) Roth, *Dipterocarpus tuberculatus* Roxb., and *Tectona grandis* L. f.. This shows that these eight species are abundant in this area.

Table 6: Tree Species Relative Density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Shorea obtusa* Wall.	19.2	34.66
2	*Shorea siamensis*(Kurz)Miq.	9.1	16.43
3	*Buchanania latifolia* Roxb.	5.4	9.75
4	*Dalbergia oliveri* Gamble	2.7	4.87
5	*Emblica officinalis* Gaertn.	2.7	4.87
6	*Terminalia alata* (Heyne) Roth	1.9	3.43
7	*Dipterocarpus tuberculatus* Roxb.	1.7	3.07
8	*Tectona grandis* L. f.	1.4	2.53
9	*Bridelia retusa* (L.) A. Juss.	1.2	2.17
10	*Phyllanthus emblica* L.	1.1	1.99
11	*Schrebera swietenioides* Roxb.	1.1	1.99
12	*Spondias pinnata* (L. f.) Kurz.	1	1.81
13	*Lagerstroemia villosa* Wall. ex Kurz	0.9	1.62
14	*Dalbergia cultrata* Grah.	0.7	1.26
15	*Gochnatia decora*	0.6	1.08
16	*Sterculia villosa*	0.6	1.08
17	*Terminalia chebula* Retz.	0.5	0.90
18	*Vangueria spinosa* Roxb.	0.4	0.72
19	*Vitex peduncularis* Wall.	0.4	0.72
20	*Albizia procera* (Roxb.) Benth.	0.2	0.36
21	*Antidesma bunius*	0.2	0.36
22	*Bombax ceiba* L.	0.2	0.36
23	*Chukrasia velutina* Roem.	0.2	0.36
24	*Croton oblongifolius* Roxb.	0.2	0.36
25	*Erythrina stricta* Roxb.	0.2	0.36
26	*Flacourtia cataphracta* Roxb.	0.2	0.36
27	*Melanorrhoea usitata* Wall.	0.2	0.36
28	*Schleichera oleosa* (Lour.) Oken	0.2	0.36
29	*Syzygium grande* (Wight) Walp	0.2	0.36
30	*Anogeissus acuminata* Wall.	0.1	0.18
31	*Flueggea leucopyrus* Willd	0.1	0.18
32	*Grewia eriocarpa Juss.*	0.1	0.18
33	*Harrisonia perforata* Merr.	0.1	0.18
34	*Pterocarpus indicus*Willd.	0.1	0.18
35	*Quercus mespilifolia* Wall.	0.1	0.18
36	*Vitex vestita* Wall.	0.1	0.18
37	*Xylia xylocarpa* (Roxb.) Taub.	0.1	0.18

Chart 1: Tree Species Relative Density



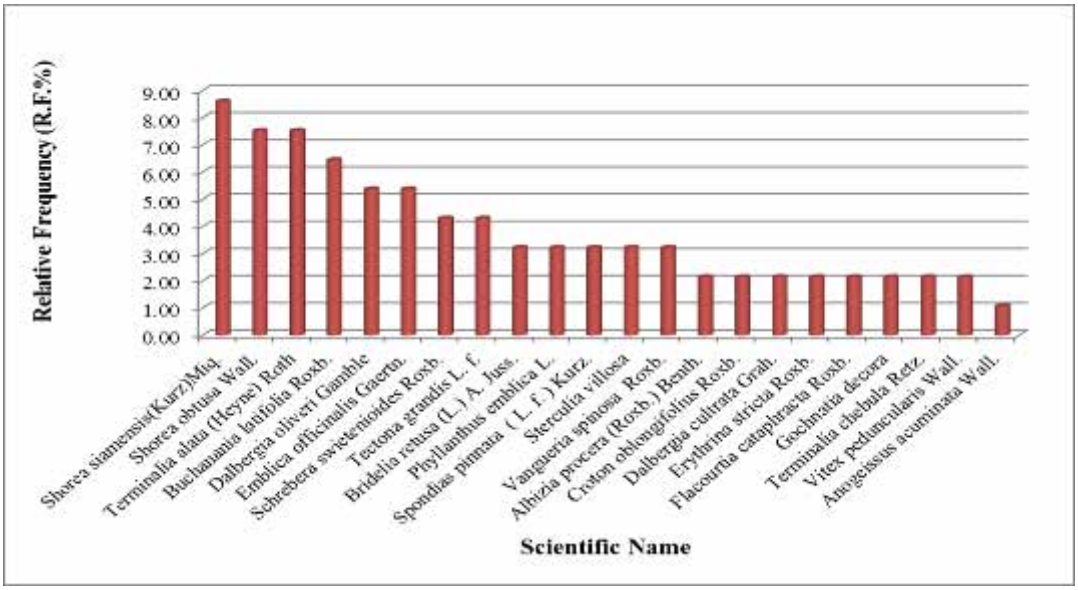
Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results**,** *Shorea siamensis* (Kurz) Miq., has the highest relative frequency value (9%) followed by *Shora obtuse* Wall and *Terminalia alata* (Heyne) Roth both at (8%), *Buchanania latifolia* Roxb. (6%) and *Dalbergia oliveri* Gamble and *Emblica officinalis* Gaertn. at (5%). These species are ubiquitous across the study area. The lower frequency of some species, such as *Anogeissus acuminata* Wall., *Lagerstroemia villosa* Wall. ex Kurz, and *Xylia xylocarpa* (Roxb.) Taub., are demarcated as rare species in the area.

Table 7: Tree Species Relative Frequency

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Shorea siamensis*(Kurz)Miq.	0.80	8.60
2	*Shorea obtusa* Wall.	0.70	7.53
3	*Terminalia alata* (Heyne) Roth	0.70	7.53
4	*Buchanania latifolia* Roxb.	0.60	6.45

5	*Dalbergia oliveri* Gamble	0.50	5.38
6	*Emblica officinalis* Gaertn.	0.50	5.38
7	*Schrebera swietenioides* Roxb.	0.40	4.30
8	*Tectona grandis* L. f.	0.40	4.30
9	*Bridelia retusa* (L.) A. Juss.	0.30	3.23
10	*Phyllanthus emblica* L.	0.30	3.23
11	*Spondias pinnata* (L. f.) Kurz.	0.30	3.23
12	*Sterculia villosa*	0.30	3.23
13	*Vangueria spinosa* Roxb.	0.30	3.23
14	*Albizia procera* (Roxb.) Benth.	0.20	2.15
15	*Croton oblongifolius* Roxb.	0.20	2.15
16	*Dalbergia cultrata* Grah.	0.20	2.15
17	*Erythrina stricta* Roxb.	0.20	2.15
18	*Flacourtia cataphracta* Roxb.	0.20	2.15
19	*Gochnatia decora*	0.20	2.15
20	*Terminalia chebula* Retz.	0.20	2.15
21	*Vitex peduncularis* Wall.	0.20	2.15
22	*Anogeissus acuminata* Wall.	0.10	1.08
23	*Antidesma bunius*	0.10	1.08
24	*Bombax ceiba* L.	0.10	1.08
25	*Chukrasia velutina* Roem.	0.10	1.08
26	*Dipterocarpus tuberculatus* Roxb.	0.10	1.08
27	*Flueggea leucopyrus* Willd	0.10	1.08
28	*Grewia eriocarpa Juss.*	0.10	1.08
29	*Harrisonia perforata* Merr.	0.10	1.08
30	*Lagerstroemia villosa* Wall. ex Kurz	0.10	1.08
31	*Melanorrhoea usitata* Wall.	0.10	1.08
32	*Pterocarpus indicus*Willd.	0.10	1.08
33	*Quercus mespilifolia* Wall.	0.10	1.08
34	*Schleichera oleosa* (Lour.) Oken	0.10	1.08
35	*Syzygium grande* (Wight) Walp	0.10	1.08
36	*Vitex vestita* Wall.	0.10	1.08
37	*Xylia xylocarpa* (Roxb.) Taub.	0.10	1.08

Chart 2: Tree Species Relative Frequency



3.1.4. Orchid Species

Peristylus affinis (D.Don) Seidenf.

Peristylus goodyeroides (D.Don) Lindl.

Table 8: Orchid Species

No.	Scientific Name	Common Name	Family Name
1	*Brachycorythis galeandra* (Rchb.f.) Summerh.	Not known	Orchidaceae
2	*Brachycorythis helferi* (Rchb.f.) Summerh.	Not known	Orchidaceae
3	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae
4	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae
5	*Peristylus affinis* (D.Don)Seidenf.	Not known	Orchidaceae
6	*Peristylus goodyeroides* (D.Don)Lindl.	Simidauk	Orchidaceae

3.1.5. Mushroom Species

Cantharellus aurantiacus (Wulf.)Fr. *Coprinus disseminates*

Table 9: Mushroom Species

No.	Scientific Name	Common Name	Family Name
1	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae
2	*Cantharellus aurantiacus* (Wulf.)Fr.	Not known	Cantharelleae
3	*Clitocybe caespitosa* Pk.	Wa-yin-hmo	Tricholomataceae
4	*Coprinus disseminatus*	Not known	Psathyrellaceae
5	*Coprinus plicatilis* (Curt.) Fr.	Not known	Psathyrellaceae
6	*Ganoderma australe*	Not known	Ganodermataceae
7	*Inonotus hispidus*	Not known	Hymenochaetaceae
8	*Lactarius volemus* Fr.	Not known	Russulaceae
9	*Lenzites betulina*	Not known	Polyporaceae
10	*Lepiota cristata*	Not known	Agaricaceae
11	*Panus tigrinus*	Not known	Polyporaceae
12	*Polyporus ovinus* (Schaeff.)Fr.	Not known	Polyporaceae
13	*Termitomyces albuminosa*	Taung-po-hmo	Agaricaceae
14	*Verpa cornica*	Not known	Morchellaceae

3.1.6. Bamboo Species

(Right Bank Bamboo Forest) *(Left Bank Bamboo Forest)*

Three species of Bamboo were identified on the left bank research area one. Their total population and relative density are given below.

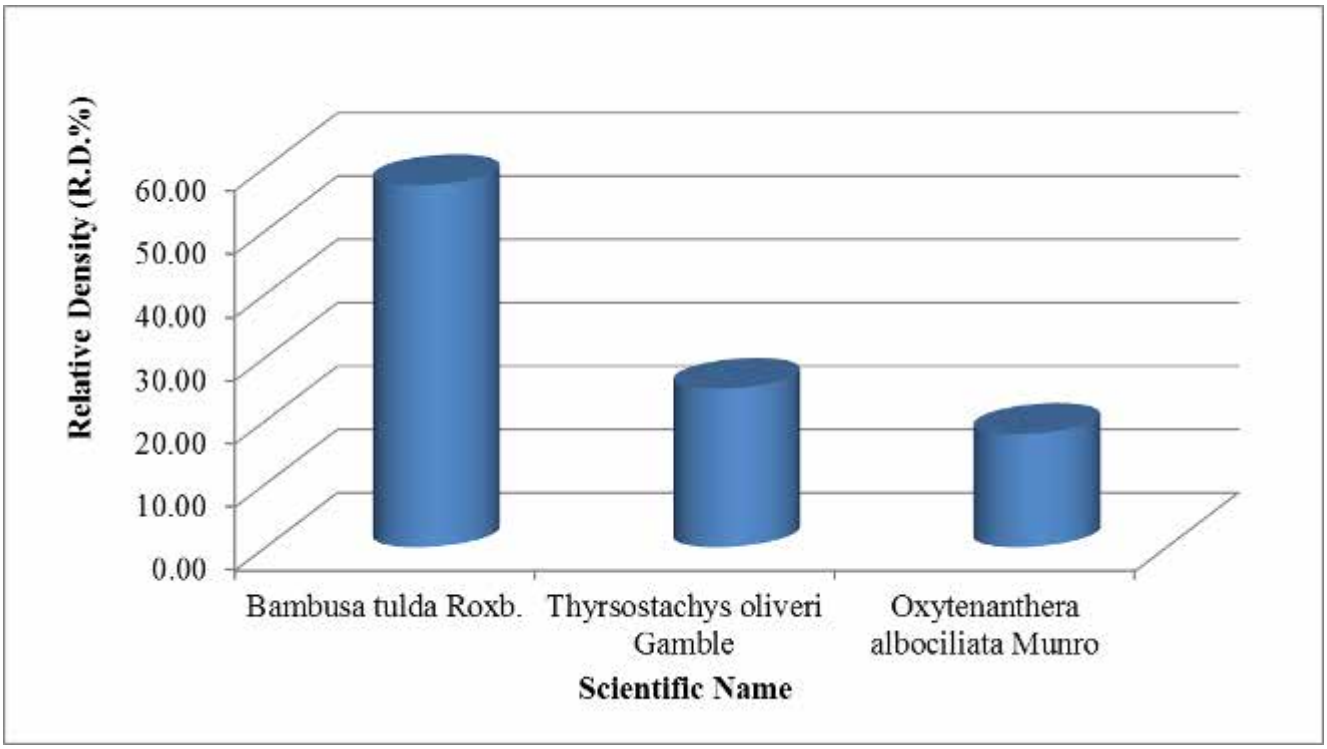
Table 10: Bamboo Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Bambusa tulda* Roxb.	5	18.52	17.86
2	*Thyrsostachys oliveri* Gamble	7	25.93	25.00
3	*Oxytenanthera albociliata* Munro	16	59.26	57.14
	Total	**28**	**103.70**	**100.00**

Table 11: Bamboo Species Relative Density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Bambusa tulda* Roxb.	5.33	57.14
2	*Thyrsostachys oliveri* Gamble	2.33	25.00
3	*Oxytenanthera albociliata* Munro	1.67	17.86

Chart 3: Bamboo Species Relative Density



3.1.7. Flora IUCN Status

Of the flora species identified on the left bank research area one, 14 species are on the IUCN Red List. They are listed below. Most notably, *Dalbergia oliveri* Gamble is classified as EN

A1cd, *Cycas siamensis* Miq. is classified as VU A2cd, and *Dalbergia cultrata* Grah. is classified as NT. The other 11 species are classified as species of least concern or low risk/least concern.

Table 12: Flora IUCN Status

No.	Scientific Name	Common Name	Family Name	IUCN Status
1	*Bauhinia ornata* Kurz	Myauk-hle-ga	Caesalpiniaceae	LC
2	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	LC
3	*Cycas siamensis* Miq.	Mon-daing	Cycadaceae	VU A2cd
4	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT
5	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	EN A1cd
6	*Dipterocarpus tuberculatus* Roxb.	In	Dipterocarpaceae	LR/Lc
7	*Engelhardtia spicata*	Pan-swe-le	Juglandaceae	LR/Lc
8	*Equisetum hyemale*	Not known	Equisetaceae	LC
9	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
10	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
11	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	LR/Lc
12	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC
13	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/Lc
14	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/Lc
EN=Endangered, VU=Vulnerable, NT=Near Threatened, LC=Least Concern, LR/Lc=Lower Risk/Least concern				

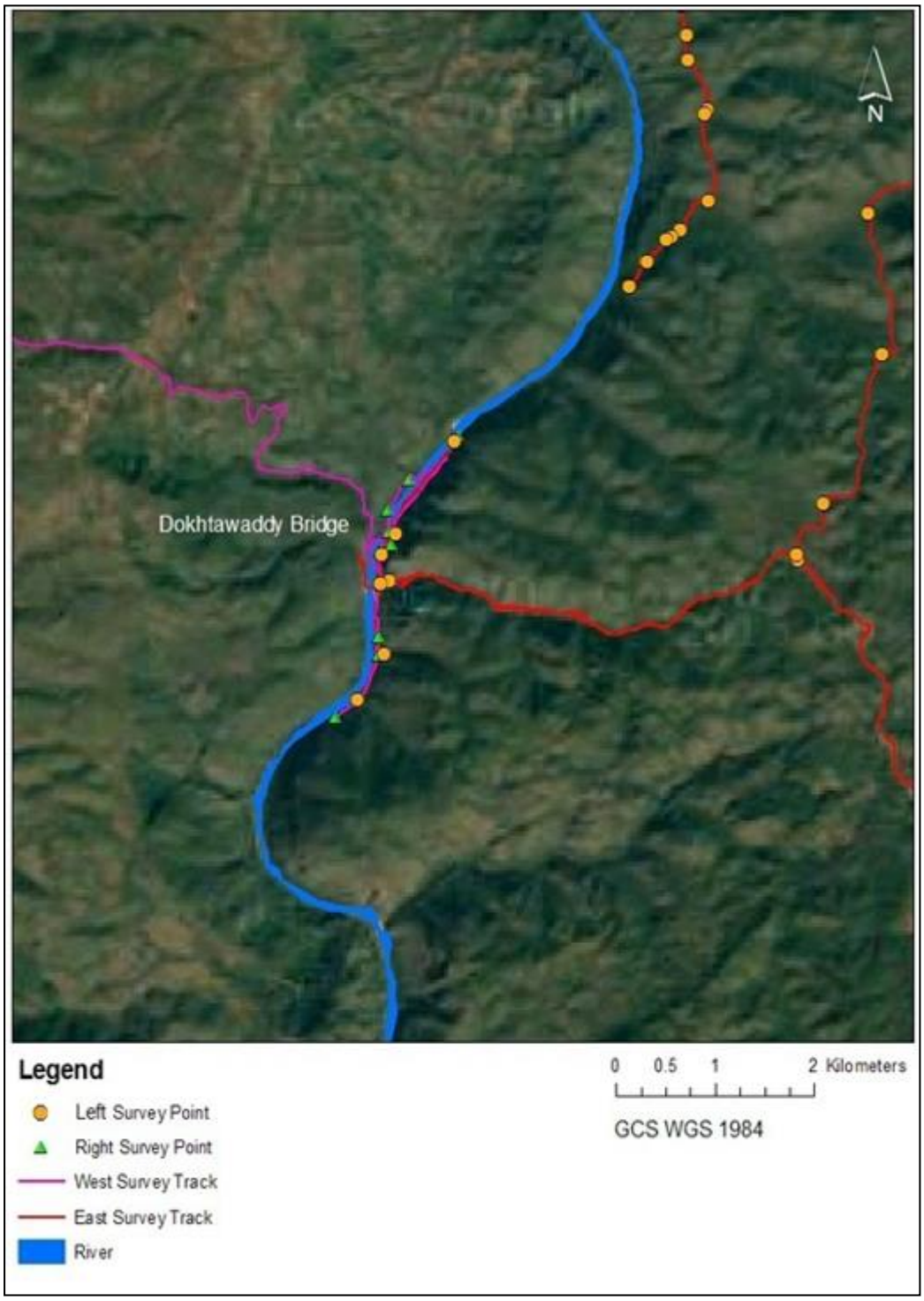
Bauhinia ornata Kurz

Holarrhena pubescens Wall. ex G. Don

Cycas siamensis Miq. *Shorea siamensis*(Kurz)Miq.

3.2 Research Area Two

Map 4: Research Area Two



Map 5: Reservoir Elevation Line

(Right Bank Forest)

(Left Bank Forest)

3.2.1. Quadrant Location and Vegetation Type

Two sample plots were taken in research area two on the left bank. In each plot the vegetation type was Riverine Forest. A summary of the sample plots and relevant data is given below.

Table 13: Research Area Two Sample Plots

No.	Sample Quadrant	Vegetation type	Latitude/Longitude	Altitude(m)	Dominant species
1	KGQ VIII	Riverine Forest	N22 01 52.0 E96 57 56.9	322	*Sterculia villosa, Shorea siamensis*(Kurz)Miq.,*Shorea obtusa* Wall., *Xylia xylocarpa* (Roxb.) Taub.,*Terminalia alata* (Heyne) Roth, *Tetrameles nudiflora* R.Br., *Bombax ceiba* L.
2	KGQ IX	Riverine Forest	N22 01 15.8 E96 57 52.9	330	

3.2.2. Flora Species on Left and Right Banks

A total of 171 flora species were identified in research area two on the left bank, compared to 176 on the right bank. There were 46 flora species found only on the left bank and 51 flora species only found on the right bank. 125 flora species were present on both banks. This yields a total of 222 flora species present on either the left bank, right bank or both banks.

Table 14: Flora Species in Left Bank Research Area Two

No.	Scientific Name	Common Name	Family Name	Habit
1	*Acacia concinna* (Willd.) DC.	Ka-mon-chin	Mimosaceae	S
2	*Acacia intsia* Willd.	Su-bok	Mimosaceae	S
3	*Acer laurinum* Hassk.	Not known	Aceraceae	ST
4	*Acer negunda*	Not known	Aceraceae	ST
5	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae	H
6	*Adenostemma viscosum*	Not known	Asteraceae	H
7	*Agaricus silvicola*	Not known	Agaricaceae	Mu
8	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	H
9	*Albatrellus ovinus*	Not known	Albatrellaceae	Mu
10	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae	T
11	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	T
12	*Alphonsea boniana*	Not known	Annonaceae	T
13	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae	T
14	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae	H
15	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	CL
16	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae	H
17	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae	H
18	*Anogeissus acuminata* Wall.	Yon	Combretaceae	T
19	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae	CL
20	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	CL
21	*Artemisia* sp.	Not known	Asteraceae	H
22	*Artemisia vulgaris*	Not known	Asteraceae	H
23	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae	H
24	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	ST
25	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae	S
26	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae	CL
27	*Bidens pilosa*	Hmwe-sok	Asteraceae	H
28	*Blumea balsamifera*	Not known	Asteraceae	H
29	*Boerhavia diffusa* L.	Pa-yan-na-wa	Nyctaginaceae	H
30	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	H
31	*Bombax ceiba* L.	Let-pan	Bombacaceae	T
32	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae	T
33	*Buddleja asiatica* Lour	Not known	Buddlejaceae	S
34	*Cananga latifolia*	Not known	Annonaceae	S

No.	Scientific Name	Common Name	Family Name	Habit
35	*Cantharellus aurantiacus* (Wulf.)Fr.	Not known	Cantharelleae	Mu
36	*Carex brizoides* L.	Taw-kyet-le-hlee	Cyperaceae	H
37	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae	T
38	*Cassia fistula* L.	Ngu	Caesalpiniaceae	T
39	*Chenopodium acuminatum* subsp. virgatum	Not known	Chenopodiaceae	H
40	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	S
41	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	ST
42	*Cissus hastata* Miq.	Sa-pyit-yaing	Vitaceae	CL
43	*Clerodendrum villosum* Blume	Phet-kha	Verbenaceae	S
44	*Collybia cirrhata*	Not known	Tricholomataceae	Mu
45	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae	ST
46	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae	ST
47	*Crotalaria multiflora* L.	Taw-paik-san	Fabaceae	H
48	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	ST
49	*Cymbidium aloifolium* (L.)Sw.	Thit-tat-lin-nay	Orchidaceae	E
50	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	G
51	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	T
52	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	ST
53	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	T
54	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	B
55	*Desmodium rufihirsutum* Craib	Not known	Fabaceae	S
56	*Desmodium triangulare* (Retz.) Merr.	Not known	Fabaceae	S
57	*Dichanthium caricosum* (L.)A.Camus	Pa-daw-myet	Poaceae	G
58	*Dichrocephala integrifolia (*L.f.)Kuntze	Not known	Asteraceae	H
59	*Dicliptera neesii* Trimen.	Not known	Acanthaceae	S
60	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	CL
61	*Dioscorea cylindrica* Burm.	Kyway-thon-ywet	Dioscoreaceae	CL
62	*Dioscorea pentaphylla* L.	Kyway-ngar-ywet	Dioscoreaceae	CL
63	*Diospyros kaki* L.f.	Tae	Ebenaceae	T
64	*Dracaena sanderiana*	Zaw-sein	Asparagaceae	H
65	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	F
66	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	T
67	*Eclipta alba* (L.) Hassk.	Kyeik-hman	Asteraceae	H
68	*Elaeocarpus hainanensis* Oliv.	Kywe-pan-pin	Elaeocarpaceae	ST
69	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	G
70	*Entada scandens* Benth.	Doe-nwee	Mimosaceae	CL
71	*Equisetum hyemale*	Not known	Equisetaceae	H
72	*Erythrina stricta* Roxb.	Ka-thit	Fabaceae	ST
73	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae	ST
74	*Euphorbia antiquorum* L.	Tazaung-gyi	Euphorbiaceae	S
75	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae	H

No.	Scientific Name	Common Name	Family Name	Habit
76	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae	T
77	*Ficus hispida* L.	Kha-aung	Moraceae	ST
78	*Ficus pumila* L.	Creeping fig.	Moraceae	S
79	*Ficus racemosa*	Not known	Moraceae	T
80	*Ficus variegate*	Kon-tha-phan	Moraceae	T
81	*Flacourtia cataphracta* Roxb.	Na-ywe	Flacourtiaceae	T
82	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae	S
83	*Fomes fomentarius*	Not known	Polyporaceae	Mu
84	*Ganoderma austral*	Not known	Ganodermataceae	Mu
85	*Garcinia cowa* Roxb.	Taung-tha-lae	Hypericaceae	ST
86	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae	ST
87	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae	H
88	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	T
89	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	ST
90	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	S
91	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae	H
92	*Hibiscus ficulneus* L.	Taw-yon-pade	Malvaceae	S
93	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	ST
94	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	ST
95	*Hydrocotyle sibthorpioides* Thunb	Myin-khwa	Apiaceae	H
96	*Hygrophorus limacinus*	Not known	Hygrophoraceae	Mu
97	*Hypericum japonicum* Thunb. ex Murray	Not known	Hypericaceae	H
98	*Hypholoma incertum* Pk.	Not known	Microthyriaceae	Mu
99	*Inonotus hispidus*	Not known	Hymenochaetaceae	Mu
100	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma	Lythraceae	T
101	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae	T
102	*Leea hirta* Banks	Naga-mauk-aphu	Leeaceae	ST
103	*Lentinus squarrosulus*	Not known	Polyporaceae	Mu
104	*Leucaena leucocephala* (Lam.) De.Wit	Baw-sa-gaing	Mimosaceae	ST
105	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	H
106	*Luffa aegyptiaca* Mill.	Tha-but	Cucurbitaceae	CL
107	*Lygodium japonicum*(Thunb.)Sw.	Not known	Lygodiaceae	F
108	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	T
109	*Markhamia stipulata* (Wall.) Seem. Ex K.Schum.	Ma-hlwa	Bignoniaceae	T
110	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae	ST
111	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae	Mu
112	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL

No.	Scientific Name	Common Name	Family Name	Habit
113	*Millettia extensa* Benth.	Win-u	Fabaceae	CL
114	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae	T
115	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
116	*Morus indica* L.	Po-sa	Moraceae	ST
117	*Myriopteron paniculatum* Griff	Ti-lay-na-tha	Asclepiadaceae	CL
118	*Nervilia plicata*	Tabin-ting-shwe-hti	Orchidaceae	H
119	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae	H
120	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	B
121	*Pandanus odoratissimus* L.f.	Sat-tha-phu	Pandanaceae	ST
122	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae	CL
123	*Pennisetum purpureum*	Yon-sa-myet	Poaceae	G
124	*Persicaria odorata*	Kywe-hna-khaung-gyate	Polygonaceae	H
125	*Pholiota flammas* Pk	Hmo	Strophariaceae	Mu
126	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	ST
127	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	H
128	*Physalis minima* L.	Bauk-thi	Solanaceae	H
129	*Pleurotus cornucopiae*	Not known	Pleurotaceae	Mu
130	*Ploiarium alternifolium*	Not known	Theaceae	S
131	*Polyalthia viridis*	Not known	Annonaceae	T
132	*Polygonum plebeium*	Not known	Polygonaceae	H
133	*Pseuderanthemum polyanthum*	Not known	Acanthaceae	H
134	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	T
135	*Pterospermum diversifolium*	Not known	Sterculiaceae	T
136	*Rumex crispus* L.	Not known	Polygonaceae	H
137	*Rumex trisetiferus* Stokes	Not known	Polygonaceae	H
138	*Saccharum spontaneum* L.	Kaing	Poaceae	G
139	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	T
140	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae	T
141	*Schizophyllum commune*	Not known	Schizophyllaceae	Mu
142	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	T
143	*Scoparia dulcis* L.	Dana-thu-kha	Scrophulariaceae	H

No.	Scientific Name	Common Name	Family Name	Habit
144	*Selaginella willdenowii*	Not known	Selaginellaceae	F
145	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae	S
146	*Senna tora* (L.*)* Roxb	Dan-gwe	Caesalpiniaceae	S
147	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	T
148	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	T
149	*Solanum aculeatissimum* Jacq.	Not known	Solanaceae	H
150	*Solanum indicum* L.	Ka-zaw-kha	Solanaceae	S
151	*Solanum nigrum* L.	Baung-laung-nyo	Solanaceae	S
152	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae	S
153	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	T
154	*Stemona burkillii* Prain	Tha-mya	Stemonaceae	H
155	*Sterculia villosa*	Shaw	Sterculiaceae	T
156	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	T
157	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	CL
158	*Tanacetum tibeticum* Hook.f. & Thomson	Not known	Asteraceae	H
159	*Taraxacum officinale*	Not known	Asteraceae	H
160	*Tectona grandis* L. f.	Kyun	Verbenaceae	T
161	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	T
162	*Terminalia oliveri* Brandis	Than	Combretaceae	T
163	*Tetrameles nudiflora* R.Br.	Thit-pok	Datiscaceae	T
164	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae	B
165	*Trametes versicolor*	Taung-po-hmo	Polyporaceae	Mu
166	*Tylophora indica*	Not known	Apocynaceae	H
167	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae	ST
168	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	ST
169	*Vitex vestita* Wall.	Tauk-sha	Verbenaceae	ST
170	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae	ST
171	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	ST
B=Bamboo,CL=Climber,E=Epiphyte,F=Fern, G=Grass,H=Herbs,Mu=Mushroom,S=Shrubs,ST=Small Tree, T=Tree				

Table 15: Right Bank and Left Bank Species

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
1	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	√	
2	*Abutilon indicum*	Bauk-khwe	Malvaceae	√	
3	*Acacia concinna* (Willd.) DC.	Ka-mon-chin	Mimosaceae	√	√
4	*Acacia intsia* Willd.	Su-bok	Mimosaceae	√	√
5	*Acer laurinum* Hassk.	Not known	Aceraceae	√	√
6	*Acer negunda*	Not known	Aceraceae	√	√
7	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae	√	√
8	*Adenostemma viscosum*	Not known	Asteraceae	√	√
9	*Adiantum latifolium*	Not known	Pteridaceae	√	
10	*Adiantum peruvianum*	Not known	Pteridaceae	√	
11	*Adiantum tenerum*	Not known	Pteridaceae	√	
12	*Agaricus silvicola*	Not known	Agaricaceae		√
13	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	√	√
14	*Albatrellus ovinus*	Not known	Albatrellaceae		√
15	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae	√	√
16	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	√	√
17	*Alphonsea boniana*	Not known	Annonaceae		√
18	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae	√	√
19	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae	√	√
20	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	√	√
21	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae	√	√
22	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae	√	√
23	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae	√	
24	*Anogeissus acuminata* Wall.	Yon	Combretaceae	√	√
25	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae	√	
26	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae	√	√
27	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae		√
28	*Artemisia* sp.	Not known	Asteraceae	√	√
29	*Artemisia vulgaris*	Not known	Asteraceae		√
30	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae	√	√
31	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	√	√
32	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae	√	√
33	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae	√	√
34	*Bidens pilosa*	Hmwe-sok	Asteraceae	√	√
35	*Blumea balsamifera*	Not known	Asteraceae	√	√
36	*Boerhavia chinensis* (L.) Asch. & Schw.	Not known	Nyctaginaceae	√	
37	*Boerhavia coccinea*	Pa-yan-na-war	Nyctaginaceae	√	
38	*Boerhavia diffusa* L.	Pa-yan-na-wa	Nyctaginaceae		√
39	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae		√
40	*Bombax ceiba* L.	Let-pan	Bombacaceae	√	√
41	*Bombax insigne* Wall.	De-du	Bombacaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
42	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae		√
43	*Buddleja asiatica* Lour	Not known	Buddlejaceae	√	√
44	*Calotropis gigantea* (L.) Dryand. ex W.T. Aiton	Ma-yoe-gyi	Asclepiadaceae	√	
45	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae	√	
46	*Cananga latifolia*	Not known	Annonaceae	√	√
47	*Canavalia cathartica*	Not known	Fabaceae	√	
48	*Cantharellus aurantiacus* (Wulf.)Fr.	Not known	Cantharelleae		√
49	*Carex brizoides* L.	Taw-kyet-le-hlee	Cyperaceae		√
50	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae	√	√
51	*Carissa spinarum* A. DC.	Taw-khan-pin	Apocynaceae	√	
52	*Cassia fistula* L.	Ngu	Caesalpiniaceae	√	√
53	*Celosia argentea* L.	Taw-kyet-mauk	Amaranthaceae	√	
54	*Chenopodium acuminatum* subsp. virgatum	Not known	Chenopodiaceae	√	√
55	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	√	√
56	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	√	√
57	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae	√	
58	*Cissus hastata* Miq.	Sa-pyit-yaing	Vitaceae	√	√
59	*Claoxylon indicum* Hassk.	Not known	Euphorbiaceae	√	
60	*Clerodendrum villosum* Blume	Phet-kha	Verbenaceae	√	√
61	*Collybia cirrhata*	Not known	Tricholomataceae		√
62	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae	√	√
63	*Commelina persicariaefolia* Wright.	Wet-kyut	Commelinaceae	√	
64	*Corchorus olitorius* L.	Pi-law-yaing	Tiliaceae	√	
65	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae	√	√
66	*Crotalaria multiflora* L.	Taw-paik-san	Fabaceae		√
67	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	√	√
68	*Cymbidium aloifolium* (L.)Sw.	Thit-tat-lin-nay	Orchidaceae		√
69	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	√	√
70	*Dactyloctenium aegyptium* (L.) Willd.	Myet-lay-gwa	Poaceae	√	
71	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	√	√
72	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	√	√
73	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	√	√
74	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	√	√
75	*Desmodium gangeticum* L.	Not known	Fabaceae	√	
76	*Desmodium rufihirsutum* Craib	Not known	Fabaceae		√
77	*Desmodium triangulare* (Retz.) Merr.	Not known	Fabaceae	√	√
78	*Dichanthium caricosum* (L.)A.Camus	Pa-daw-myet	Poaceae	√	√
79	*Dichrocephala integrifolia (*L.f.)Kuntze	Not known	Asteraceae	√	√
80	*Dicliptera neesii* Trimen.	Not known	Acanthaceae	√	√
81	*Dioscorea alata*	Myauk-u	Dioscoreaceae	√	
82	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
83	*Dioscorea cylindrica* Burm.	KYwary-thon-ywet	Dioscoreaceae	√	√
84	*Dioscorea pentaphylla* L.	Kyway-ngar-ywet	Dioscoreaceae	√	√
85	*Diospyros kaki* L.f.	Tae	Ebenaceae	√	√
86	*Dracaena sanderiana*	Zaw-sein	Asparagaceae		√
87	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	√	√
88	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	√	√
89	*Eclipta alba* (L.) Hassk.	Kyeik-hman	Asteraceae		√
90	*Elaeocarpus hainanensis* Oliv.	Kywe-pan-pin	Elaeocarpaceae	√	√
91	*Elatostema reticulatum*	Wet-sa	Urticaceae	√	
92	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	√	√
93	*Entada scandens* Benth.	Doe-nwee	Mimosaceae	√	√
94	*Equisetum hyemale*	Not known	Equisetaceae	√	√
95	*Eragrostis tef* (Zucc.)Trotter	Myet	Poaceae	√	
96	*Erythrina stricta* Roxb.	Ka-thit	Fabaceae	√	√
97	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae	√	√
98	*Euphorbia antiquorum* L.	Tazaung-gyi	Euphorbiaceae	√	√
99	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae	√	
100	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae	√	√
101	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae		√
102	*Ficus hispida* L.	Kha-aung	Moraceae		√
103	*Ficus pumila* L.	Creeping fig.	Moraceae	√	√
104	*Ficus racemosa*	Tha-phan	Moraceae	√	√
105	*Ficus variegate*	Kon-tha-phan	Moraceae	√	√
106	*Flacourtia cataphracta* Roxb.	Na-ywe	Flacourtiaceae		√
107	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae	√	√
108	*Fomes fomentarius*	Not known	Polyporaceae		√
109	*Ganoderma austral*	Not known	Ganodermataceae		√
110	*Garcinia cowa* Roxb.	Taung-tha-lae	Hypericaceae		√
111	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae		√
112	*Getonia floribunda* Roxb.	Kywet-nwee	Combretaceae	√	
113	*Globba patens*	Pa-dein-ngo	Zingiberaceae	√	
114	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae		√
115	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae		√
116	*Gonostegia hirta*	Not known	Rubiaceae	√	
117	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae		√
118	*Habenaria chlorina* Par. & Rchb.f.	Not known	Orchidaceae	√	
119	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	√	√
120	*Helicteres angustifolia* L.	Not known	Sterculiaceae	√	
121	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae	√	√
122	*Hemigraphis repanda*	Not known	Acanthaceae	√	
123	*Hibiscus ficulneus* L.	Taw-yon-pade	Malvaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
124	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	√	√
125	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	√	√
126	*Hydrocotyle sibthorpioides* Thunb	Myin-khwa	Apiaceae	√	√
127	*Hygrophorus limacinus*	Not known	Hygrophoraceae		√
128	*Hypericum japonicum* Thunb. ex Murray	Not known	Hypericaceae	√	√
129	*Hypholoma incertum* Pk.	Not known	Microthyriaceae		√
130	*Inonotus hispidus*	Not known	Hymenochaetaceae		√
131	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma	Lythraceae	√	√
132	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae	√	√
133	*Lantana camara* L.	Sein-na-pan	Verbenaceae	√	
134	*Leea hirta* Banks	Naga-mauk-aphu	Leeaceae	√	√
135	*Lentinus squarrosulus*	Not known	Polyporaceae		√
136	*Leucaena leucocephala* (Lam.) De.Wit	Baw-sa-gaing	Mimosaceae	√	√
137	*Lithocarpus craibianus* Barnett	Thit-ae	Fagaceae	√	
138	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	√	√
139	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae	√	
140	*Luffa aegyptiaca* Mill.	Tha-but	Cucurbitaceae		√
141	*Lygodium circinnatum*	Not known	Lygodiaceae	√	
142	*Lygodium japonicum*(Thunb.)Sw.	Not known	Lygodiaceae		√
143	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	√	√
144	*Markhamia stipulata* (Wall.) Seem. Ex K.Schum.	Ma-hlwa	Bignoniaceae		√
145	*Merremia vitifolia* (Burm.f.) Hallier. f.	Kyet-hinga-lae-new	Convolvulaceae	√	
146	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae	√	√
147	*Microporus xanthopus* (Fr.) Kuntze	Hmo	Polyporaceae	√	√
148	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	√	√
149	*Millettia extensa* Benth.	Win-u	Fabaceae	√	√
150	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae	√	√
151	*Mimosa pudica* L.	Hti-ka-yon	Mimosaceae	√	√
152	*Morus indica* L.	Po-sa	Moraceae	√	√
153	*Myriopteron paniculatum* Griff	Ti-lay-nantha	Asclepiadaceae	√	√
154	*Nervilia plicata*	Tabin-ting-shwe-hti	Orchidaceae	√	√
155	*Operculina turpethum* (L.) Silva Mansa	Kyar-hin-nwee	Convolvulaceae	√	
156	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae	√	√
157	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	√	√
158	*Pandanus odoratissimus* L.f.	Sat-tha-phu	Pandanaceae	√	√
159	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae	√	√
160	*Pennisetum purpureum*	Yon-sa-myet	Poaceae	√	√
161	*Peperomia pellucida*	Thit-ye-kyi	Piperaceae	√	
162	*Pericampylus glaucus* L.	Not known	Menispermaceae	√	
163	*Peristrophe roxburghiana*	Not known	Acanthaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
164	*Persicaria odorata*	Kywe-hna-khaung-gyate	Polygonaceae	√	√
165	*Pholiota flammas* Pk.	Hmo	Strophariaceae	√	√
166	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae	√	
167	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	√	√
168	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	√	√
169	*Physalis minima* L.	Bauk-thi	Solanaceae	√	√
170	*Pleurotus cornucopiae*	Not known	Pleurotaceae		√
171	*Ploiarium alternifolium*	Not known	Theaceae	√	√
172	*Polyalthia viridis*	Not known	Annonaceae		√
173	*Polygonum plebeium*	Not known	Polygonaceae	√	√
174	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	√	
175	*Pseuderanthemum polyanthum*	Not known	Acanthaceae		√
176	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	√	√
177	*Pterospermum acerifolium*	Not known	Sterculiaceae	√	
178	*Pterospermum diversifolium*	Not known	Sterculiaceae	√	√
179	*Rumex crispus* L.	Not known	Polygonaceae	√	√
180	*Rumex trisetiferus* Stokes	Not known	Polygonaceae	√	√
181	*Saccharum spontaneum* L.	Kaing	Poaceae	√	√
182	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	√	√
183	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae	√	√
184	*Schizophyllum commune*	Not known	Schizophyllaceae	√	√
185	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	√	√
186	*Scindapsus officinalis* (Roxb.) Schott	Sin-peik-chin	Araceae	√	
187	*Scoparia dulcis* L.	Dana-thu-kha	Scrophulariaceae	√	√
188	*Scurrula parasitica* L.	Kyi-paung	Loranthaceae	√	
189	*Selaginella willdenowii*	Not known	Selaginellaceae	√	√
190	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae	√	√
191	*Senna tora* (L.*)* Roxb	Dan-gwe	Caesalpiniaceae	√	√
192	*Setaria palmifolia* Stapf.	Myet	Poaceae	√	
193	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae		√
194	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	√	√
195	*Solanum aculeatissimum* Jacq.	Not known	Solanaceae	√	√
196	*Solanum indicum* L.	Ka-zaw-kha	Solanaceae	√	√
197	*Solanum nigrum* L.	Baung-laung-nyo	Solanaceae		√
198	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae	√	√
199	*Spermacoce remota*	Not known	Rubiaceae	√	
200	*Spirogyra* sp.	Algae	Zygnemataceae	√	
201	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae		√
202	*Stemona burkillii* Prain	Tha-mya	Stemonaceae		√
203	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae	√	
204	*Sterculia villosa*	Shaw	Sterculiaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
205	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	√	√
206	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	√	√
207	*Tanacetum tibeticum* Hook.f. & Thomson	Not known	Asteraceae	√	√
208	*Taraxacum officinale*	Not known	Asteraceae	√	√
209	*Tectona grandis* L. f.	Kyun	Verbenaceae	√	√
210	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae		√
211	*Terminalia oliveri* Brandis	Than	Combretaceae	√	√
212	*Tetrameles nudiflora* R.Br.	Thit-pok	Datiscaceae	√	√
213	*Tetrastigma leucostaphylum*	Not known	Vitaceae	√	
214	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae		√
215	*Tithonia diversifolia* A. Gray	Nay-kyar-yaing	Asteraceae	√	
216	*Trametes versicolor*	Taung-po-hmo	Polyporaceae	√	√
217	*Tylophora indica*	Not known	Apocynaceae	√	√
218	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae		√
219	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	√	√
220	*Vitex vestita* Wall.	Tauk-sha	Verbenaceae		√
221	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae		√
222	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	√	√

3.2.3. Tree Species

A total of 14 tree species belonging to 13 genera were identified in two sample plots in research area two. The dominant tree species in this area are *Sterculia villosa* (shaw) followed by *Shorea siamensis* (Kurz)Miq. (In-gyin), and *Shorea obtusa* Wall. (Thit-ya), *Xylia xylocarpa* (Roxb.) Taub., (Pyin-ka-doe).

Table 16: Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Bombax ceiba* L.	1	5.56	1.37
2	*Buchanania latifolia* Roxb.	1	5.56	1.37
3	*Flacourtia cataphracta* Roxb.	1	5.56	1.37
4	*Garcinia cowa* Roxb.	1	5.56	1.37
5	*Holarrhena pubescens* Wall. ex G. Don	1	5.56	1.37
6	*Millettia ovalifolia* Kurz	1	5.56	1.37
7	*Samadera indica* Gaertn.	1	5.56	1.37
8	*Shorea obtusa* Wall.	9	50.00	12.33
9	*Shorea siamensis*(Kurz)Miq.	15	83.33	20.55
10	*Spondias pinnata* (L. f.) Kurz.	1	5.56	1.37

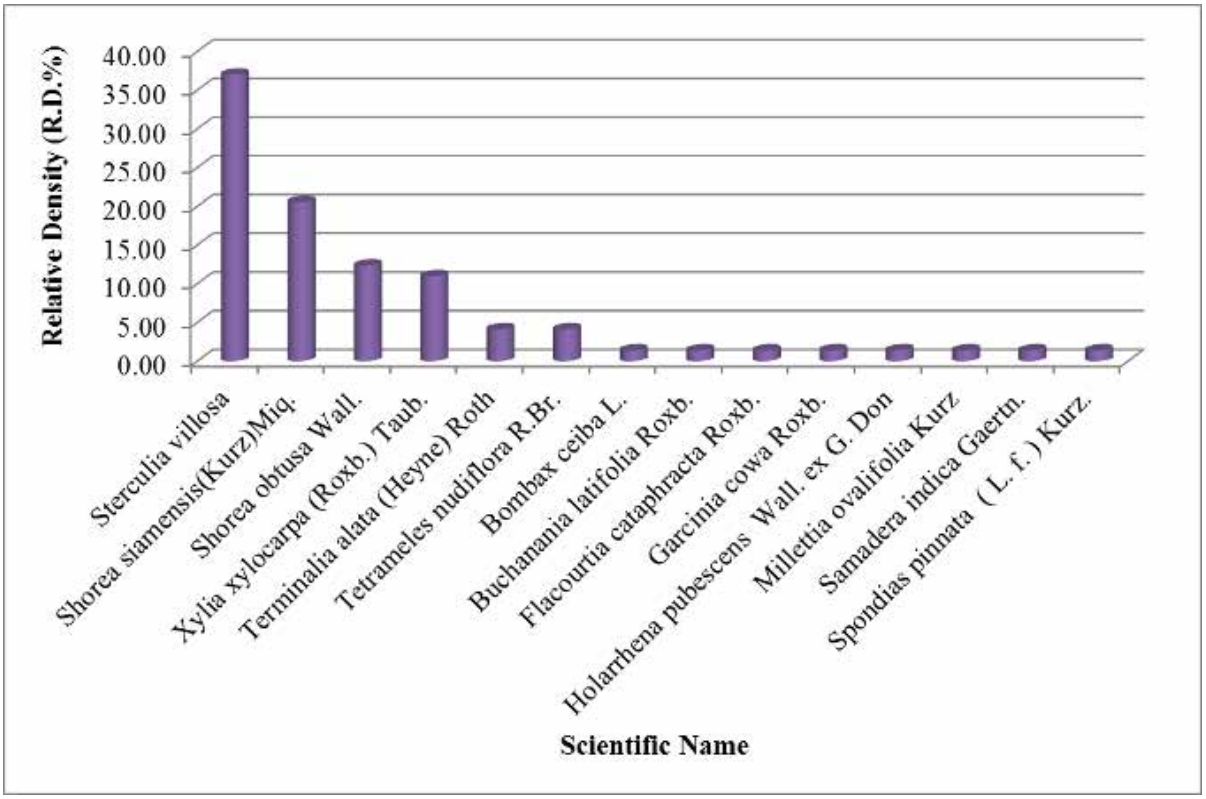
11	*Sterculia villosa*	27	150.00	36.99
12	*Terminalia alata* (Heyne) Roth	3	16.67	4.11
13	*Tetrameles nudiflora* R.Br.	3	16.67	4.11
14	*Xylia xylocarpa* (Roxb.) Taub.	8	44.44	10.96
	Total	**73**	**405.56**	**100.00**

Among the sample plots, the species density per hectare is varied and the highest density is observed *Sterculia villosa*, *Shorea siamensis* (Kurz)Miq., *Shorea obtusa* Wall., and *Xylia xylocarpa* (Roxb.) Taub., followed by *Terminalia alata* (Heyne) Roth, and *Tetrameles nudiflora* R.Br.,. This shows that these six species are abundant in this area.

Table 17: Tree Species Relative Density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Sterculia villosa*	13.5	36.99
2	*Shorea siamensis*(Kurz)Miq.	7.5	20.55
3	*Shorea obtusa* Wall.	4.5	12.33
4	*Xylia xylocarpa* (Roxb.) Taub.	4	10.96
5	*Terminalia alata* (Heyne) Roth	1.5	4.11
6	*Tetrameles nudiflora* R.Br.	1.5	4.11
7	*Bombax ceiba* L.	0.5	1.37
8	*Buchanania latifolia* Roxb.	0.5	1.37
9	*Flacourtia cataphracta* Roxb.	0.5	1.37
10	*Garcinia cowa* Roxb.	0.5	1.37
11	*Holarrhena pubescens* Wall. ex G. Don	0.5	1.37
12	*Millettia ovalifolia* Kurz	0.5	1.37
13	*Samadera indica* Gaertn.	0.5	1.37
14	*Spondias pinnata* (L. f.) Kurz.	0.5	1.37

Chart 4: Tree Species Relative Density

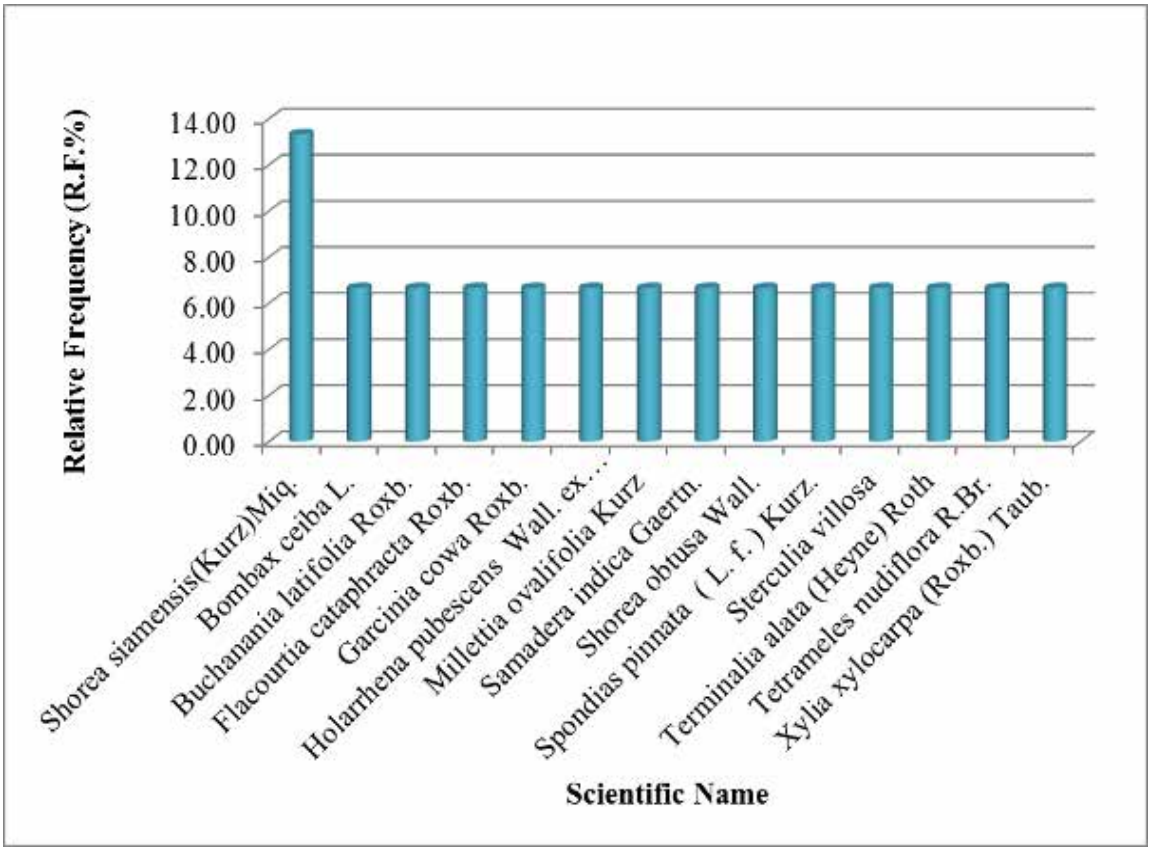


Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results**,** *Shorea siamensis* (Kurz)Miq., is high relative frequency value (13%). Therefore, these species are occurred everywhere in the study area. The lower frequencies of other species are demarcated as rare species in the area.

Table 18: Relative Frequency

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Shorea siamensis*(Kurz)Miq.	1	13.33
2	*Bombax ceiba* L.	0.5	6.67
3	*Buchanania latifolia* Roxb.	0.5	6.67
4	*Flacourtia cataphracta* Roxb.	0.5	6.67
5	*Garcinia cowa* Roxb.	0.5	6.67
6	*Holarrhena pubescens* Wall. ex G. Don	0.5	6.67
7	*Millettia ovalifolia* Kurz	0.5	6.67
8	*Samadera indica* Gaertn.	0.5	6.67
9	*Shorea obtusa* Wall.	0.5	6.67
10	*Spondias pinnata* (L. f.) Kurz.	0.5	6.67
11	*Sterculia villosa*	0.5	6.67
12	*Terminalia alata* (Heyne) Roth	0.5	6.67
13	*Tetrameles nudiflora* R.Br.	0.5	6.67
14	*Xylia xylocarpa* (Roxb.) Taub.	0.5	6.67

Chart 5: Tree Species Relative Frequency



3.2.4. Orchid Species

Cymbidium aloifolium (L.)Sw.

Nervilia plicata

Table 19: Orchid Species

No.	Scientific Name	Common Name	Family Name
1	*Cymbidium aloifolium* (L.)Sw.	Thit-tat-lin-nay	Orchidaceae
2	*Nervilia plicata*	Tabin-ting-shwe-hti	Orchidaceae

3.2.5. Mushroom Species

Pholiota flammas Pk

Hypholoma incertum Pk.

Table 20: Mushroom Species

No.	Scientific Name	Common Name	Family Name
1	*Agaricus silvicola*	Not known	Agaricaceae
2	*Albatrellus ovinus*	Not known	Albatrellaceae
3	*Cantharellus aurantiacus* (Wulf.)Fr.	Not known	Cantharelleae
4	*Collybia cirrhata*	Not known	Tricholomataceae
5	*Fomes fomentarius*	Not known	Polyporaceae
6	*Ganoderma austral*	Not known	Ganodermataceae
7	*Hygrophorus limacinus*	Not known	Hygrophoraceae
8	*Hypholoma incertum* Pk.	Not known	Microthyriaceae
9	*Inonotus hispidus*	Not known	Hymenochaetaceae
10	*Lentinus squarrosulus*	Not known	Polyporaceae
11	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae
12	*Pholiota flammas* Pk	Hmo	Strophariaceae
13	*Pleurotus cornucopiae*	Not known	Pleurotaceae
14	*Schizophyllum commune*	Not known	Schizophyllaceae
15	*Trametes versicolor*	Taung-po-hmo	Polyporaceae

3.2.6. Flora IUCN Status

Of the flora species identified on the left bank research area two, 12 species are on the IUCN Red List. They are listed below. Most notably, *Dalbergia oliveri* Gamble is classified as EN A1cd and *Dalbergia cultrata* Grah.is classified as NT. The other 10 species are classified as species of least concern or low risk/least concern.

Table 21: Threatened Flora Species

No.	Scientific Name	Common Name	Family Name	IUCN Status
1	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	LC
2	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT

3	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	EN A1cd
4	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC
5	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
6	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
7	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	LC
8	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	LR/Lc
9	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC
10	*Saccharum spontaneum* L.	Kaing	Poaceae	LC
11	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/Lc
12	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/Lc
EN=Endangered, LC=Least Concern, LR/Lc=Lower Risk/Least concern, NT=Near Threatened				

Boesenbergia rotunda (L.) Mansf.

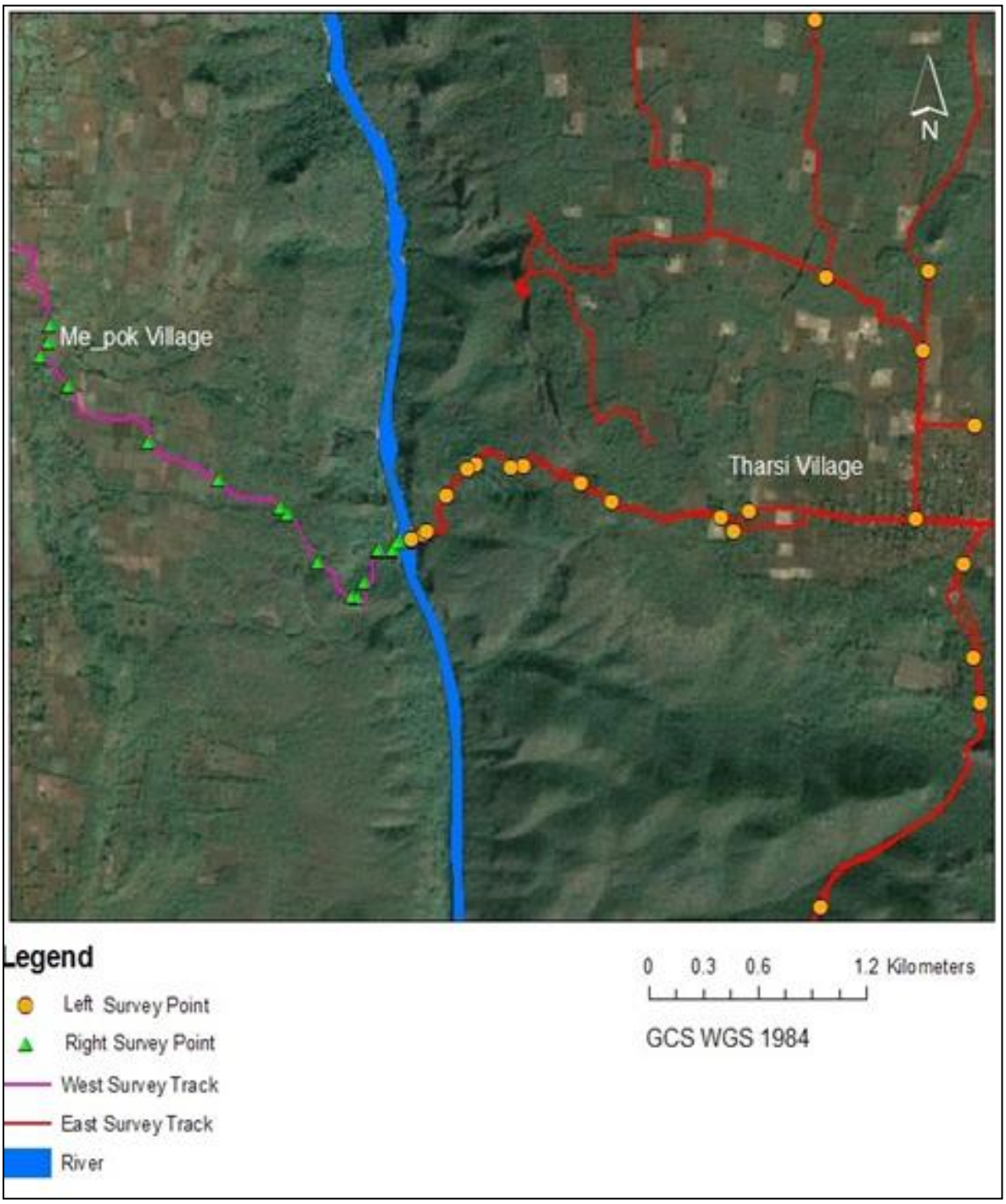
Dendrocalamus membranaceus Munro

Homonoia riparia

Ludwigia hyssopifolia

3.3. Research Area Three

Map 6: Research Area Three



Map 7: Reservoir Elevation Line

(*Right Bank Forest)*

(Left Bank Forest)

3.3.1. Quadrant Location and Vegetation Type

A total of 13 sample plots were taken in the left bank research area three. Vegetation in each of the plots consisted solely of Indine forest. Relevant data is summarized in the table below.

Table 22: Research Area Three Sample Plots

No.	Sample Quadrant	Vegetation type	Latitude/Longitude	Altitude(m)	Dominant species
1	KGQ XIII	Indine Forest	N22 06 15.5 E96 59 08.3	692	*Shorea obtusa* Wall., *Buchanania latifolia* Roxb. ,*Shorea siamensis*(Kurz)Miq., *Dalbergia oliveri* Gamble, *Grewia eriocarpa* Juss., *Terminalia alata* (Heyne) Roth, *Dipterocarpus*
2	KGQ XIV	Indine & Bamboo Forest	N22 06 21.1 E96 58 50.3	472	
3	KGQ XV	Indine & Bamboo Forest	N22 06 20.7 E96 58 42.6	452	
4	KGQ XVI	Indine & Bamboo Forest	N22 06 10.7 E96 58 35.5	338	
5	KGQ XVII	Indine Forest	N22 05 50.6 E97 00 12.9	740	
6	KGQ XVIII	Indine & Bamboo Forest	N22 05 10.4 E96 59 45.7	634	

7	KGQ XIX	Indine & Bamboo Forest	N22 04 15.0 E96 59 32.1	538	*tuberculatus* Roxb., *Strychnos nux-blanda* A.W.Hill, *Sterculia villosa*, *Phyllanthus emblica* L.
8	KGQ XX	Indine & Bamboo Forest	N22 03 32.5 E96 59 38.8	495	
9	KGQ XXI	Indine & Bamboo Forest	N22 03 14.4 E96 59 19.1	473	
10	KGQ XXII	Bamboo Forest	N22 03 21.7 E96 59 26.9	483	
11	KGQ XXIII	Indine Forest	N22 03 21.0 E96 59 25.3	479	
12	KGQ XXIV	Indine & Bamboo Forest	N22 03 06.9 E96 59 13.0	405	
13	KGQ XXV	Indine & Bamboo Forest	N22 07 57.5 E96 58 46.6	668	

3.3.2. Flora Species on Left and Right Banks

A total of 176 flora species were identified in research area three on the left bank, compared to 113 on the right bank. There were 123 flora species found only on the left bank and 60 flora species found only on the right bank. 53 flora species were present on both banks. This yields a total of 236 flora species present on the left bank, right bank or both banks.

Table 23: Flora Species in Left Bank Research Area Three

No	Scientific Name	Common Name	Family Name	Habit
1	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	S
2	*Acacia pennata* (L.)Willd.	Su-yit	Mimosaceae	CL
3	*Adiantum latifolium*	Not known	Pteridaceae	F
4	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	H
5	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	T
6	*Albizia procera* (Roxb.) Benth.	Thit-phyu	Mimosaceae	T
7	*Amalocalyx microlobus*	Not known	Apocynaceae	CL
8	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae	H
9	*Anneslea fragrans* Wall.	Pan-ma	Theaceae	T
10	*Anogeissus acuminata* Wall.	Yon	Combretaceae	T
11	*Antidesma bunius*	Kin-ba-lin	Euphorbiaceae	S
12	*Aporusa dioica* (Roxb.) Mull.Arg.	Thit-khauk	Euphorbiaceae	ST
13	*Appendicula* sp.	Not known	Orchidaceae	E
14	*Ardisia* sp.	Kyet-ma-ok	Myrsinaceae	S
15	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	CL
16	*Artemisia vulgaris*	Not known	Asteraceae	H
17	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae	CL
18	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	ST
19	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae	Mu
20	*Bambusa tulda* Roxb.	Theik-wa	Poaceae	B
21	*Bauhinia racemosa* Lam.	Pha-lan/Hta-la	Caesalpiniaceae	ST
22	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae	CL
23	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae	H
24	*Berrya mollis*	Not known	Tiliaceae	T
25	*Bliospermum axillare* Blume	Hnut-cho	Euphorbiaceae	S
26	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	H

No	Scientific Name	Common Name	Family Name	Habit
27	*Bombax ceiba* L.	Let-pan	Bombacaceae	T
28	*Brachycorythis galeandra* (Rchb.f.) Summerh.	Not known	Orchidaceae	E
29	*Brachycorythis helferi* (Rchb.f.) Summerh.	Not known	Orchidaceae	E
30	*Bridelia retusa* (L.) A. Juss.	Myauk-zi/Seik-chi	Euphorbiaceae	T
31	*Buchanania latifolia* Roxb.	Lun	Anacardiaceae	T
32	*Bulbophyllum* sp.	Not known	Orchidaceae	E
33	*Butea parviflora* L.	Pauk-home	Fabaceae	CL
34	*Butea superba* Roxb.	Pauk-nwee	Fabaceae	CL
35	*Calvatia gigantean* (Batsch.)Fr.	Not known	Agaricaceae	Mu
36	*Carex brizoides* L.	Taw-kyet-le-hlee	Cyperaceae	H
37	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae	T
38	*Cassia fistula* L.	Ngu	Caesalpiniaceae	T
39	*Celosia argentea* L.	Taw-kyet-mauk	Amaranthaceae	H
40	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	S
41	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	ST
42	*Cleisostoma williamsonii* (Rchb.f.)Garay.	Not known	Orchidaceae	E
43	*Clerodendrum serratum* L.	Yin-bya-net	Verbenaceae	S
44	*Codonopsis lanceolata*	Ba-la-cheik	Campanulaceae	CL
45	*Colocasia esculenta*	Pein-yaing	Araceae	H
46	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae	ST
47	*Costus specious* Sm.	Pha-lan-taung-hmwe	Costaceae	H
48	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae	ST
49	*Cratoxylum neriifolium* Kurz	Bae-bya	Hypericaceae	ST
50	*Cratoxylum polyanthum*Korth.	Bae-bya	Hypericaceae	ST
51	*Croton joufra* Roxb.	Tha-yin-ka-doe	Euphorbiaceae	ST
52	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	ST
53	*Curcuma aromatica*	Mar-la	Zingiberaceae	H
54	*Cycas siamensis* Miq.	Mon-daing	Cycadaceae	ST
55	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae	E
56	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	G
57	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	T
58	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	T
59	*Dendrobium* sp.	Not known	Orchidaceae	E
60	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	B
61	*Desmodium rufihirsutum* Craib	Not known	Fabaceae	S
62	*Desmodium umbellatum* DC.	Kyee-hmi-apho	Fabaceae	S
63	*Dillenia parviflora* Griff.	Zin-byun	Dilleniaceae	ST
64	*Dioscorea alata*	Myauk-u	Dioscoreaceae	CL
65	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	CL
66	*Dioscorea cylindrica* Burm.	Kyway-thon-ywet	Dioscoreaceae	CL
67	*Dioscorea pentaphylla* L.	Kyway-ngar-ywet	Dioscoreaceae	CL

No	Scientific Name	Common Name	Family Name	Habit
68	*Diospyros kaki* L.f.	Tae	Ebenaceae	CL
69	*Dipterocarpus tuberculatus* Roxb.	In	Dipterocarpaceae	T
70	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	T
71	*Dysolobium grande* Prain	Khwe-la-byut	Fabaceae	CL
72	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae	T
73	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae	ST
74	*Eugenia balsama* Wight	Ye-tha-bye	Myrtaceae	T
75	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae	H
76	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae	H
77	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae	T
78	*Ficus hispida* L.	Kha-aung	Moraceae	ST
79	*Ficus religiosa* L.	Baw-di-nyaung	Moraceae	T
80	*Ficus semicordata*	Ka-dut	Moraceae	T
81	*Flacourtia cataphracta* Roxb.	Na-ywe	Flacourtiaceae	T
82	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae	ST
83	*Ganoderma australe*	Not known	Ganodermataceae	Mu
84	*Gardenia turgida* Roxb.	Hman-phyu/ Hnan-khaung-chauk	Rubiaceae	ST
85	*Garuga pinnata* Roxb.	Chin-yoke	Burseraceae	T
86	*Gastrochilus* sp.	Not known	Orchidaceae	E
87	*Globba patens*	Pa-dein-ngo	Zingiberaceae	H
88	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae	H
89	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	T
90	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	ST
91	*Habenaria procera*	Not known	Orchidaceae	E
92	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	S
93	*Hedyotis auricularia*	Not known	Rubiaceae	H
94	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae	H
95	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	ST
96	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	S
97	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-than	Rubiaceae	T
98	*Imperata cylindrica* (L.)P. Beauv.	Thet-ke	Poaceae	G
99	*Indigofera tinctoria* L.	Taw-hne	Fabaceae	S
100	*Lactarius volemus* Fr.	Not known	Russulaceae	Mu
101	*Lagerstroemia macrocarpa* Kurz	Pyin-ma-ywet-gyi	Lythraceae	T
102	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae	T
103	*Lagerstroemia villosa* Wall.ex Kurz	Let-khwe	Lythraceae	T
104	*Lantana camara* L.	Sein-na-pan	Verbenaceae	S
105	*Leea hirta* Banks	Naga-mauk-phyu/Hta-min-yae	Leeaceae	S
106	*Leea macrophylla* Roxb.	Na-ga-mauk-gyi	Leeaceae	S
107	*Leea rubra*	Naga-mauk-ni/Hta-min-yae	Leeaceae	S
108	*Lepiota morgani* Pk.	Not known	Agraricaceae	Mu

No	Scientific Name	Common Name	Family Name	Habit
109	*Leptadenia reticulata* Wight & Arn.	Gon-kha	Asclepiadaceae	CL
110	*Leucas cephalotes* Spreng.	Pin-gu-hteik-peik	Lamiaceae	S
111	*Litsea glutinosa*	On-don	Lauraceae	T
112	*Lycoperdon pyriforme*	Not known	Agaricaceae	Mu
113	*Mallotus philippensis*	Taw-thi-din	Euphorbiaceae	T
114	*Marasmius foetidum* Fr.	Not known	Marasmiaceae	Mu
115	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae	Mu
116	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL
117	*Millettia extensa* Benth.	Win-u	Fabaceae	CL
118	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
119	*Musa* sp.	Nga-pyaw-yaing	Musaceae	H
120	*Myriopteron paniculatum* Griff	Ti-lay-na-tha	Asclepiadaceae	CL
121	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae	H
122	*Ophioglossum nudicaule*	Addler's Tongue Fern	Ophioglossaceae	F
123	*Oroxylum indicum* (L.)Kurz	Kyaung-sha	Bignoniaceae	ST
124	*Phoenix loureiri* Kunth	Thin-baung	Arecaceae	ST
125	*Pholiota flammas* Pk	Hmo	Strophariaceae	Mu
126	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae	H
127	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	ST
128	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	H
129	*Portulaca grandiflora* Hook.	Shan-hnin-si	Portulacaceae	H
130	*Premna amplectens* Wall	Yin-bya-phyu	Verbenaceae	S
131	*Psalliota placomyces* (Pk.) Kauffm.	Not known	Agaricaceae	Mu
132	*Psalliota silvatica* (Schaeff.) Quel.	Not known	Agaricaceae	Mu
133	*Pseuderanthemum polyanthum*	Not known	Acanthaceae	H
134	*Pycnoporus cinnabarinus*	Not known	Polyporaceae	Mu
135	*Quercus mespilifolia* Wall.	Yin-gu	Fagaceae	T
136	*Schizophyllum commune*	Not known	Schizophyllaceae	Mu
137	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	T
138	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae	ST
139	*Selaginella willdenowii*	Not known	Selaginellaceae	F
140	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae	S
141	*Senna tora* (L.) Roxb	Dan-gwe	Caesalpiniaceae	S
142	*Sesbania* sp.	Nyan	Fabaceae	S
143	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	T
144	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	T
145	*Sida acuta* Burm.f.	Ta-byet-si-bin	Malvaceae	S
146	*Smilax aspericaulis* Wall ex A. D.C.	Sein-na-baw-thay	Smilacaceae	CL
147	*Smilax macrophylla* Roxb.	Sein-na-baw-gyi	Smilacaceae	CL
148	*Solanum aculeatissimum* Jacq.	Not known	Solanaceae	H
149	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae	S

No	Scientific Name	Common Name	Family Name	Habit
150	*Solanum verbascifolium*	Not known	Solanaceae	ST
151	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	T
152	*Stemona burkillii* Prain	Tha-mya	Stemonaceae	H
153	*Sterculia villosa*	Shaw	Sterculiaceae	T
154	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	T
155	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	CL
156	*Strobilanthes isophyllus*	Not known	Acanthaceae	S
157	*Strophanthus wallichii* A.DC.	Na-sha-gyi	Apocynaceae	CL
158	*Strychnos nux-blanda* A.W.Hill	Kha-baung	Loganiaceae	ST
159	*Syzygium grande* (Wight) Walp	Nay-yaing-pin/Tha-bye	Myrtaceae	T
160	*Tectona grandis* L. f.	Kyun	Verbenaceae	T
161	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	T
162	*Terminalia chebula* Retz.	Phan-kha	Combretaceae	T
163	*Thespesia lampas* Dalzell & A.Gibson	Taw-wa	Malvaceae	S
164	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae	B
165	*Tithonia diversifolia* A. Gray	Nay-kyar-yaing	Asteraceae	S
166	*Tristaniopsis burmanica* (griff.)P.G.Wilson & J.T. Waterh.	Dauk-yat	Myrtaceae	T
167	*Triumfetta bartramia* L.	Kat-se-nae-thay	Tiliaceae	S
168	*Uraria lagopodioides* (L.)Desv.ex DC.	Not known	Fabaceae	H
169	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae	ST
170	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	ST
171	*Vitex vestita* Wall.	Tauk-sha	Verbenaceae	ST
172	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	ST
173	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae	ST
174	*Zephyranthes carinata* Herb.	Hnin-pan	Amaryllidaceae	H
175	*Zingibr zerumbet*	Linne-gyi	Zingiberaceae	H
176	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	ST
B=Bamboo,CL=Climber,E=Epiphyte,F=Fern, G=Grass,H=Herbs,Mu=Mushroom,S=Shrubs,ST=Small Tree, T=Tree				

Table 24: Right Bank and Left Bank Species

No	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
1	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	√	√
2	*Acacia pennata* (L.)Willd.	Su-yit	Mimosaceae		√
3	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae	√	
4	*Adenostemma viscosum*	Not known	Asteraceae	√	
5	*Adiantum latifolium*	Not known	Pteridaceae		√
6	*Adiantum peruvianum*	Not known	Pteridaceae	√	
7	*Adiantum tenerum*	Not known	Pteridaceae	√	
8	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	√	√
9	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae	√	

No	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
10	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	√	√
11	*Albizia procera* (Roxb.) Benth.	Thit-phyu	Mimosaceae		√
12	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae	√	
13	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	√	
14	*Amalocalyx microlobus*	Not known	Apocynaceae		√
15	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae	√	
16	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae	√	
17	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae		√
18	*Anneslea fragrans* Wall.	Pan-ma	Theaceae		√
19	*Anogeissus acuminata* Wall.	Yon	Combretaceae		√
20	*Antidesma bunius*	Kin-ba-lin	Euphorbiaceae		√
21	*Aporusa dioica* (Roxb.) Mull.Arg.	Thit-khauk	Euphorbiaceae		√
22	*Appendicula* sp.	Not known	Orchidaceae		√
23	*Ardisia* sp.	Kyet-ma-ok	Myrsinaceae		√
24	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae	√	
25	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae	√	
26	*Aristolochia acuminata*	Eik-tha-ya-mu-li	Aristolochiaceae	√	
27	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae		√
28	*Artemisia* sp.	Not known	Asteraceae	√	
29	*Artemisia vulgaris*	Not known	Asteraceae	√	√
30	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae		√
31	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae	√	
32	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae		√
33	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae		√
34	*Bambusa bambos*(L.)Voss.	Kya-khat-wa	Poaceae	√	
35	*Bambusa tulda* Roxb.	Theik-wa	Poaceae		√
36	*Barleria strigosa* Willd.	Not known	Acanthaceae	√	
37	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae	√	
38	*Bauhinia racemosa* Lam.	Pha-lan/Hta-la	Caesalpiniaceae		√
39	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae	√	√
40	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae	√	√
41	*Berrya mollis*	Not known	Tiliaceae		√
42	*Bidens pilosa*	Hmwe-sok	Asteraceae	√	
43	*Bliospermum axillare* Blume	Hnut-cho	Euphorbiaceae	√	√
44	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae		√
45	*Bombax ceiba* L.	Let-pan	Bombacaceae		√
46	*Brachycorythis galeandra* (Rchb.f.) Summerh.	Not known	Orchidaceae		√
47	*Brachycorythis helferi* (Rchb.f.) Summerh.	Not known	Orchidaceae		√
48	*Bridelia retusa* (L.) A. Juss.	Myauk-zi/Seik-chi	Euphorbiaceae		√
49	*Buchanania latifolia* Roxb.	Lun	Anacardiaceae	√	√
50	*Buddleja asiatica* Lour	Not known	Buddlejaceae	√	

No	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
51	*Bulbophyllum* sp.	Not known	Orchidaceae		√
52	*Butea parviflora* L.	Pauk-home	Fabaceae		√
53	*Butea superba* Roxb.	Pauk-nwee	Fabaceae		√
54	*Calvatia gigantean* (Batsch.)Fr.	Not known	Agaricaceae		√
55	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae	√	
56	*Carduus pycnocephalus*	Not known	Asteraceae	√	
57	*Carex brizoides* L.	Taw-kyet-le-hlee	Cyperaceae		√
58	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae		√
59	*Cassia fistula* L.	Ngu	Caesalpiniaceae		√
60	*Celosia argentea* L.	Taw-kyet-mauk	Amaranthaceae		√
61	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	√	√
62	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	√	√
63	*Cissus hastata* Miq.	Sa-pyit-yaing	Vitaceae	√	
64	*Clausena excavata* var.*villosa* Hook. f.	Taw-pyin-daw-thein	Rutaceae	√	
65	*Cleisostoma williamsonii* (Rchb.f.)Garay.	Not known	Orchidaceae		√
66	*Clerodendrum serratum* L.	Yin-bya-net	Verbenaceae	√	√
67	*Codonopsis lanceolata*	Ba-la-cheik	Campanulaceae	√	√
68	*Colocasia esculenta*	Pein-yaing	Araceae	√	√
69	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae		√
70	*Convolvulus parviflorus* Vahl	Not known	Convolvulaceae	√	
71	*Costus specious* Sm.	Pha-lan-taung-hmwe	Costaceae		√
72	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae		√
73	*Cratoxylum neriifolium* Kurz	Bae-bya	Hypericaceae		√
74	*Cratoxylum polyanthum*Korth.	Bae-bya	Hypericaceae		√
75	*Crotalaria sericea* Retz	Taw-paik-san	Fabaceae	√	
76	*Croton joufra* Roxb.	Tha-yin-ka-doe	Euphorbiaceae		√
77	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	√	√
78	*Curcuma aromatica*	Mar-la	Zingiberaceae		√
79	*Curcuma* sp.	Mar-la	Zingiberaceae	√	
80	*Cycas siamensis* Miq.	Mon-daing	Cycadaceae		√
81	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae		√
82	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	√	√
83	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	√	√
84	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	√	√
85	*Dendrobium* sp.	Not known	Orchidaceae		√
86	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	√	√
87	*Desmodium gangeticum* L.	Not known	Fabaceae	√	
88	*Desmodium rufihirsutum* Craib	Not known	Fabaceae	√	√
89	*Desmodium triflorum*	Not known	Fabaceae	√	
90	*Desmodium umbellatum* DC.	Kyee-hmi-apho	Fabaceae		√
91	*Dillenia parviflora* Griff.	Zin-byun	Dilleniaceae		√

No	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
92	*Dioscorea alata*	Myauk-u	Dioscoreaceae	√	√
93	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	√	√
94	*Dioscorea cylindrica* Burm.	Kyway-thon-ywet	Dioscoreaceae	√	√
95	*Dioscorea pentaphylla* L.	KYwary-ngar-ywet	Dioscoreaceae	√	√
96	*Dioscorea sativa* L.	Kyauk-yin-nwee	Dioscoreaceae	√	
97	*Diospyros kaki* L.f.	Tae	Ebenaceae	√	√
98	*Dipterocarpus tuberculatus* Roxb.	In	Dipterocarpaceae		√
99	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	√	√
100	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	√	
101	*Dunbaria punctata*	Not known	Fabaceae	√	
102	*Dysolobium grande* Prain	Khwe-la-byut	Fabaceae		√
103	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae		√
104	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae		√
105	*Eugenia balsama* Wight	Ye-tha-bye	Myrtaceae		√
106	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae		√
107	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae		√
108	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae		√
109	*Ficus hispida* L.	Kha-aung	Moraceae		√
110	*Ficus religiosa* L.	Baw-di-nyaung	Moraceae		√
111	*Ficus semicordata*	Ka-dut	Moraceae		√
112	*Flacourtia cataphracta* Roxb.	Na-ywe	Flacourtiaceae		√
113	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae		√
114	*Ganoderma australe*	Not known	Ganodermataceae		√
115	*Gardenia turgida* Roxb.	Hman-phyu/ Hnan-khaung-chauk	Rubiaceae		√
116	*Garuga pinnata* Roxb.	Chin-yoke	Burseraceae		√
117	*Gastrochilus* sp.	Not known	Orchidaceae		√
118	*Globba patens*	Pa-dein-ngo	Zingiberaceae	√	√
119	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae	√	√
120	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae		√
121	*Gochnatia decora*	Not known	Asteraceae	√	
122	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	√	√
123	*Grewia laevigata* Vahl	Ta-yaw	Tiliaceae	√	
124	*Habenaria hosseusii* Schltr.	Not known	Orchidaceae	√	
125	*Habenaria procera*	Not known	Orchidaceae		√
126	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	√	√
127	*Hedyotis auricularia*	Not known	Rubiaceae		√
128	*Helicteres angustifolia L.*	Not known	Sterculiaceae	√	
129	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae		√
130	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae	√	
131	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	√	√

No	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
132	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	√	√
133	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-than	Rubiaceae		√
134	*Imperata cylindrica* (L.)P. Beauv.	Thet-ke	Poaceae		√
135	*Indigofera tinctoria* L.	Taw-hne	Fabaceae	√	√
136	*Ipomoea cordatotriloba*	Ka-zun	Convolvulaceae	√	
137	*Justicia procumbens*	Not known	Acanthaceae	√	
138	*Lactarius volemus* Fr.	Not known	Russulaceae		√
139	*Lagerstroemia macrocarpa* Kurz	Pyin-ma-ywet-gyi	Lythraceae		√
140	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae		√
141	*Lagerstroemia villosa* Wall.ex Kurz	Let-khwe	Lythraceae		√
142	*Lantana camara* L.	Sein-na-pan	Verbenaceae		√
143	*Leea hirta* Banks	Naga-mauk-phyu/Hta-min-yae	Leeaceae		√
144	*Leea macrophylla* Roxb.	Na-ga-mauk-gyi	Leeaceae		√
145	*Leea rubra*	Naga-mauk-ni/Hta-min-yae	Leeaceae		√
146	*Lepiota morgani* Pk.	Not known	Agraricaceae		√
147	*Leptadenia reticulata* Wight & Arn.	Gon-kha	Asclepiadaceae		√
148	*Leucas cephalotes* Spreng.	Pin-gu-hteik-peik	Lamiaceae		√
149	*Litsea glutinosa*	On-don	Lauraceae		√
150	*Lycoperdon pyriforme*	Not known	Agaricaceae		√
151	*Mallotus philippensis*	Taw-thi-din	Euphorbiaceae		√
152	*Marasmius foetidum* Fr.	Not known	Marasmiaceae		√
153	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae	√	
154	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae		√
155	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae		√
156	*Millettia extensa* Benth.	Win-u	Fabaceae	√	√
157	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae	√	
158	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae		√
159	*Musa* sp.	Nga-pyaw-yaing	Musaceae		√
160	*Myriopteron paniculatum* Griff	Ti-lay-na-tha	Asclepiadaceae	√	√
161	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae		√
162	*Ochna integerrima*	Indaing-seni	Ochnaceae	√	
163	*Ophioglossum nudicaule*	Addler's Tongue Fern	Ophioglossaceae		√
164	*Oroxylum indicum* (L.)Kurz	Kyaung-sha	Bignoniaceae		√
165	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae	√	
166	*Paxillus involutus* (Batsch.)Fr.	Hmo	Paxillaceae	√	
167	*Peristrophe roxburghiana*	Not known	Acanthaceae	√	
168	*Phoenix loureiri* Kunth	Thin-baung	Arecaceae		√
169	*Pholiota flammas* Pk	Hmo	Strophariaceae		√
170	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae		√
171	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	√	√

No	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
172	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	√	√
173	*Poa sylvestris*	Myet	Poaceae	√	
174	*Portulaca grandiflora* Hook.	Shan-hnin-si	Portulacaceae		√
175	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	√	
176	*Pouzolzia zeylanica*	Not known	Urticaceae	√	
177	*Premna amplectens* Wall	Yin-bya-phyu	Verbenaceae		√
178	*Psalliota placomyces* (Pk.) Kauffm.	Not known	Agaricaceae		√
179	*Psalliota silvatica* (Schaeff.) Quel.	Not known	Agaricaceae		√
180	*Pseuderanthemum polyanthum*	Not known	Acanthaceae	√	√
181	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	√	
182	*Pterospermum diversifolium*	Not known	Sterculiaceae	√	
183	*Pycnoporus cinnabarinus*	Not known	Polyporaceae		√
184	*Quercus mespilifolia* Wall.	Yin-gu	Fagaceae		√
185	*Rumex crispus* L.	Not known	Polygonaceae	√	
186	*Rumex trisetiferus* Stokes	Not known	Polygonaceae	√	
187	*Saccharum spontaneum* L.	Kaing	Poaceae	√	
188	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	√	
189	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae	√	
190	*Schizophyllum commune*	Not known	Schizophyllaceae		√
191	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	√	√
192	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae		√
193	*Selaginella willdenowii*	Not known	Selaginellaceae	√	√
194	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae		√
195	*Senna tora* (L.*)* Roxb	Dan-gwe	Caesalpiniaceae		√
196	*Sesbania* sp.	Nyan	Fabaceae		√
197	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	√	√
198	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	√	√
199	*Sida acuta* Burm.f.	Ta-byet-si-bin	Malvaceae		√
200	*Smilax aspericaulis* Wall ex A. D.C.	Sein-na-baw-thay	Smilacaceae		√
201	*Smilax macrophylla* Roxb.	Sein-na-baw-gyi	Smilacaceae		√
202	*Smilax*sp.	Sein-na-baw	Smilacaceae	√	
203	*Solanum aculeatissimum* Jacq.	Not known	Solanaceae		√
204	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae		√
205	*Solanum verbascifolium*	Not known	Solanaceae		√
206	*Spirogyra* sp.	Algae	Zygnemataceae	√	
207	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	√	√
208	*Stemona burkillii* Prain	Tha-mya	Stemonaceae		√
209	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae	√	
210	*Sterculia villosa*	Shaw	Sterculiaceae	√	√
211	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	√	√
212	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	√	√

No	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
213	*Strobilanthes isophyllus*	Not known	Acanthaceae		√
214	*Strophanthus wallichii* A.DC.	Na-sha-gyi	Apocynaceae		√
215	*Strychnos nux-blanda* A.W.Hill	Kha-baung	Loganiaceae	√	√
216	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae	√	√
217	*Tanacetum tibeticum* Hook.f. & Thomson	Not known	Asteraceae	√	
218	*Taraxacum officinale*	Not known	Asteraceae	√	
219	*Tectona grandis* L. f.	Kyun	Verbenaceae		√
220	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	√	√
221	*Terminalia chebula* Retz.	Phan-kha	Combretaceae		√
222	*Thespesia lampas* Dalzell & A.Gibson	Taw-wa	Malvaceae	√	√
223	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae		√
224	*Tithonia diversifolia* A. Gray	Nay-kyar-yaing	Asteraceae	√	√
225	*Tristaniopsis burmanica* (griff.)P.G.Wilson & J.T. Waterh.	Dauk-yat	Myrtaceae		√
226	*Triumfetta bartramia* L.	Kat-se-nae-thay	Tiliaceae		√
227	*Uraria lagopodioides* (L.)Desv.ex DC.	Not known	Fabaceae		√
228	*Vanda coerulescens* Griff.	Mo-lon-hmying-apyar-lay	Orchidaceae	√	
229	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae	√	√
230	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	√	√
231	*Vitex vestita* Wall.	Tauk-sha	Verbenaceae		√
232	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	√	√
233	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae		√
234	*Zephyranthes carinata* Herb.	Hnin-pan	Amaryllidaceae		√
235	*Zingibr zerumbet*	Linne-gyi	Zingiberaceae		√
236	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae		√

3.3.3. Tree Species

A total of 40 tree species belonging to 35 genera were identified in 12 sample plots in research area three on the left bank. The dominant tree species in this area are *Shorea obtusa* Wall. (Thit-ya), *Buchanania latifolia* Roxb. (Lun-pho), *Shorea siamensis* (Kurz)Miq. (In-gyin), and *Dalbergia oliveri* Gamble (Ta-ma-lan).

Table 25: Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Albizia lebbekoides* (DC.) Benth.	10	9.26	2.31
2	*Albizia procera* (Roxb.) Benth.	1	0.93	0.23
3	*Anogeissus acuminata* Wall.	5	4.63	1.16
4	*Antidesma bunius*	7	6.48	1.62
5	*Aporusa dioica* (Roxb.) Mull.Arg.	1	0.93	0.23
6	*Bombax ceiba* L.	1	0.93	0.23
7	*Bridelia retusa* (L.) A. Juss.	5	4.63	1.16

8	*Buchanania latifolia* Roxb.	62	57.41	14.35
9	*Careya arborea* Roxb.	2	1.85	0.46
10	*Chukrasia velutina* Roem.	1	0.93	0.23
11	*Croton joufra* Roxb.	3	2.78	0.69
12	*Croton oblongifolius* Roxb.	2	1.85	0.46
13	*Dalbergia cultrata* Grah.	2	1.85	0.46
14	*Dalbergia oliveri* Gamble	30	27.78	6.94
15	*Dillenia parviflora* Griff.	1	0.93	0.23
16	*Diospyros kaki* L.f.	8	7.41	1.85
17	*Dipterocarpus tuberculatus* Roxb.	18	16.67	4.17
18	*Emblica officinalis* Gaertn.	4	3.70	0.93
19	*Ficus semicordata*	1	0.93	0.23
20	*Flacourtia cataphracta* Roxb.	7	6.48	1.62
21	*Gardenia turgida* Roxb.	2	1.85	0.46
22	*Grewia eriocarpa Juss.*	25	23.15	5.79
23	*Hymenodictyon orixense* (Roxb.) Mabb.	6	5.56	1.39
24	*Lagerstroemia macrocarpa* Kurz	2	1.85	0.46
25	*Oroxylum indicum* (L.)Kurz	1	0.93	0.23
26	*Phyllanthus emblica* L.	11	10.19	2.55
27	*Quercus mespilifolia* Wall.	1	0.93	0.23
28	*Schleichera oleosa* (Lour.) Oken	11	10.19	2.55
29	*Shorea obtusa* Wall.	66	61.11	15.28
30	*Shorea siamensis*(Kurz)Miq.	47	43.52	10.88
31	*Spondias pinnata* (L. f.) Kurz.	9	8.33	2.08
32	*Sterculia villosa*	13	12.04	3.01
33	*Stereospermum suaveolens* (Roxb.) DC.	1	0.93	0.23
34	*Strychnos nux-blanda* A.W.Hill	18	16.67	4.17
35	*Syzygium grande* (Wight) Walp	5	4.63	1.16
36	*Tectona grandis* L. f.	10	9.26	2.31
37	*Terminalia alata* (Heyne) Roth	23	21.30	5.32
38	*Terminalia chebula* Retz.	2	1.85	0.46
39	*Vitex peduncularis* Wall.	6	5.56	1.39
40	*Wendlandia tinctoria* DC.	2	1.85	0.46
	Total	**432**	**400.00**	**100.00**

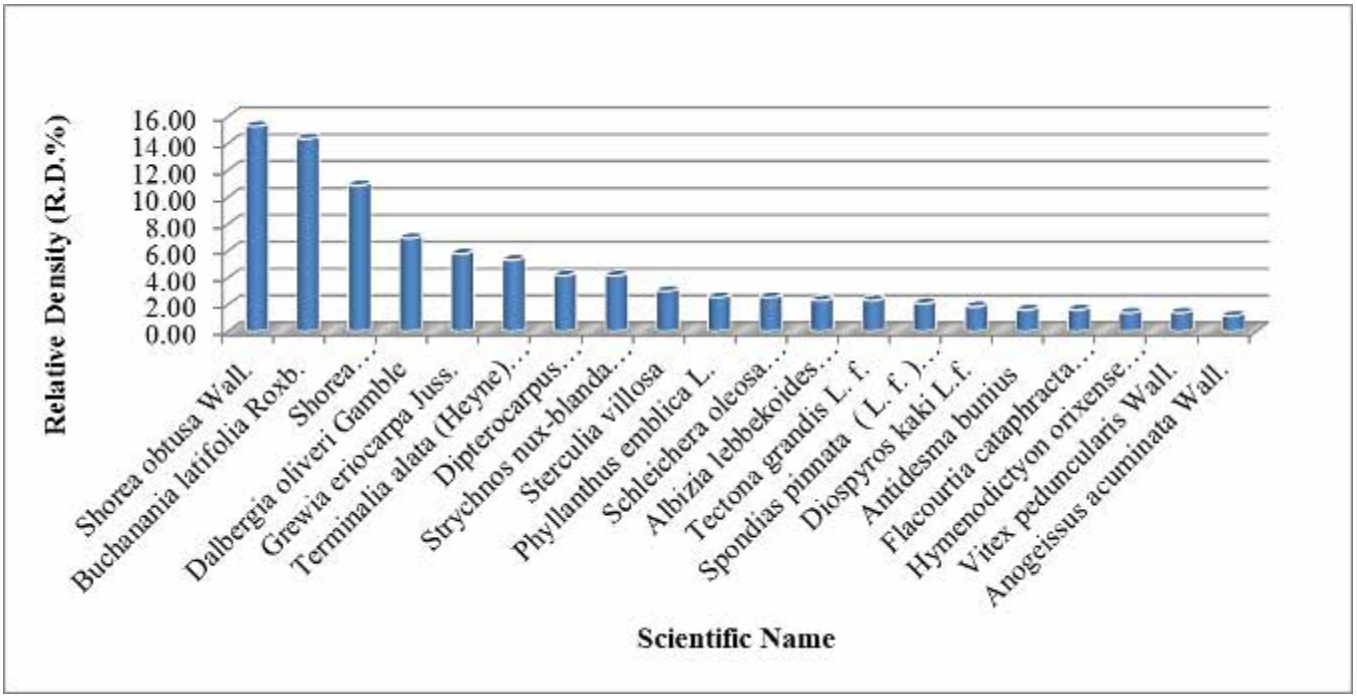
Among the sample plots, species density per hectare is varied and the species with the highest densities are *Shorea obtusa* Wall., *Buchanania latifolia* Roxb., *Shorea siamensis*(Kurz)Miq., followed by *Dalbergia oliveri* Gamble, *Grewia eriocarpa Juss.*, and *Terminalia alata* (Heyne) Roth. This shows that these six species are abundant in this area.

Table 26: Tree Species Relative Density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)

1	*Shorea obtusa* Wall.	5.50	15.28
2	*Buchanania latifolia* Roxb.	5.17	14.35
3	*Shorea siamensis*(Kurz)Miq.	3.92	10.88
4	*Dalbergia oliveri* Gamble	2.50	6.94
5	*Grewia eriocarpa Juss.*	2.08	5.79
6	*Terminalia alata* (Heyne) Roth	1.92	5.32
7	*Dipterocarpus tuberculatus* Roxb.	1.50	4.17
8	*Strychnos nux-blanda* A.W.Hill	1.50	4.17
9	*Sterculia villosa*	1.08	3.01
10	*Phyllanthus emblica* L.	0.92	2.55
11	*Schleichera oleosa* (Lour.) Oken	0.92	2.55
12	*Albizia lebbekoides* (DC.) Benth.	0.83	2.31
13	*Tectona grandis* L. f.	0.83	2.31
14	*Spondias pinnata* (L. f.) Kurz.	0.75	2.08
15	*Diospyros kaki* L.f.	0.67	1.85
16	*Antidesma bunius*	0.58	1.62
17	*Flacourtia cataphracta* Roxb.	0.58	1.62
18	*Hymenodictyon orixense* (Roxb.) Mabb.	0.50	1.39
19	*Vitex peduncularis* Wall.	0.50	1.39
20	*Anogeissus acuminata* Wall.	0.42	1.16
21	*Bridelia retusa* (L.) A. Juss.	0.42	1.16
22	*Syzygium grande* (Wight) Walp	0.42	1.16
23	*Emblica officinalis* Gaertn.	0.33	0.93
24	*Croton joufra* Roxb.	0.25	0.69
25	*Careya arborea* Roxb.	0.17	0.46
26	*Croton oblongifolius* Roxb.	0.17	0.46
27	*Dalbergia cultrata* Grah.	0.17	0.46
28	*Gardenia turgida* Roxb.	0.17	0.46
29	*Lagerstroemia macrocarpa* Kurz	0.17	0.46
30	*Terminalia chebula* Retz.	0.17	0.46
31	*Wendlandia tinctoria* DC.	0.17	0.46
32	*Albizia procera* (Roxb.) Benth.	0.08	0.23
33	*Aporusa dioica* (Roxb.) Mull.Arg.	0.08	0.23
34	*Bombax ceiba* L.	0.08	0.23
35	*Chukrasia velutina* Roem.	0.08	0.23
36	*Dillenia parviflora* Griff.	0.08	0.23
37	*Ficus semicordata*	0.08	0.23
38	*Oroxylum indicum* (L.)Kurz	0.08	0.23
39	*Quercus mespilifolia* Wall.	0.08	0.23
40	*Stereospermum suaveolens* (Roxb.) DC.	0.08	0.23

Chart 6: Tree Species Relative Density



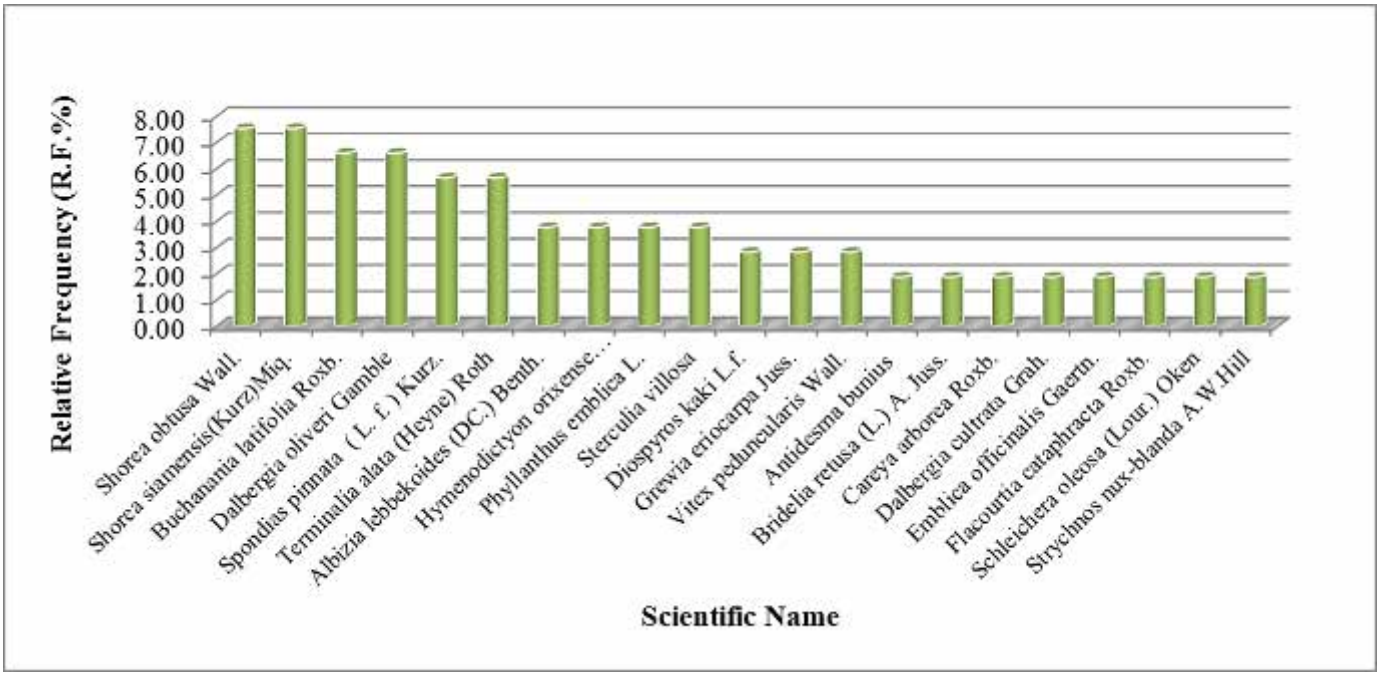
Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results**,** *Shorea obtusa* Wall., and *Shorea siamensis* (Kurz) Miq., are high relative frequency value (8%) followed by *Buchanania latifolia* Roxb., and *Dalbergia oliveri* Gamble (7%). Therefore, these species are fairly common in the area while those with lower frequencies such as *Albizia procera* (Roxb.) Benth., *Dillenia parviflora* Griff., and *Stereospermum suaveolens* (Roxb.) DC., can be considered rare species in the area.

Table 27: Tree Species Relative Frequency

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Shorea obtusa* Wall.	0.67	7.55
2	*Shorea siamensis*(Kurz)Miq.	0.67	7.55
3	*Buchanania latifolia* Roxb.	0.58	6.60
4	*Dalbergia oliveri* Gamble	0.58	6.60
5	*Spondias pinnata* (L. f.) Kurz.	0.50	5.66
6	*Terminalia alata* (Heyne) Roth	0.50	5.66
7	*Albizia lebbekoides* (DC.) Benth.	0.33	3.77
8	*Hymenodictyon orixense* (Roxb.) Mabb.	0.33	3.77
9	*Phyllanthus emblica* L.	0.33	3.77
10	*Sterculia villosa*	0.33	3.77
11	*Diospyros kaki* L.f.	0.25	2.83
12	*Grewia eriocarpa Juss.*	0.25	2.83
13	*Vitex peduncularis* Wall.	0.25	2.83
14	*Antidesma bunius*	0.17	1.89

15	*Bridelia retusa* (L.) A. Juss.	0.17	1.89
16	*Careya arborea* Roxb.	0.17	1.89
17	*Dalbergia cultrata* Grah.	0.17	1.89
18	*Emblica officinalis* Gaertn.	0.17	1.89
19	*Flacourtia cataphracta* Roxb.	0.17	1.89
20	*Schleichera oleosa* (Lour.) Oken	0.17	1.89
21	*Strychnos nux-blanda* A.W.Hill	0.17	1.89
22	*Syzygium grande* (Wight) Walp	0.17	1.89
23	*Tectona grandis* L. f.	0.17	1.89
24	*Terminalia chebula* Retz.	0.17	1.89
25	*Wendlandia tinctoria* DC.	0.17	1.89
26	*Albizia procera* (Roxb.) Benth.	0.08	0.94
27	*Anogeissus acuminata* Wall.	0.08	0.94
28	*Aporusa dioica* (Roxb.) Mull.Arg.	0.08	0.94
29	*Bombax ceiba* L.	0.08	0.94
30	*Chukrasia velutina* Roem.	0.08	0.94
31	*Croton joufra* Roxb.	0.08	0.94
32	*Croton oblongifolius* Roxb.	0.08	0.94
33	*Dillenia parviflora* Griff.	0.08	0.94
34	*Dipterocarpus tuberculatus* Roxb.	0.08	0.94
35	*Ficus semicordata*	0.08	0.94
36	*Gardenia turgida* Roxb.	0.08	0.94
37	*Lagerstroemia macrocarpa* Kurz	0.08	0.94
38	*Oroxylum indicum* (L.)Kurz	0.08	0.94
39	*Quercus mespilifolia* Wall.	0.08	0.94
40	*Stereospermum suaveolens* (Roxb.) DC.	0.08	0.94

Chart 7: Tree Species Relative Frequency



3.3.4. Orchid Species

Brachycorythis helferi (Rchb.f.) Summerh.

Brachycorythis galeandra (Rchb.f.) Summerh.

Table 28: Orchid Species

No	Scientific Name	Common Name	Family Name
1	*Appendicula* sp.	Not known	Orchidaceae
2	*Brachycorythis galeandra* (Rchb.f.) Summerh.	Not known	Orchidaceae
3	*Brachycorythis helferi* (Rchb.f.) Summerh.	Not known	Orchidaceae
4	*Bulbophyllum* sp.	Not known	Orchidaceae
5	*Cleisostoma williamsonii* (Rchb.f.)Garay.	Not known	Orchidaceae
6	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae
7	*Dendrobium* sp.	Not known	Orchidaceae
8	*Gastrochilus* sp.	Not known	Orchidaceae
9	*Habenaria procera*	Not known	Orchidaceae
10	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae

3.3.5. Mushroom Species

Psalliota silvatica (Schaeff.) Quel.

Marasmius foetidum Fr.

Table 29: Mushroom Species

No	Scientific Name	Common Name	Family Name
1	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae
2	*Calvatia gigantean* (Batsch.)Fr.	Not known	Agaricaceae
3	*Ganoderma australe*	Not known	Ganodermataceae
4	*Lactarius volemus* Fr.	Not known	Russulaceae
5	*Lepiota morgani* Pk.	Not known	Agraricaceae
6	*Lycoperdon pyriforme*	Not known	Agaricaceae
7	*Marasmius foetidum* Fr.	Not known	Marasmiaceae
8	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae
9	*Pholiota flammas* Pk	Hmo	Strophariaceae
10	*Psalliota placomyces* (Pk.) Kauffm.	Not known	Agaricaceae
11	*Psalliota silvatica* (Schaeff.) Quel.	Not known	Agaricaceae
12	*Pycnoporus cinnabarinus*	Not known	Polyporaceae
13	*Schizophyllum commune*	Not known	Schizophyllaceae

3.3.6. Bamboo Species

(Bamboo Forest Right Bank) *(Bamboo Forest Left Bank)*

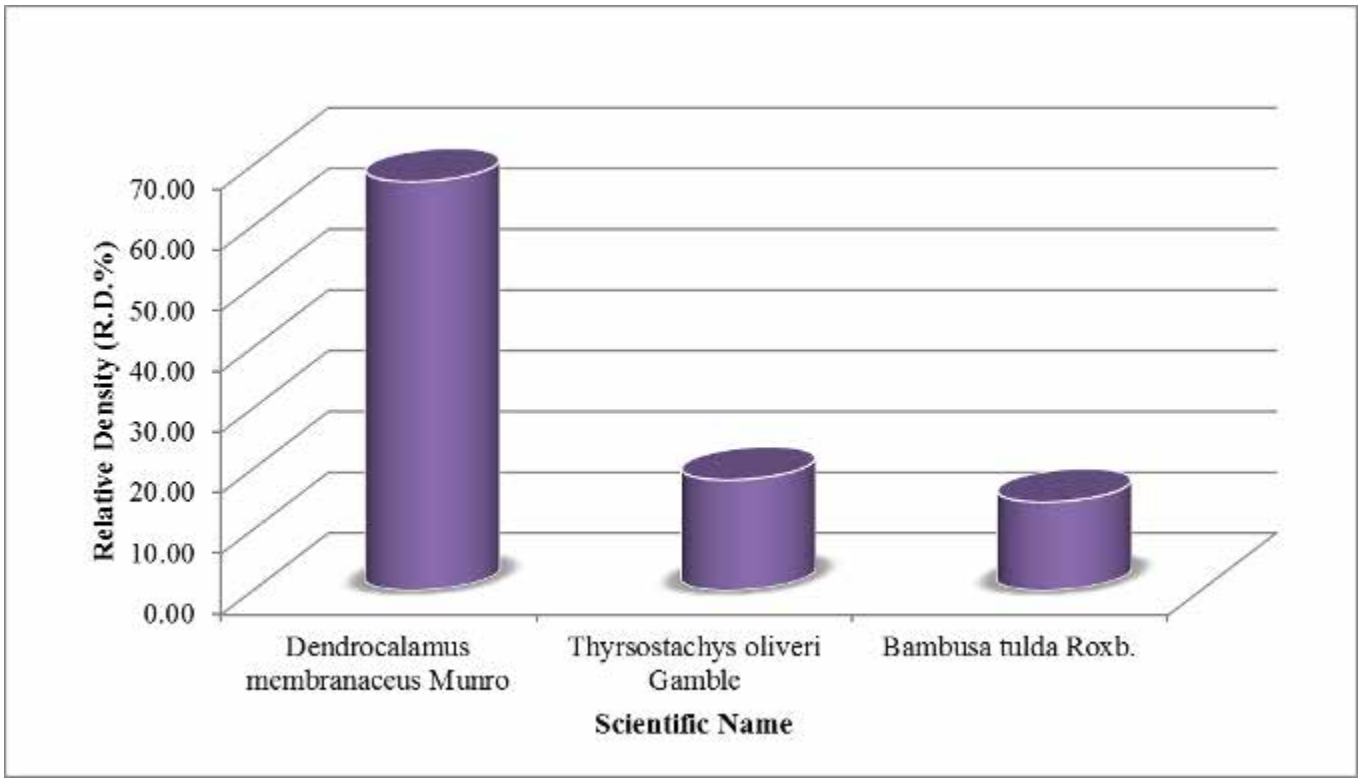
Table 30: Bamboo Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Bambusa tulda* Roxb.	8	22.22	14.55
2	*Dendrocalamus membranaceus* Munro	37	102.78	67.27
3	*Thyrsostachys oliveri* Gamble	10	27.78	18.18
	Total	**55**	**152.78**	**100.00**

Table 31: Bamboo Species Relative Density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Dendrocalamus membranaceus* Munro	9.25	67.27
2	*Thyrsostachys oliveri* Gamble	2.5	18.18
3	*Bambusa tulda* Roxb.	2	14.55

Chart 8: Bamboo Species Relative Density



3.3.7. Flora IUCN Status

Of the flora species identified in research area three on the left bank, nine species are on the IUCN Red List. They are listed below. Most notably, *Dalbergia oliveri* Gamble is classified as EN A1cd and *Dalbergia cultrata* Grah.is classified as NT. The other seven species are classified as species of least concern or low risk/least concern.

Table 32: Flora on Threatened Species List

No	Scientific Name	Common Name	Family Name	IUCN Status
1	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	LC
2	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT
3	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	EN A1cd
4	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC
5	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
6	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
7	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC
8	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/Lc
9	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/Lc
EN=Endangered, LC=Least Concern, LR/Lc=Lower Risk/Least concern, NT=Near Threatened				

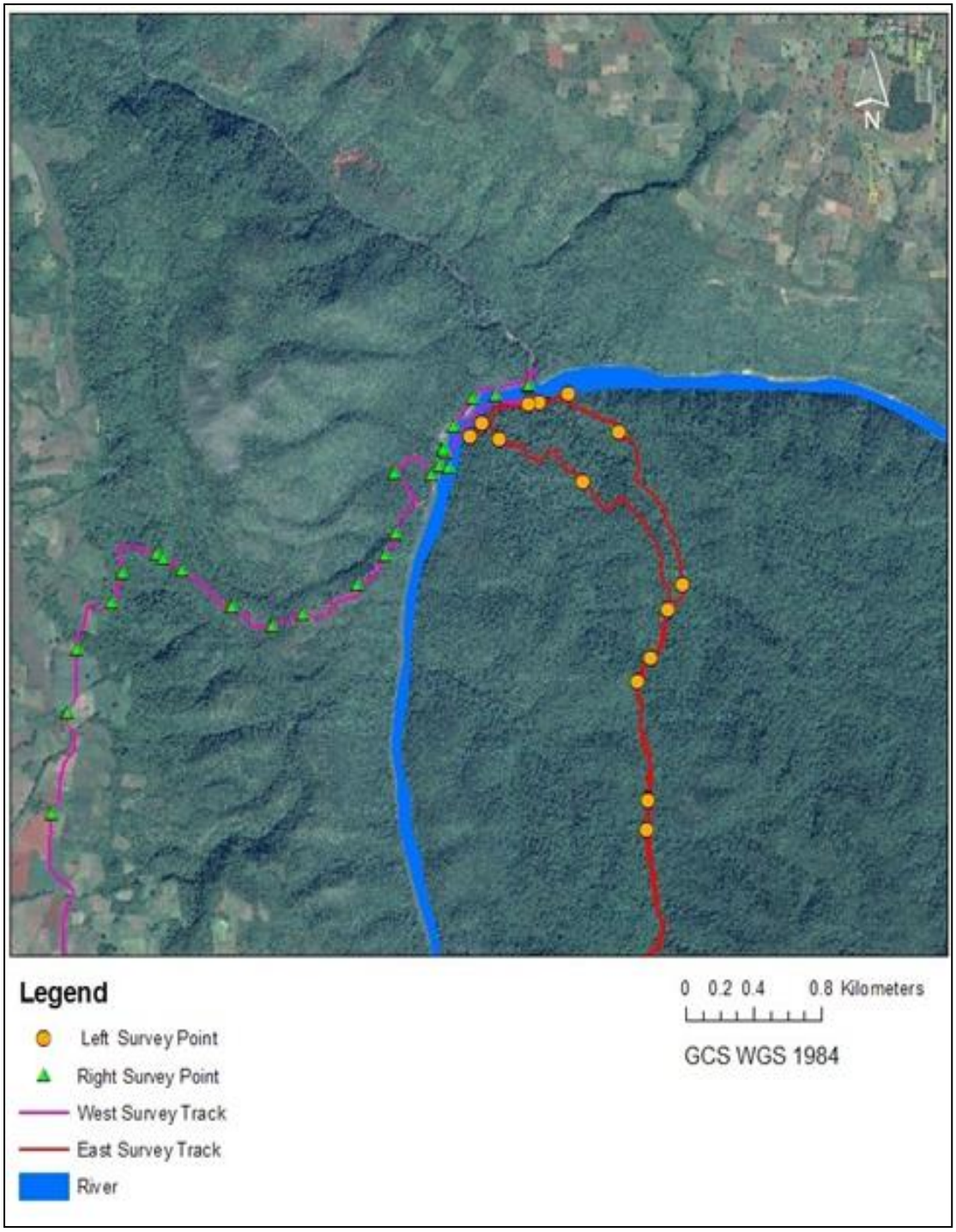
Dalbergia cultrata Grah.

Mimosa pudica L.

Shorea obtusa Wall. *Dalbergia oliveri* Gamble

3.4. Research Area Four

Map 8: Research Area Four



Map 9: Reservoir Elevation Line

Right Bank Forest

Left Bank Forest

3.4.1. Quadrant Location and Vegetation Type

A total of 14 sample plots were taken in the left bank research area four. Vegetation in each of the plots consisted of deciduous teak forest. Relevant data is summarized in the table below.

Table 33: Research Area Four Sample Plots

No.	Sample Quadrant	Vegetation type	Latitude/Longitude	Altitude(m)	Dominant species
1	KGQ XXVI	Deciduous Teak & Bamboo Forest	N22 13 53.2 E96 57 11.0	614	*Tectona grandis* L. f.,*Terminalia alata* (Heyne) Roth, *Schleichera oleosa* (Lour.) Oken, *Shorea obtusa* Wall., *Dalbergia oliveri* Gamble, *Duabanga grandiflora*, *Shorea siamensis*(Kurz)Miq., *Lagerstroemia speciosa* (L.)
2	KGQ XXVII	Deciduous Teak & Bamboo Forest	N22 14 02.9 E96 57 04.3	565	
3	KGQ XXVIII	Deciduous Teak & Bamboo Forest	N22 13 26.2 E96 57 37.3	720	
4	KGQ XXIX	Deciduous Teak & Bamboo Forest	N22 14 28.6 E96 57 07.8	590	
5	KGQ XXX	Deciduous Teak & Bamboo Forest	N22 15 36.9 E96 57 20.4	461	
6	KGQ XXXI	Deciduous Teak & Bamboo Forest	N22 16 03.1 E96 57 08.3	390	
7	KGQ XXXII	Deciduous Teak & Bamboo Forest	N22 16 08.3 E96 56 52.9	319	
8	KGQ XXXIII	Deciduous Teak & Bamboo Forest	N22 16 01.9 E96 56 45.5	360	

9	KGQ XXXIV	Deciduous Teak Forest	N22 13 59.4 E97 02 12.3	669	Pers.,*Albizia lebbekoides* (DC.) Benth., *Vitex peduncularis* Wall., *Aporusa dioica* (Roxb.) Mull.Arg.
10	KGQ XXXV	Deciduous Teak & Bamboo Forest	N22 14 02.0 E97 02 11.8	640	
11	KGQ XXXVI	Deciduous Teak & Bamboo Forest	N22 14 10.3 E97 02 06.1	518	
12	KGQ XXXVII	Deciduous Teak & Bamboo Forest	N22 14 14.7 E97 02 03.4	459	
13	KGQ XXXVIII	Deciduous Teak & Bamboo Forest	N22 14 19.8 E97 02 00.3	394	
14	KGQ XXXIX	Deciduous Teak Forest	N22 14 22.6 E97 01 58.1	376	

3.4.2. Flora Species on Left and Right Banks

A total of 160 flora species were identified in research area four on the left bank, compared to 142 on the right bank. There were 111 flora species found only on the left bank and 93 flora species found only on the right bank. 49 species were present on both banks. This yields a total of 253 flora species present on left, right or both banks.

Table 34: Flora Species in Left Bank Research Area Four

No.	Scientific Name	Common Name	Family Name	Habit
1	*Acacia intsia* Willd.	Su-bok	Mimosaceae	CL
2	*Acacia pennata* (L.)Willd.	Su-yit	Mimosaceae	CL
3	*Adiantum latifolium*	Not known	Pteridaceae	F
4	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	H
5	*Alangium chinense* (Lour.) Harms	Taw-po-sa	Alangiaceae	T
6	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	T
7	*Alocasia macrorrhizos*	Pein-gyi	Araceae	H
8	*Amalocalyx microlobus*	Not known	Apocynaceae	CL
9	*Amaranthus gracilis* Desf.	Hnin-nu-nwee-ying	Amaranthaceae	H
10	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae	H
11	*Anthocephalus morindaefolius* Korth.	Ma-u-let-tan-shae	Rubiaceae	T
12	*Antidesma bunius*	Kin-ba-lin	Euphorbiaceae	S
13	*Aporusa dioica* (Roxb.) Mull.Arg.	Thit-khauk	Euphorbiaceae	ST
14	*Arenga pinnata*(Wurmb)Merr.	Taw-ohn	Arecaceae	T
15	*Artemisia vulgaris*	Not known	Asteraceae	H
16	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	ST
17	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae	Mu
18	*Bauhinia racemosa* Lam.	Pha-lan/Hta-la	Caesalpiniaceae	ST
19	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae	H
20	*Bliospermum axillare* Blume	Hnut-cho	Euphorbiaceae	S
21	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	H
22	*Bombax ceiba* L.	Let-pan	Bombacaceae	T
23	*Bridelia retusa* (L.) A. Juss.	Myauk-zi/Seik-chi	Euphorbiaceae	T
24	*Butea parviflora* L.	Pauk-home	Fabaceae	CL
25	*Butea superba* Roxb.	Pauk-nwee	Fabaceae	CL
26	*Caesalpinia sappan* L.	Tein-nyet	Caesalpiniaceae	ST
27	*Callicarpa formosana*	Kyun-na-lin	Verbenaceae	ST

No.	Scientific Name	Common Name	Family Name	Habit
28	*Calocera viscosa*	Not known	Dacrymycetaceae	Mu
29	*Cassia fistula* L.	Ngu	Caesalpiniaceae	T
30	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	S
31	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	ST
32	*Cinnamomum parthenoxylon* Meissner	Ka-ra-way-yaing	Lauraceae	T
33	*Clausena excavata* var.*villosa* Hook. f.	Taw-pyin-daw-thein	Rutaceae	ST
34	*Clerodendrum paniculatum* L.	Pan-pa-day-tha	Verbenaceae	S
35	*Clerodendrum serratum* L.	Yin-bya-net	Verbenaceae	S
36	*Codonopsis lanceolata*	Ba-la-cheik	Campanulaceae	CL
37	*Colocasia esculenta*	Pein-yaing	Araceae	H
38	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae	ST
39	*Commelina communis*	Myet-kyut	Commelinaceae	H
40	*Commelina persicariaefolia* Wright.	Myet-kyut	Commelinaceae	H
41	*Costus specious* Sm.	Pha-lan-taung-hmwe	Costaceae	H
42	*Crassocephalum crepidioides*	Pan-zauk-htoe	Asteraceae	H
43	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae	ST
44	*Cratoxylum neriifolium* Kurz	Bae-bya	Hypericaceae	ST
45	*Cratoxylum polyanthum*Korth.	Bae-bya	Hypericaceae	ST
46	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	ST
47	*Curcuma alismatifolia*	Ma-lar	Zingiberaceae	H
48	*Curcuma longa*	Ma-lar	Zingiberaceae	H
49	*Curcuma petiolata* Roxb.	Ma-lar	Zingiberaceae	H
50	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	G
51	*Cyperus malaccensis* var. *brevifolius*	Not known	Cyperaceae	H
52	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	T
53	*Datura metel* L.	Pa-daing	Solanaceae	S
54	*Dendrocalamus latiflorus* Munro	Wa-bo	Poaceae	B
55	*Desmodium heterocarpon*	Myay-pe-htwe	Fabaceae	S
56	*Desmodium umbellatum* DC.	Kyee-hmi-apho	Fabaceae	S
57	*Dillenia parviflora* Griff.	Zin-byun	Dilleniaceae	ST
58	*Dioscorea alata*	Myauk-u	Dioscoreaceae	CL
59	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	CL
60	*Dioscorea cylindrica* Burm.	Kyway-thon-ywet	Dioscoreaceae	CL
61	*Dioscorea pentaphylla* L.	Kyway-ngar-ywet	Dioscoreaceae	CL
62	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	F
63	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	T
64	*Equisetum hyemale*	Not known	Equisetaceae	H
65	*Eugenia balsama* Wight	Ye-tha-bye	Myrtaceae	T
66	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae	H
67	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae	H
68	*Ficus auriculata*	Sin-tha-phan	Moraceae	T

No.	Scientific Name	Common Name	Family Name	Habit
69	*Ficus bengalensis* L.	Pyin-nyaung	Moraceae	T
70	*Ficus hispida* L.	Kha-aung	Moraceae	ST
71	*Ficus lanceolata* Buch.-Ham.	Ye-tha-phan	Moraceae	T
72	*Ficus pumila* L.	Kyauk-kat-nyaung	Moraceae	CL
73	*Ficus semicordata*	Ka-dut	Moraceae	T
74	*Ficus variegata*	Kon-tha-phan	Moraceae	T
75	*Flemingia stricta* Roxb.	Kyee-hmi	Fabaceae	S
76	*Ganoderma lucidum*	Not known	Ganodermataceae	Mu
77	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae	ST
78	*Garuga pinnata* Roxb.	Chin-yoke	Burseraceae	T
79	*Globba patens*	Pa-dein-ngo	Zingiberaceae	H
80	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae	H
81	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	T
82	*Gochnatia decora*	Not known	Asteraceae	ST
83	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	ST
84	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	S
85	*Heteropanax fragrans* (Roxb. ex DC.) Seem.	Kyaung-dauk/La-ka-du	Araliaceae	ST
86	*Heterophragma sulfureum* Kurz	Phet-than	Bignoniaceae	T
87	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	S
88	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-than	Rubiaceae	T
89	*Hypholoma incertum* Pk.	Not known	Microthyriaceae	Mu
90	*Jasminum multiflorum*	Taw-sa-bei	Oleaceae	S
91	*Lactarius glaucescens* Pk.	Not known	Russulaceae	Mu
92	*Lactarius volemus* Fr.	Not known	Russulaceae	Mu
93	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae	T
94	*Lagerstroemia villosa* Wall.ex Kurz	Let-khwe	Lythraceae	T
95	*Lasia aculeata* Lour.	Za-yit	Araceae	H
96	*Leea hirta* Banks	Naga-mauk-phyu/Hta-min-yae	Leeaceae	S
97	*Leea macrophylla* Roxb.	Na-ga-mauk-gyi	Leeaceae	S
98	*Leea rubra*	Naga-mauk-ni/Hta-min-yae	Leeaceae	S
99	*Leucaena leucocephala* (Lam.) De.Wit	Baw-sa-gaing	Mimosaceae	ST
100	*Lygodium japonicum*(Thunb.)Sw.	Not known	Lygodiaceae	F
101	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	T
102	*Marasmium oreades*	Not known	Marasmiaceae	Mu
103	*Markhamia stipulata* (Wall.) Seem. Ex K.Schum.	Ma-hlwa	Bignoniaceae	T
104	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae	T
105	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae	Mu
106	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL
107	*Millettia extensa* Benth.	Win-u	Fabaceae	CL
108	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
109	*Mitragyna rotundifolia* (Roxb.) Kuntze	Bin-ga	Rubiaceae	T

No.	Scientific Name	Common Name	Family Name	Habit
110	*Musa balbisiana*	Nget-pyaw	Musaceae	H
111	*Musa* sp.	Nga-pyaw-yaing	Musaceae	H
112	*Mussaenda calycina* Wall. ex Kurz	Pwint-tu-ywet-tu	Rubiaceae	ST
113	*Nauclea orientalis* L.	Ma-u-let-tan-to	Rubiaceae	T
114	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae	H
115	*Oroxylum indicum* (L.)Kurz	Kyaung-sha	Bignoniaceae	ST
116	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	B
117	*Pennisetum purpureum*	Yone-zar-myet	Poaceae	G
118	*Phellinus tremulae*	Not known	Hymenochaetaceae	Mu
119	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	ST
120	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	H
121	*Pleurotus cornucopiae*	Not known	Pleurotaceae	Mu
122	*Polygonum barbatum*	Kywe-hna-khaung-gyate	Polygonaceae	H
123	*Pouzolzia zeylanica* (L.) Benn.	Not known	Urticaceae	H
124	*Premna amplectens* Wall	Yin-bya-phyu	Verbenaceae	S
125	*Pseuderanthemum polyanthum*	Not known	Acanthaceae	H
126	*Pterospermum acerifolium* (L.) Willd.	Taung-phet-wun	Sterculiaceae	T
127	*Quercus mespilifolia* Wall.	Yin-gu	Fagaceae	T
128	*Randia uliginosa* DC.	Hman-ni	Rubiaceae	ST
129	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	T
130	*Selaginella willdenowii*	Not known	Selaginellaceae	F
131	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae	S
132	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	T
133	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	T
134	*Sida acuta* Burm f.	Ta-byet-si-ywet-shae	Malvaceae	S
135	*Sida rhombifolia* L.	Ta-byet-se-ywet-waing	Malvaceae	S
136	*Sinomenium acutum* (Thunb.)Rehd.et Wils.	Nwee-war/Say-war	Menispermaceae	CL
137	*Smilax aspericaulis* Wall ex A. D.C.	Sein-na-baw-thay	Smilacaceae	CL
138	*Smilax macrophylla* Roxb.	Sein-na-baw-gyi	Smilacaceae	CL
139	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae	S
140	*Solanum verbascifolium*	Not known	Solanaceae	ST
141	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	T
142	*Sterculia villosa*	Shaw	Sterculiaceae	T
143	*Strychnos nux-blanda* A.W.Hill	Kha-baung	Loganiaceae	ST
144	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae	T
145	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae	T
146	*Tectona grandis* L. f.	Kyun	Verbenaceae	T
147	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	T
148	*Terminalia bellerica* Roxb.	Thit-seint	Combretaceae	T
149	*Terminalia chebula* Retz.	Phan-kha	Combretaceae	T
150	*Tetrameles nudiflora* R.Br.	Thit-pok	Datiscaceae	T

No.	Scientific Name	Common Name	Family Name	Habit
151	*Thespesia lampas* Dalzell & A.Gibson	Taw-wa	Malvaceae	S
152	*Thunbergia fragrans* Roxb.	Pan-ye-sut	Acanthaceae	CL
153	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae	B
154	*Tithonia diversifolia* A. Gray	Nay-kyar-yaing	Asteraceae	S
155	*Triumfetta bartramia* L.	Kat-se-nae-thay	Tiliaceae	S
156	*Uraria crinita* (L.)Desv.ex DC.	Not known	Fabaceae	S
157	*Urena sinuata*	Kat-se nae-gyi	Malvaceae	S
158	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae	ST
159	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	T
160	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	ST
161	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	ST
B=Bamboo,CL=Climber,F=Fern, G=Grass,H=Herbs,Mu=Mushroom,S=Shrubs,ST=Small Tree, T=Tree				

Table 35: Right and Left Bank Species

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
1	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	√	
2	*Acacia intsia* Willd.	Su-bok	Mimosaceae		√
3	*Acacia pennata* (L.)Willd.	Su-yit	Mimosaceae		√
4	*Adenanthera pavonina* L.	Ywe-gyi	Mimosaceae	√	
5	*Adenostemma viscosum*	Not known	Asteraceae	√	
6	*Adiantum latifolium*	Not known	Pteridaceae		√
7	*Adiantum peruvianum*	Adiantum	Pteridaceae	√	
8	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	√	√
9	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae	√	√
10	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	√	√
11	*Alocasia macrorrhizos*	Pein-gyi	Araceae		√
12	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	√	
13	*Amalocalyx microlobus*	Not known	Apocynaceae		√
14	*Amaranthus gracilis* Desf.	Hnin-nu-nwee-ying	Amaranthaceae	√	√
15	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae	√	
16	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae		√
17	*Anisomeles indica*	Not known	Lamiaceae	√	
18	*Anthocephalus morindaefolius* Korth.	Ma-u-let-tan-shae	Rubiaceae		√
19	*Antidesma bunius*	Kin-ba-lin	Euphorbiaceae	√	√
20	*Aporusa dioica* (Roxb.) Mull.Arg.	Thit-khauk	Euphorbiaceae		√
21	*Ardisia* sp.	Kyet-ma-ok	Myrsinaceae	√	
22	*Arenga pinnata*(Wurmb)Merr.	Taw-ohn	Arecaceae		√
23	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae	√	
24	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae	√	
25	*Aristolochia acuminata*	Eik-tha-ya-mu-li	Aristolochiaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
26	*Artemisia vulgaris*	Not known	Asteraceae		√
27	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	√	√
28	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae		√
29	*Bambusa bambos*(L.)Voss.	Kya-khat-wa	Poaceae	√	
30	*Barleria strigosa* Willd.	Not known	Acanthaceae	√	
31	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae	√	
32	*Bauhinia racemosa* Lam.	Pha-lan/Hta-la	Caesalpiniaceae		√
33	*Bauhinia* sp.	Swe-daw	Caesalpiniaceae	√	
34	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae		√
35	*Bidens pilosa*	Hmwe-sok	Asteraceae	√	
36	*Bischofia javanica*	Not known	Euphorbiaceae	√	
37	*Bliospermum axillare* Blume	Hnut-cho	Euphorbiaceae	√	√
38	*Blumea balsamifera*	Not known	Asteraceae	√	
39	*Boerhavia diffusa* L.	Pa-yan-na-wa	Nyctaginaceae	√	
40	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae		√
41	*Bombax ceiba* L.	Let-pan	Bombacaceae	√	√
42	*Bombax insigne* Wall.	De-du	Bombacaceae	√	
43	*Bridelia retusa* (L.) A. Juss.	Myauk-zi/Seik-chi	Euphorbiaceae		√
44	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae	√	
45	*Butea parviflora* L.	Pauk-home	Fabaceae		√
46	*Butea superba* Roxb.	Pauk-nwee	Fabaceae		√
47	*Caesalpinia sappan* L.	Tein-nyet	Caesalpiniaceae		√
48	*Callicarpa formosana*	Kyun-na-lin	Verbenaceae		√
49	*Calocera viscosa*	Not known	Dacrymycetaceae		√
50	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae	√	
51	*Canavalia cathartica*	Not known	Fabaceae	√	
52	*Canscora diffusa* (Vahl) R.Br.	Kyauk-pan	Gentianaceae	√	
53	*Carduus pycnocephalus*	Not known	Asteraceae	√	
54	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae	√	
55	*Cassia fistula* L.	Ngu	Caesalpiniaceae	√	√
56	*Centratherum punctatum*	Not known	Asteraceae	√	
57	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae		√
58	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae		√
59	*Cinnamomum parthenoxylon* Meissner	Ka-ra-way-yaing	Lauraceae		√
60	*Cissus hastata* Miq.	Sa-pyit-yaing	Vitaceae	√	
61	*Clausena excavata* var.*villosa* Hook. f.	Taw-pyin-daw-thein	Rutaceae		√
62	*Clerodendrum paniculatum* L.	Pan-pa-day-tha	Verbenaceae		√
63	*Clerodendrum serratum* L.	Yin-bya-net	Verbenaceae	√	√
64	*Codonopsis lanceolata*	Not known	Campanulaceae	√	√
65	*Colocasia esculenta*	Pein-yaing	Araceae		√
66	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
67	*Commelina communis*	Myet-kyut	Commelinaceae		√
68	*Commelina persicariaefolia* Wright.	Myet-kyut	Commelinaceae	√	√
69	*Costus specious* Sm.	Pha-lan-taung-hmwe	Costaceae	√	√
70	*Crassocephalum crepidioides*	Pan-zauk-htoe	Asteraceae		√
71	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae		√
72	*Cratoxylum neriifolium* Kurz	Bae-bya	Hypericaceae		√
73	*Cratoxylum polyanthum*Korth.	Bae-bya	Hypericaceae		√
74	*Crotalaria alata* Buch.-Ham. ex G.Don	Not known	Fabaceae	√	
75	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae		√
76	*Curcuma alismatifolia*	Ma-lar	Zingiberaceae		√
77	*Curcuma longa*	Ma-lar	Zingiberaceae		√
78	*Curcuma petiolata* Roxb.	Ma-lar	Zingiberaceae	√	√
79	*Curcuma* sp.	Mar-la	Zingiberaceae	√	
80	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae	√	
81	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae		√
82	*Cyperus malaccensis* var. *brevifolius*	Not known	Cyperaceae		√
83	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	√	
84	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	√	
85	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	√	√
86	*Datura metel* L.	Pa-daing	Solanaceae		√
87	*Dendrocalamus latiflorus* Munro	Wa-bo	Poaceae		√
88	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	√	
89	*Dendrophthoe pentandra* (L.) Miq.	Kyi-paung	Loranthaceae	√	
90	*Desmodium gangeticum* L.	Not known	Fabaceae	√	
91	*Desmodium heterocarpon*	Myay-pe-htwe	Fabaceae		√
92	*Desmodium pulchellum* Benth.	Taung-damin	Fabaceae	√	
93	*Desmodium triangulare* (Retz.) Merr.	Not known	Fabaceae	√	
94	*Desmodium umbellatum* DC.	Kyee-hmi-apho	Fabaceae		√
95	*Dichanthium caricosum* (L.)A.Camus	Pa-daw-myet	Poaceae	√	
96	*Dillenia parviflora* Griff.	Zin-byun	Dilleniaceae	√	√
97	*Dioscorea alata*	Myauk-u	Dioscoreaceae		√
98	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	√	√
99	*Dioscorea cylindrica* Burm.	KYwary-thon-ywet	Dioscoreaceae	√	√
100	*Dioscorea pentaphylla* L.	KYwary-ngar-ywet	Dioscoreaceae	√	√
101	*Dioscorea sativa* L.	Kyauk-yin-nwee	Dioscoreaceae	√	
102	*Diospyros kaki* L.f.	Tae	Ebenaceae	√	
103	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	√	√
104	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	√	√
105	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae	√	
106	*Elaeocarpus hainanensis* Oliv.	Kywe-pan-pin	Elaeocarpaceae	√	
107	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
108	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae	√	
109	*Engelhardtia spicata*	Pan-swe-le	Juglandaceae	√	
110	*Equisetum hyemale*	Not known	Equisetaceae		√
111	*Erythrina stricta* Roxb.	Ka-thit	Fabaceae	√	
112	*Eugenia balsama* Wight	Ye-tha-bye	Myrtaceae		√
113	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae	√	
114	*Euphorbia antiquorum* L.	Tazaung-gyi	Euphorbiaceae	√	
115	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae		√
116	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae		√
117	*Ficus auriculata*	Sin-tha-phan	Moraceae		√
118	*Ficus bengalensis* L.	Pyin-nyaung	Moraceae	√	√
119	*Ficus hispida* L.	Kha-aung	Moraceae	√	√
120	*Ficus lanceolata* Buch.-Ham.	Ye-tha-phan	Moraceae		√
121	*Ficus pumila* L.	Kyauk-kat-nyaung	Moraceae	√	√
122	*Ficus racemosa*	Tha-phan	Moraceae	√	
123	*Ficus semicordata*	Ka-dut	Moraceae		√
124	*Ficus variegata*	Kon-tha-phan	Moraceae	√	√
125	*Flemingia stricta* Roxb.	Kyee-hmi	Fabaceae		√
126	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae	√	
127	*Gagea reticulata* (Pall.) Schult.	Not known	Liliaceae	√	
128	*Ganoderma lucidum*	Not known	Ganodermataceae		√
129	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae		√
130	*Garuga pinnata* Roxb.	Chin-yoke	Burseraceae		√
131	*Globba patens*	Pa-dein-ngo	Zingiberaceae	√	√
132	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae		√
133	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	√	√
134	*Gochnatia decora*	Not known	Asteraceae		√
135	*Gonostegia hirta*	Not known	Rubiaceae	√	
136	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae		√
137	*Grewia laevigata* Vahl	Ta-yaw	Tiliaceae	√	
138	*Habenaria chlorina* Par. & Rchb.f.	Not known	Orchidaceae	√	
139	*Habenaria hosseusii* Schltr.	Not known	Orchidaceae	√	
140	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	√	√
141	*Hedyotis diffusa*	Not known	Rubiaceae	√	
142	*Helicteres angustifolia L.*	Not known	Sterculiaceae	√	
143	*Heteropanax fragrans* (Roxb. ex DC.) Seem.	Kyaung-dauk/La-ka-du	Araliaceae		√
144	*Heterophragma sulfureum* Kurz	Phet-than	Bignoniaceae		√
145	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae	√	
146	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	√	
147	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	√	√
148	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-than	Rubiaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
149	*Hypholoma incertum* Pk.	Not known	Microthyriaceae		√
150	*Indigofera tinctoria*	Me-yaing	Fabaceae	√	
151	*Isachne albens* Trin.	Myet	Poaceae	√	
152	*Jasminum multiflorum*	Taw-sa-bei	Oleaceae		√
153	*Justicia procumbens*	Not known	Acanthaceae	√	
154	*Lactarius glaucescens* Pk.	Not known	Russulaceae		√
155	*Lactarius volemus* Fr.	Not known	Russulaceae		√
156	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae		√
157	*Lagerstroemia villosa* Wall.ex Kurz	Let-khwe	Lythraceae		√
158	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae	√	
159	*Lasia aculeata* Lour.	Za-yit	Araceae		√
160	*Leea hirta* Banks	Naga-mauk-phyu/Hta-min-yae	Leeaceae	√	√
161	*Leea macrophylla* Roxb.	Na-ga-mauk-gyi	Leeaceae	√	√
162	*Leea rubra*	Na-ga-mauk-ni	Leeaceae	√	√
163	*Leucaena leucocephala* (Lam.) De.Wit	Baw-sa-gaing	Mimosaceae		√
164	*Lygodium circinnatum*	Not known	Lygodiaceae	√	
165	*Lygodium japonicum*(Thunb.)Sw.	Not known	Lygodiaceae		√
166	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae		√
167	*Marasmium oreades*	Not known	Marasmiaceae		√
168	*Markhamia stipulata* (Wall.) Seem. Ex K.Schum.	Ma-hlwa	Bignoniaceae		√
169	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae	√	
170	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae		√
171	*Micromelum minutum* (G. Forst.) Wight & Arn.	Pa-le-pan/Pauk-chaung	Rutaceae	√	
172	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae	√	√
173	*Mikania micrantha* H.B.K.	Bi-zet-new	Asteraceae	√	√
174	*Millettia extensa* Benth.	Win-u	Fabaceae		√
175	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae	√	
176	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae		√
177	*Mitragyna rotundifolia* (Roxb.) Kuntze	Bin-ga	Rubiaceae		√
178	*Musa balbisiana*	Nget-pyaw	Musaceae		√
179	*Musa* sp.	Nga-pyaw-yaing	Musaceae		√
180	*Mussaenda calycina* Wall. ex Kurz	Pwint-tu-ywet-tu	Rubiaceae		√
181	*Myriopteron paniculatum* Griff	Ti-lay-na-tha	Asclepiadaceae	√	
182	*Nauclea orientalis* L.	Ma-u-let-tan-to	Rubiaceae		√
183	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae		√
184	*Ochna integerrima*	Indaing-seni	Ochnaceae	√	
185	*Oldenlandia diffusa*	Not known	Rubiaceae	√	
186	*Oroxylum indicum* (L.)Kurz	Kyaung-sha	Bignoniaceae		√
187	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	√	√
188	*Paederia foetida*	Pe-bok-nwee-thay	Rubiaceae	√	
189	*Paederia scandens* Lour.	Pe-bok-nwee-gyi	Rubiaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
190	*Pennisetum purpureum*	Yone-zar-myet	Poaceae		√
191	*Pericampylus glaucus* L.	Not known	Menispermaceae	√	
192	*Phellinus tremulae*	Not known	Hymenochaetaceae		√
193	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae	√	
194	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	√	√
195	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	√	√
196	*Pilea scripta* Langtang	Phet-ya	Urticaceae	√	
197	*Pleurotus cornucopiae*	Not known	Pleurotaceae		√
198	*Polygonum barbatum*	Kywe-hna-khaung-gyate	Polygonaceae		√
199	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	√	
200	*Pouzolzia zeylanica* (L.) Benn.	Not known	Urticaceae		√
201	*Premna amplectens* Wall	Yin-bya-phyu	Verbenaceae		√
202	*Pseuderanthemum polyanthum*	Not known	Acanthaceae		√
203	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	√	
204	*Pterospermum acerifolium* (L.) Willd.	Taung-phet-wun	Sterculiaceae		√
205	*Pycnoporus sanguineus*	Hmo	Polyporaceae	√	
206	*Quercus mespilifolia* Wall.	Yin-gu	Fagaceae		√
207	*Randia uliginosa* DC.	Hman-ni	Rubiaceae		√
208	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae	√	
209	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	√	√
210	*Selaginella willdenowii*	Not known	Selaginellaceae		√
211	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae		√
212	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	√	√
213	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	√	√
214	*Sida acuta* Burm f.	Ta-byet-si-ywet-shae	Malvaceae		√
215	*Sida rhombifolia* L.	Ta-byet-se-ywet-waing	Malvaceae		√
216	*Sinomenium acutum* (Thunb.)Rehd.et Wils.	Nwee-war/Say-war	Menispermaceae		√
217	*Smilax aspericaulis* Wall ex A. D.C.	Sein-na-baw-thay	Smilacaceae		√
218	*Smilax macrophylla* Roxb.	Sein-na-baw-gyi	Smilacaceae		√
219	*Smilax*sp.	Sein-na-baw	Smilacaceae	√	
220	*Solanum coagulans*	Kha-yan	Solanaceae	√	
221	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae		√
222	*Solanum verbascifolium*	Not known	Solanaceae		√
223	*Spirogyra* sp.	Algae	Zygnemataceae	√	
224	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	√	√
225	*Stemona tuberosa*	Tha-mya	Stemonaceae	√	
226	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae	√	
227	*Sterculia villosa*	Shaw	Sterculiaceae	√	√
228	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	√	
229	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	√	
230	*Strychnos nux-blanda* A.W.Hill	Kha-baung	Loganiaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
231	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae	√	√
232	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae		√
233	*Tectona grandis* L. f.	Kyun	Verbenaceae		√
234	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	√	√
235	*Terminalia bellerica* Roxb.	Thit-seint	Combretaceae		√
236	*Terminalia chebula* Retz.	Phan-kha	Combretaceae		√
237	*Termitomyces albuminosa*	Taung-po-hmo	Agaricaceae	√	
238	*Tetrameles nudiflora* R.Br.	Thit-pok	Datiscaceae		√
239	*Thespesia lampas* Dalzell & A.Gibson	Taw-wa	Malvaceae		√
240	*Thunbergia fragrans* Roxb.	Pan-ye-sut	Acanthaceae		√
241	*Thunbergia grandiflora*	Kyi-hnok-thi-nwee	Acanthaceae	√	
242	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae		√
243	*Tithonia diversifolia* A. Gray	Nay-kyar-yaing	Asteraceae	√	√
244	*Trichosanthes cordata* Roxb.	Kyi-ah	Cucurbitaceae	√	
245	*Triumfetta bartramia* L.	Kat-se-nae-thay	Tiliaceae		√
246	*Uraria crinita* (L.)Desv.ex DC.	Not known	Fabaceae	√	√
247	*Urena sinuata*	Kat-se nae-gyi	Malvaceae		√
248	*Uvaria cordata* Schum. & Thonn.	Tha-but-gyi	Annonaceae	√	
249	*Vanda coerulescens* Griff.	Mo-lon-hmying-apyar-lay	Orchidaceae	√	
250	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae		√
251	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	√	√
252	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	√	√
253	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	√	√

3.4.3. Tree Species

Out of the 14 sample plots in research area four on the left bank, 25 tree species belonging to 22 genera were identified. The dominant tree species in this area is *Tectona grandis* L. f. (Kyun) followed by *Terminalia alata* (Heyne) Roth (Htauk-kyant), *Schleichera oleosa* (Lour.) Oken (Gyo), and *Shorea obtusa* Wall., (Thit-ya).

Table 36: Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Albizia lebbekoides* (DC.) Benth.	5	3.97	2.76
2	*Aporusa dioica* (Roxb.) Mull.Arg.	4	3.17	2.21
3	*Bridelia retusa* (L.) A. Juss.	2	1.59	1.10
4	*Croton oblongifolius* Roxb.	2	1.59	1.10
5	*Dalbergia oliveri* Gamble	8	6.35	4.42
6	*Dillenia parviflora* Griff.	1	0.79	0.55
7	*Duabanga grandiflora*	8	6.35	4.42

8	*Ficus bengalensis* L.	1	0.79	0.55
9	*Ficus lanceolata* Buch.-Ham.	4	3.17	2.21
10	*Heterophragma sulfureum* Kurz	1	0.79	0.55
11	*Lagerstroemia speciosa* (L.) Pers.	6	4.76	3.31
12	*Mangifera sylvatica* Roxb.	1	0.79	0.55
13	*Quercus mespilifolia* Wall.	1	0.79	0.55
14	*Schleichera oleosa* (Lour.) Oken	22	17.46	12.15
15	*Shorea obtusa* Wall.	10	7.94	5.52
16	*Shorea siamensis*(Kurz)Miq.	8	6.35	4.42
17	*Spondias pinnata* (L. f.) Kurz.	4	3.17	2.21
18	*Sterculia villosa*	1	0.79	0.55
19	*Tamarindus indica* L.	1	0.79	0.55
20	*Tectona grandis* L. f.	55	43.65	30.39
21	*Terminalia alata* (Heyne) Roth	25	19.84	13.81
22	*Terminalia chebula* Retz.	1	0.79	0.55
23	*Tetrameles nudiflora* R.Br.	4	3.17	2.21
24	*Vitex peduncularis* Wall.	5	3.97	2.76
25	*Wendlandia tinctoria* DC.	1	0.79	0.55
	Total	**181**	**143.65**	**100.00**

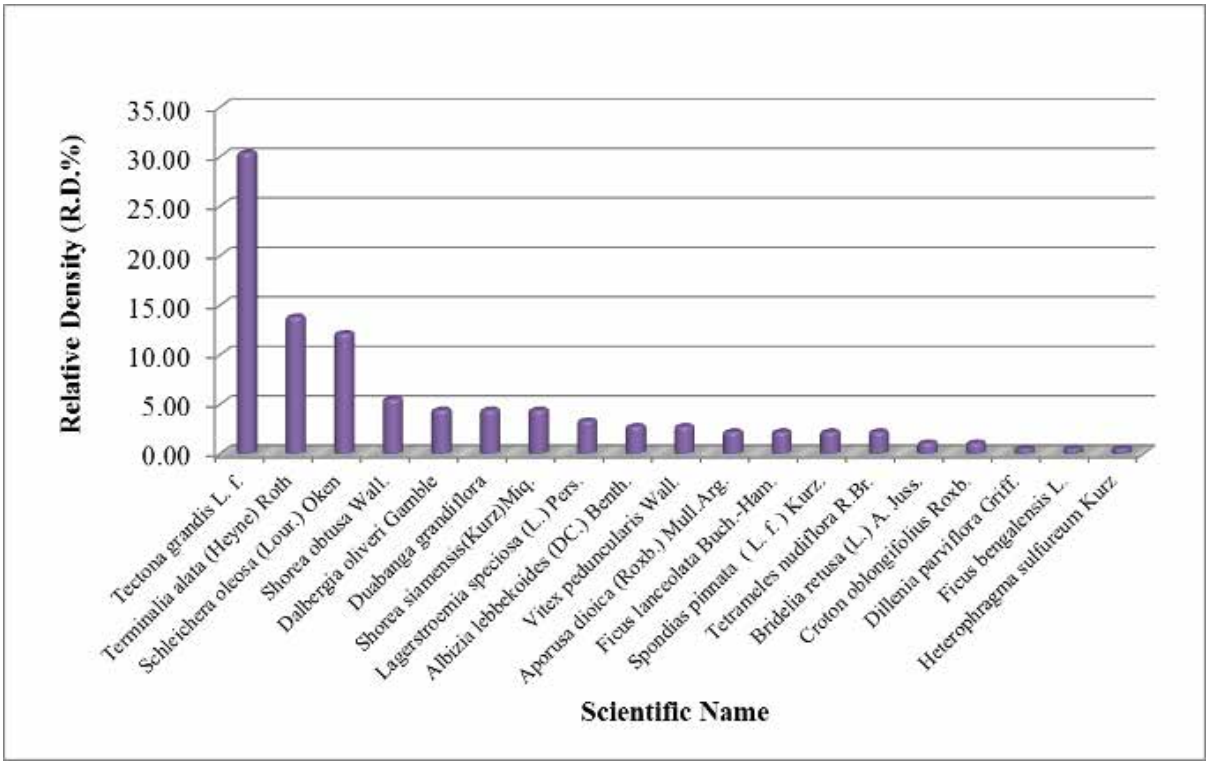
Among the sample plots, species density per hectare varied. The most densely populated species include; *Tectona grandis* L. f., *Terminalia alata* (Heyne) Roth, *Schleichera oleosa* (Lour.) Oken, followed by *Shorea obtusa* Wall., *Dalbergia oliveri* Gamble, *Duabanga grandiflora* and *Shorea siamensis* (Kurz) Miq.. These seven species can be considered abundant in this area.

Table 37: Tree Species Relative Density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Tectona grandis* L. f.	3.93	30.39
2	*Terminalia alata* (Heyne) Roth	1.79	13.81
3	*Schleichera oleosa* (Lour.) Oken	1.57	12.15
4	*Shorea obtusa* Wall.	0.71	5.52
5	*Dalbergia oliveri* Gamble	0.57	4.42
6	*Duabanga grandiflora*	0.57	4.42
7	*Shorea siamensis*(Kurz)Miq.	0.57	4.42
8	*Lagerstroemia speciosa* (L.) Pers.	0.43	3.31
9	*Albizia lebbekoides* (DC.) Benth.	0.36	2.76
10	*Vitex peduncularis* Wall.	0.36	2.76
11	*Aporusa dioica* (Roxb.) Mull.Arg.	0.29	2.21
12	*Ficus lanceolata* Buch.-Ham.	0.29	2.21
13	*Spondias pinnata* (L. f.) Kurz.	0.29	2.21
14	*Tetrameles nudiflora* R.Br.	0.29	2.21

15	*Bridelia retusa* (L.) A. Juss.	0.14	1.10
16	*Croton oblongifolius* Roxb.	0.14	1.10
17	*Dillenia parviflora* Griff.	0.07	0.55
18	*Ficus bengalensis* L.	0.07	0.55
19	*Heterophragma sulfureum* Kurz	0.07	0.55
20	*Mangifera sylvatica* Roxb.	0.07	0.55
21	*Quercus mespilifolia* Wall.	0.07	0.55
22	*Sterculia villosa*	0.07	0.55
23	*Tamarindus indica* L.	0.07	0.55
24	*Terminalia chebula* Retz.	0.07	0.55
25	*Wendlandia tinctoria* DC.	0.07	0.55

Chart 9: Tree Species Relative Density

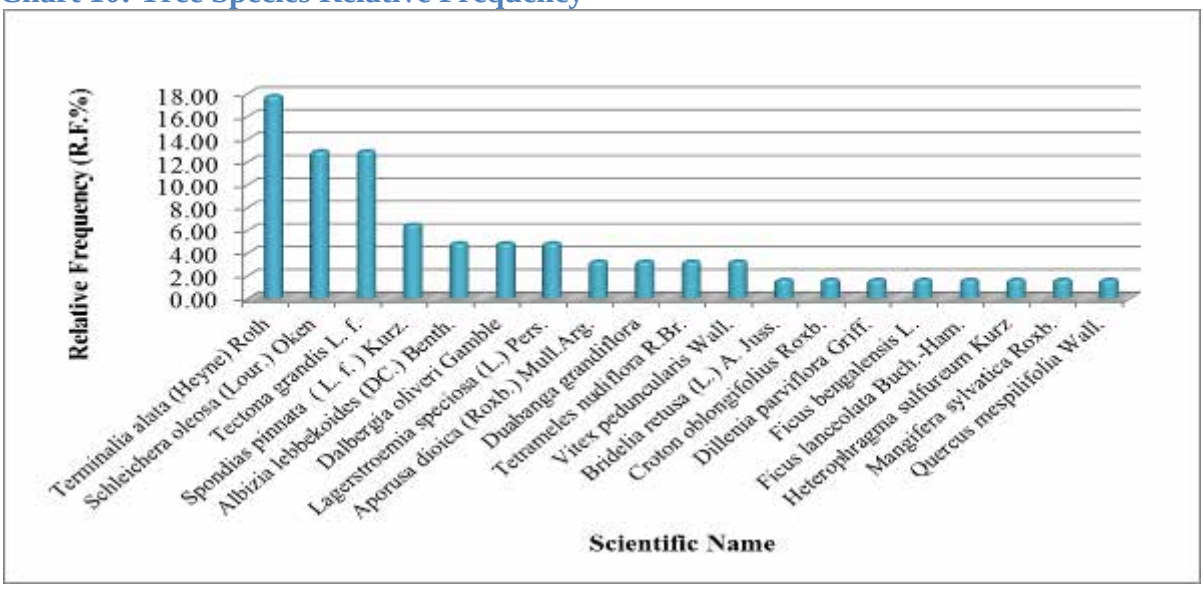


Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results**,** *Terminalia alata* (Heyne) Roth are high relative frequency value (18%) and followed by *Schleichera oleosa* (Lour.) Oken, and *Tectona grandis* L. f., (13%) are equal *Spondias pinnata* (L. f.) Kurz., (6%) respectively. Therefore, these species occur everywhere in the study area. The lower frequency of some species is such as *Bridelia retusa* (L.) A. Juss., *Quercus mespilifolia* Wall., and *Wendlandia tinctoria* DC. are demarcated as rare species in the area.

Table 38: Tree Species Relative Frequency

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Terminalia alata* (Heyne) Roth	0.79	17.74
2	*Schleichera oleosa* (Lour.) Oken	0.57	12.90
3	*Tectona grandis* L. f.	0.57	12.90
4	*Spondias pinnata* (L. f.) Kurz.	0.29	6.45
5	*Albizia lebbekoides* (DC.) Benth.	0.21	4.84
6	*Dalbergia oliveri* Gamble	0.21	4.84
7	*Lagerstroemia speciosa* (L.) Pers.	0.21	4.84
8	*Aporusa dioica* (Roxb.) Mull.Arg.	0.14	3.23
9	*Duabanga grandiflora*	0.14	3.23
10	*Tetrameles nudiflora* R.Br.	0.14	3.23
11	*Vitex peduncularis* Wall.	0.14	3.23
12	*Bridelia retusa* (L.) A. Juss.	0.07	1.61
13	*Croton oblongifolius* Roxb.	0.07	1.61
14	*Dillenia parviflora* Griff.	0.07	1.61
15	*Ficus bengalensis* L.	0.07	1.61
16	*Ficus lanceolata* Buch.-Ham.	0.07	1.61
17	*Heterophragma sulfureum* Kurz	0.07	1.61
18	*Mangifera sylvatica* Roxb.	0.07	1.61
19	*Quercus mespilifolia* Wall.	0.07	1.61
20	*Shorea obtusa* Wall.	0.07	1.61
21	*Shorea siamensis*(Kurz)Miq.	0.07	1.61
22	*Sterculia villosa*	0.07	1.61
23	*Tamarindus indica* L.	0.07	1.61
24	*Terminalia chebula* Retz.	0.07	1.61
25	*Wendlandia tinctoria* DC.	0.07	1.61

Chart 10: Tree Species Relative Frequency



3.4.4. Orchid Species

Nervilia plicata

Table 39: Orchid Species

No.	Scientific Name	Common Name	Family Name
1	*Nervilia plicata*	Ta-bin-taing-shwe-hti	Orchidaceae

3.4.5. Mushroom Species

Calocera viscosa

Auricularia auricula-judae (Bull.) J.Schröt.

Table 40: Mushroom Species

No.	Scientific Name	Common Name	Family Name
1	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae
2	*Calocera viscose*	Not known	Dacrymycetaceae
3	*Ganoderma lucidum*	Not known	Ganodermataceae
4	*Hypholoma incertum* Pk.	Not known	Microthyriaceae
5	*Lactarius glaucescens* Pk.	Not known	Russulaceae
6	*Lactarius volemus* Fr.	Not known	Russulaceae
7	*Marasmium oreades*	Not known	Marasmiaceae
8	*Microporus xanthopus* (Fr.) Kuntze	Not known	Polyporaceae
9	*Phellinus tremulae*	Not known	Hymenochaetaceae
10	*Pleurotus cornucopiae*	Not known	Pleurotaceae

3.4.6. Bamboo Species

(Bamboo Forest Right Bank)

(Bamboo Forest Left Bank)

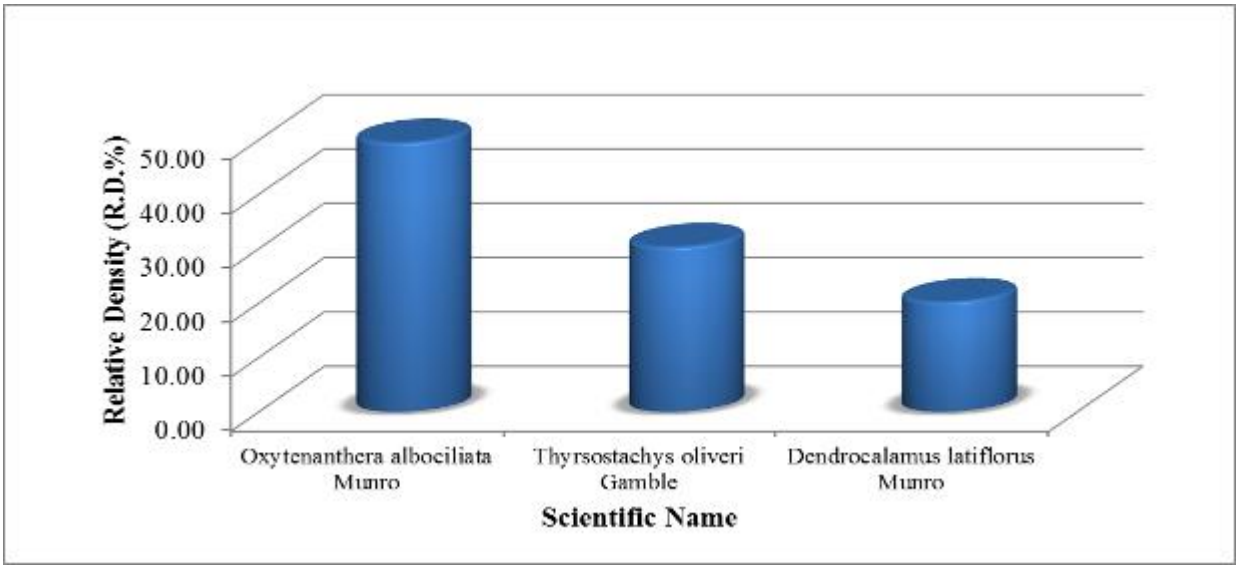
Table 41: Bamboo Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Dendrocalamus latiflorus* Munro	40	37.04	20.20
2	*Oxytenanthera albociliata* Munro	98	90.74	49.49
3	*Thyrsostachys oliveri* Gamble	60	55.56	30.30
	Total	**198**	**183.33**	**100.00**

Table 42: Bamboo Species Relative Density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Oxytenanthera albociliata* Munro	8.17	49.49
2	*Thyrsostachys oliveri* Gamble	5.00	30.30
3	*Dendrocalamus latiflorus* Munro	3.33	20.20

Chart 11: Bamboo Species Relative Density



3.4.7. Flora IUCN Status

A total of 10 flora species in research area four on the left bank are on the IUCN Red List. Most notably, *Curcuma alismatifolia* is classified as NT and *Dalbergia oliveri* Gamble is classified as EN A1cd. The other eight species are classified as least concern or low risk/least concern.

No.	Scientific Name	Common Name	Family Name	IUCN Status
1	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae	LC
2	*Caesalpinia sappan* L.	Tein-nyet	Caesalpiniaceae	LR/Lc
3	*Colocasia esculenta*	Pein-yaing	Araceae	LC
4	*Curcuma alismatifolia*	Ma-lar	Zingiberaceae	NT
5	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	EN A1cd
6	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
7	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	LR/Lc
8	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC
9	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/Lc
10	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/Lc
EN=Endangered, LC=Least Concern, LR/Lc=Lower Risk/Least concern, NT=Near Threatened				

Caesalpinia sappan L.

Curcuma alismatifolia

Colocasia esculenta

Homonoia riparia

3.5 Combined Data for all Four Research Areas

A total of 462 species of flora were identified across the entire project area on both banks. Of these species, 289 can be found on the right bank and 383 can be found on the left bank. This means that the left bank has more diversity than the right bank with an additional 94 species (or 33% more species) than the right bank. 210 species of flora can be found on both banks, indicating a similar environment in terms of flora cover.

Table 43: Flora Species Across Entire Research Area

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
1	*Abelmoschus esculentus*	Not known	Malvaceae	√	
2	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	√	√
3	*Abutilon indicum*	Bauk-khwe	Malvaceae	√	
4	*Acacia catechu* Willd.	Sha	Mimosaceae		√
5	*Acacia concinna* (Willd.) DC.	Ka-mon-chin	Mimosaceae	√	√
6	*Acacia intsia* Willd.	Su-bok	Mimosaceae	√	√
7	*Acacia pennata* (L.)Willd.	Su-yit	Mimosaceae		√
8	*Acer laurinum* Hassk.	Not known	Aceraceae	√	√
9	*Acer negunda*	Not known	Aceraceae	√	√
10	*Acmella calva* (DC.) R.K. Jansen	Pe-le-nyin	Asteraceae	√	√
11	*Adenanthera pavonina* L.	Ywe-gyi	Mimosaceae	√	
12	*Adenostemma viscosum*	Not known	Asteraceae	√	√
13	*Adiantum latifolium*	Not known	Pteridaceae	√	√
14	*Adiantum peruvianum*	Not known	Pteridaceae	√	
15	*Adiantum tenerum*	Not known	Pteridaceae	√	
16	*Aegiceras corniculatum* (L.) Blanco	Bu-ta-let	Myrsinaceae		√
17	*Aeginetia indica* L.	Kauk-hlaing-di	Orobanchaceae	√	
18	*Agaricus silvicola*	Not known	Agaricaceae		√
19	*Ageratum conyzoides* L.	Khwe-thay-pan	Asteraceae	√	√
20	*Albatrellus ovinus*	Not known	Albatrellaceae		√
21	*Albizia chinensis* (Osbeck)Merr.	Bom-me-za	Mimosaceae	√	√
22	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
23	*Albizia procera* (Roxb.) Benth.	Thit-phyu	Mimosaceae		√
24	*Alocasia macrorrhizos*	Pein-gyi	Araceae		√
25	*Alphonsea boniana*	Not known	Annonaceae		√
26	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae	√	√
27	*Alternanthera nodiflora* R.Br.	Ka-na-phaw-yaing	Amaranthaceae	√	√
28	*Alternanthera sessilis* (L.) R.Br.	Pa-zun-sa-yaing	Amaranthaceae	√	√
29	*Alysicarpus vaginalis* (L.) Dc.	Than-ma-naing-kyauk-ma-naing	Fabaceae	√	
30	*Amalocalyx microlobus*	Not known	Apocynaceae		√
31	*Amaranthus gracilis* Desf.	Hin-nu-nwe-yaing	Amaranthaceae	√	√
32	*Amaranthus spinosus* L.	Hnin-nu-new-su-bauk	Amaranthaceae	√	√
33	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Wa-u	Araceae	√	√
34	*Ampelocissus barbata* Planch.	Not known	Vitaceae		√
35	*Anisomeles indica*	Not known	Lamiaceae	√	
36	*Anneslea fragrans* Wall.	Pan-ma	Theaceae		√
37	*Anogeissus acuminata* Wall.	Yon	Combretaceae	√	√
38	*Anthocephalus morindaefolius* Korth.	Ma-u-let-tan-shae	Rubiaceae		√
39	*Antidesma bunius*	Kin-ba-lin	Euphorbiaceae	√	√
40	*Aporusa dioica* (Roxb.) Mull.Arg.	Thit-khauk	Euphorbiaceae		√
41	*Appendicula* sp.	Not known	Orchidaceae		√
42	*Ardisia* sp.	Kyet-ma-ok	Myrsinaceae	√	√
43	*Arenga pinnata*(Wurmb)Merr.	Taw-ohn	Arecaceae		√
44	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae	√	
45	*Argyreia nervosa*	Ka-zun-nwee	Convolvulaceae	√	√
46	*Argyreia nervosa* (Burm.f.)Bojer	Kazun-gyi	Convolvulaceae	√	√
47	*Aristolochia acuminata*	Eik-tha-ya-mu-li	Aristolochiaceae	√	
48	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	√	√
49	*Artemisia* sp.	Not known	Asteraceae	√	√
50	*Artemisia vulgaris*	Not known	Asteraceae	√	√
51	*Artocarpus lakoocha*	Taung-pein-ne	Moraceae		√
52	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae	√	√
53	*Asparagus filicinus* Buch.-Ham. ex D. Don	Ka-nyut	Asparagaceae	√	√
54	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	√	√
55	*Auricularia auricula-judae* (Bull.) J.Schröt.	Kywet-na-ywet-hmo	Auriculariaceae		√
56	*Bambusa bambos*(L.)Voss.	Kya-khat-wa	Poaceae	√	
57	*Bambusa teres* Buch.-Ham. ex Wall.	Ta-bin-taing-wa	Poaceae		√
58	*Bambusa tulda* Roxb.	Theik-wa	Poaceae		√
59	*Barleria strigosa* Willd.	Not known	Acanthaceae	√	√
60	*Bauhinia corymbosa*	Swe-daw	Caesalpiniaceae	√	√
61	*Bauhinia ornata* Kurz	Myauk-hle-ga	Caesalpiniaceae		√
62	*Bauhinia racemosa* Lam.	Pha-lan/Hta-la	Caesalpiniaceae		√
63	*Bauhinia* sp.	Swe-daw-thay	Caesalpiniaceae	√	√
64	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
65	*Berrya mollis*	Not known	Tiliaceae		√
66	*Bidens pilosa*	Hmwe-sok	Asteraceae	√	√
67	*Bischofia javanica*	Ye-pa-done	Euphorbiaceae	√	√
68	*Bliospermum axillare* Blume	Hnut-cho	Euphorbiaceae	√	√
69	*Blumea balsamifera*	Not known	Asteraceae	√	√
70	*Blumea balsamifera* (L.) DC.	Phon-ma-thein	Asteraceae	√	√
71	*Boerhavia chinensis* (L.) Asch. & Schw.	Not known	Nyctaginaceae	√	
72	*Boerhavia coccinea*	Pa-yan-na-war	Nyctaginaceae	√	
73	*Boerhavia diffusa* L.	Pa-yan-na-wa	Nyctaginaceae	√	√
74	*Boesenbergia rotunda* (L.) Mansf.	Seik-phu	Zingiberaceae		√
75	*Bombax ceiba* L.	Let-pan	Bombacaceae	√	√
76	*Bombax insigne* Wall.	De-du	Bombacaceae	√	
77	*Brachycorythis galeandra* (Rchb.f.) Summerh.	Not known	Orchidaceae		√
78	*Brachycorythis helferi* (Rchb.f.) Summerh.	Not known	Orchidaceae		√
79	*Bridelia retusa* (L.) A. Juss.	Myauk-zi/Seik-chi	Euphorbiaceae		√
80	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae	√	√
81	*Buddleja asiatica* Lour	Not known	Buddlejaceae	√	√
82	*Bulbophyllum* sp.	Not known	Orchidaceae		√
83	*Butea parviflora* L.	Pauk-home	Fabaceae		√
84	*Butea superba* Roxb.	Pauk-nwee	Fabaceae		√
85	*Caesalpinia sappan* L.	Tein-nyet	Caesalpiniaceae		√
86	*Callicarpa formosana*	Kyun-na-lin	Verbenaceae		√
87	*Calocera viscosa*	Not known	Dacrymycetaceae		√
88	*Calotropis gigantea* (L.) Dryand. ex W.T. Aiton	Ma-yoe-gyi	Asclepiadaceae	√	
89	*Calvatia gigantean* (Batsch.)Fr.	Not known	Agaricaceae		√
90	*Calycopteris floribunda* Lam.	Kyun-khaung-nwee	Combretaceae	√	
91	*Cananga latifolia*	Not known	Annonaceae	√	√
92	*Canavalia cathartica*	Not known	Fabaceae	√	√
93	*Canscora diffusa* (Vahl) R.Br.	Kyauk-pan	Gentianaceae	√	
94	*Cantharellus aurantiacus* (Wulf.)Fr.	Not known	Cantharelleae		√
95	*Canthium parvifolium* Roxb.	Say-than-baya	Rubiaceae		√
96	*Carduus pycnocephalus*	Not known	Asteraceae	√	
97	*Carex brizoides* L.	Taw-kyet-le-hlee	Cyperaceae		√
98	*Careya arborea* Roxb.	Ban-bwe	Lecythidaceae	√	√
99	*Carissa spinarum* A. DC.	Taw-khan-pin	Apocynaceae	√	
100	*Cassia fistula* L.	Ngu	Caesalpiniaceae	√	√
101	*Castanopsis diversifolia* King	Pa-phyu/Castanopsis	Fagaceae		√
102	*Celastrus monospermus* Roxb.	Not known	Celastracae		√
103	*Celosia argentea* L.	Taw-kyet-mauk	Amaranthaceae	√	√
104	*Centratherum punctatum*	Not known	Asteraceae	√	
105	*Chamaesyce hypericifolia*	Not known	Euphorbiaceae	√	
106	*Chamaesyce thymifolia*	Not known	Euphorbiaceae		√
107	*Chenopodium acuminatum* subsp. virgatum	Not known	Chenopodiaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
108	*Chromolaena odorata* (L.) R.M. King & H Robinson	Bi-zet	Asteraceae	√	√
109	*Chukrasia velutina* Roem.	Yin-ma	Meliaceae	√	√
110	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae	√	
111	*Cinnamomum parthenoxylon* Meissner	Ka-ra-way-yaing	Lauraceae		√
112	*Cissus discolor* Blume	Wa-yaung-chin	Vitaceae	√	√
113	*Cissus hastata* Miq.	Sa-pyit-yaing	Vitaceae	√	√
114	*Claoxylon indicum* Hassk.	Not known	Euphorbiaceae	√	√
115	*Clausena excavata* var.*villosa* Hook. f.	Taw-pyin-daw-thein	Rutaceae	√	√
116	*Cleisostoma williamsonii* (Rchb.f.)Garay.	Not known	Orchidaceae		√
117	*Clerodendrum paniculatum* L.	Pan-pa-day-tha	Verbenaceae		√
118	*Clerodendrum serratum* L.	Yin-bya-net	Verbenaceae	√	√
119	*Clerodendrum villosum* Blume	Phet-kha	Verbenaceae	√	√
120	*Clitocybe caespitosa* Pk.	Wa-yin-hmo	Tricholomataceae	√	√
121	*Codonopsis lanceolata*	Not known	Campanulaceae	√	√
122	*Collybia cirrhata*	Not known	Tricholomataceae		√
123	*Colocasia esculenta*	Pein-yaing	Araceae	√	√
124	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae	√	√
125	*Combretum alfredii* Hance	Not known	Combretaceae	√	
126	*Commelina communis*	Myet-kyut	Commelinaceae		√
127	*Commelina diffusa* Burm.f.	Myet-kyut	Commelinaceae		√
128	*Commelina persicariaefolia* Wright.	Myet-kyut	Commelinaceae	√	√
129	*Convolvulus parviflorus* Vahl	Not known	Convolvulaceae	√	
130	*Coprinus disseminatus*	Not known	Psathyrellaceae		√
131	*Coprinus plicatilis* (Curt.) Fr.	Not known	Psathyrellaceae		√
132	*Corchorus olitorius* L.	Pi-law-yaing	Tiliaceae	√	
133	*Costus specious* Sm.	Pha-lan-taung-hmwe	Costaceae	√	√
134	*Crassocephalum crepidioides*	Pan-zauk-htoe	Asteraceae		√
135	*Crateva magna* (Lour.) DC.	Ka-det	Capparaceae	√	√
136	*Cratoxylum neriifolium* Kurz	Bae-bya	Hypericaceae		√
137	*Cratoxylum polyanthum*Korth.	Bae-bya	Hypericaceae		√
138	*Crotalaria alata* Buch.-Ham. ex G.Don	Not known	Fabaceae	√	
139	*Crotalaria multiflora* L.	Taw-paik-san	Fabaceae	√	√
140	*Crotalaria sericea* Retz	Taw-paik-san	Fabaceae	√	
141	*Croton joufra* Roxb.	Tha-yin-ka-doe	Euphorbiaceae		√
142	*Croton oblongifolius* Roxb.	Tha-yin-gyi	Euphorbiaceae	√	√
143	*Curculigo orchioides* Gaertn.	Kywet-ma-lut-ohn	Hypoxidaceae		√
144	*Curcuma alismatifolia*	Ma-lar	Zingiberaceae		√
145	*Curcuma aromatica*	Mar-la	Zingiberaceae		√
146	*Curcuma longa*	Ma-lar	Zingiberaceae		√
147	*Curcuma longa* L.	Na-nwin	Zingiberaceae		√
148	*Curcuma petiolata* Roxb.	Ma-lar	Zingiberaceae	√	√
149	*Curcuma* sp.	Mar-la	Zingiberaceae	√	
150	*Cycas siamensis* Miq.	Mon-daing	Cycadaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
151	*Cymbidium aloifolium* (L.)Sw.	Thit-tet-lin-nae	Orchidaceae	√	√
152	*Cynodon dactylon* (L.) Pers.	Myay-sa	Poaceae	√	√
153	*Cyperus malaccensis* var. *brevifolius*	Not known	Cyperaceae		√
154	*Dactyloctenium aegyptium* (L.) Willd.	Myet-lay-gwa	Poaceae	√	
155	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	√	√
156	*Dalbergia fusca* Pierre	Taw-yingu	Fabaceae	√	√
157	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	√	√
158	*Datura metel* L.	Pa-daing	Solanaceae		√
159	*Dendrobium* sp.	Not known	Orchidaceae		√
160	*Dendrocalamus latiflorus* Munro	Wa-bo	Poaceae		√
161	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	√	√
162	*Dendrophthoe pentandra* (L.) Miq.	Kyi-paung	Loranthaceae	√	
163	*Desmodium gangeticum* L.	Not known	Fabaceae	√	
164	*Desmodium heterocarpon*	Myay-pe-htwe	Fabaceae		√
165	*Desmodium pulchellum* Benth.	Taung-damin	Fabaceae	√	
166	*Desmodium rufihirsutum* Craib	Not known	Fabaceae	√	√
167	*Desmodium triangulare* (Retz.) Merr.	Not known	Fabaceae	√	√
168	*Desmodium triflorum*	Not known	Fabaceae	√	
169	*Desmodium umbellatum* DC.	Kyee-hmi-apho	Fabaceae	√	√
170	*Dichanthium caricosum* (L.)A.Camus	Pa-daw-myet	Poaceae	√	√
171	*Dichrocephala integrifolia (*L.f.)Kuntze	Not known	Asteraceae	√	√
172	*Dicliptera neesii* Trimen.	Not known	Acanthaceae	√	√
173	*Dillenia indica* L.	Tha-byu	Dilleniaceae		√
174	*Dillenia parviflora* Griff.	Zin-byun	Dilleniaceae	√	√
175	*Dioscorea alata*	Myauk-u	Dioscoreaceae	√	√
176	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	√	√
177	*Dioscorea cylindrica* Burm.	Kywary-thon-ywet	Dioscoreaceae	√	√
178	*Dioscorea pentaphylla* L.	Kyway-ngar-ywet	Dioscoreaceae	√	√
179	*Dioscorea sativa* L.	Kyauk-yin-nwee	Dioscoreaceae	√	√
180	*Diospyros kaki* L.f.	Tae	Ebenaceae	√	√
181	*Dipterocarpus tuberculatus* Roxb.	In	Dipterocarpaceae		√
182	*Dracaena sanderiana*	Zaw-sein	Asparagaceae		√
183	*Drynaria quercifolia*	Birdnet-fern	Polypodiaceae	√	√
184	*Duabanga grandiflora*	Myauk-ngo/Phet-pauk	Lythraceae	√	√
185	*Dunbaria punctata*	Not known	Fabaceae	√	√
186	*Dysolobium grande* Prain	Khwe-la-byut	Fabaceae		√
187	*Eclipta alba* (L.) Hassk.	Kyeik-hman	Asteraceae		√
188	*Ehretia acuminata* R.Br	Taung-poe-lu-lin	Boraginaceae	√	√
189	*Elaeocarpus hainanensis* Oliv.	Kywe-pan-pin	Elaeocarpaceae	√	√
190	*Elatostema reticulatum*	Wet-sa	Urticaceae	√	√
191	*Eleusine indica* Gaertn.	Sin-ngo-myet	Poaceae	√	√
192	*Emblica officinalis* Gaertn.	Sha-phyu	Euphorbiaceae	√	√
193	*Engelhardtia spicata*	Pan-swe-le	Juglandaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
194	*Entada scandens* Benth.	Doe-nwee	Mimosaceae	√	√
195	*Equisetum hyemale*	Not known	Equisetaceae	√	√
196	*Eragrostis tef* (Zucc.)Trotter	Myet	Poaceae	√	
197	*Erythrina stricta* Roxb.	Ka-di\Ka-thit	Fabaceae	√	√
198	*Eugenia balsama* Wight	Ye-tha-bye	Myrtaceae		√
199	*Eugenia densiflora* DC.	Kyauk-tha-bye	Myrtaceae	√	√
200	*Euphorbia antiquorum* L.	Tazaung-gyi	Euphorbiaceae	√	√
201	*Euphorbia heterophylla*	Sae-pa-le	Euphorbiaceae	√	√
202	*Euphorbia hypericifolia* L.	Kywe-kyaung-hmin-se	Euphorbiaceae	√	√
203	*Ficus auriculata*	Sin-tha-phan	Moraceae		√
204	*Ficus bengalensis* L.	Pyin-nyaung	Moraceae	√	√
205	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae		√
206	*Ficus hispida* L.	Kha-aung	Moraceae	√	√
207	*Ficus lanceolata* Buch.-Ham.	Ye-tha-phan	Moraceae		√
208	*Ficus pumila* L.	Creeping fig.	Moraceae	√	√
209	*Ficus racemosa*	Tha-phan	Moraceae	√	√
210	*Ficus religiosa* L.	Baw-di-nyaung	Moraceae		√
211	*Ficus semicordata*	Ka-dut	Moraceae		√
212	*Ficus variegata*	Kon-tha-phan	Moraceae	√	√
213	*Fimbristylis sieboldii*	Not known	Cyperaceae		√
214	*Flacourtia cataphracta* Roxb.	Na-ywe	Flacourtiaceae		√
215	*Flemingia stricta* Roxb.	Kyee-hmi	Fabaceae		√
216	*Flueggea leucopyrus* Willd	Ye-chin-ya	Euphorbiaceae	√	√
217	*Fomes fomentarius*	Not known	Polyporaceae		√
218	*Gagea reticulata* (Pall.) Schult.	Not known	Liliaceae	√	
219	*Ganoderma australe*	Not known	Ganodermataceae		√
220	*Ganoderma lucidum*	Not known	Ganodermataceae		√
221	*Garcinia cowa* Roxb.	Taung-tha-lae	Hypericaceae		√
222	*Gardenia coronaria* Buch-Ham.	Yin-khat-gyi	Rubiaceae	√	√
223	*Gardenia turgida* Roxb.	Hman-phyu/ Hnan-khaung-chauk	Rubiaceae		√
224	*Garuga pinnata* Roxb.	Chin-yoke	Burseraceae		√
225	*Gastrochilus* sp.	Not known	Orchidaceae		√
226	*Getonia floribunda* Roxb.	Kywet-nwee	Combretaceae	√	
227	*Getonia floribunda* Roxb.	Kywet-nwee	Combretaceae	√	
228	*Globba patens*	Pa-dein-ngo	Zingiberaceae	√	√
229	*Globba pendula*	Pa-dein-ngo-thay	Zingiberaceae	√	√
230	*Glochidion* sp.	Hta-min-sok	Euphorbiaceae		√
231	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	√	√
232	*Gochnatia decora*	Not known	Asteraceae	√	√
233	*Gonostegia hirta*	Not known	Rubiaceae	√	√
234	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	√	√
235	*Grewia laevigata*	Not known	Tiliaceae		√
236	*Grewia laevigata* Vahl	Ta-yaw	Tiliaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
237	*Habenaria chlorina* Par. & Rchb.f.	Not known	Orchidaceae	√	
238	*Habenaria hosseusii* Schltr.	Not known	Orchidaceae	√	
239	*Habenaria procera*	Not known	Orchidaceae		√
240	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	√	√
241	*Hedyotis auricularia*	Not known	Rubiaceae		√
242	*Hedyotis diffusa*	Not known	Rubiaceae	√	
243	*Helicia erratica* Hook. f.	Dauk-yat	Proteaceae		√
244	*Helicteres angustifolia* L.	Not known	Sterculiaceae	√	√
245	*Heliotropium indicum* L.	Sin-hna-maung	Boraginaceae	√	√
246	*Hemigraphis repanda*	Not known	Acanthaceae	√	
247	*Heteropanax fragrans* (Roxb. ex DC.) Seem.	Kyaung-dauk/La-ka-du	Araliaceae		√
248	*Heterophragma adenophylla* (Wall.) Seem. ex Benth. & Hook.	Phet-than	Bignoniaceae		√
249	*Heterophragma sulfureum* Kurz	Phet-than	Bignoniaceae		√
250	*Hibiscus ficulneus* L.	Taw-yon-pade	Malvaceae	√	√
251	*Hiptage benghalensis* (L.) Kurz	Sar-say/Bein-nwee	Malpighiaceae	√	√
252	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	√	√
253	*Homonoia riparia*	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	√	√
254	*Hydrocotyle sibthorpioides* Thunb	Myin-khwa	Apiaceae	√	√
255	*Hygrophorus limacinus*	Not known	Hygrophoraceae		√
256	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-than	Rubiaceae		√
257	*Hypericum japonicum* Thunb. ex Murray	Not known	Hypericaceae	√	√
258	*Hypholoma incertum* Pk.	Not known	Microthyriaceae		√
259	*Impatiens chinensis* L.	Dan-pan	Balsaminaceae		√
260	*Imperata cylindrica* (L.) P. Beauv.	Thet-kae	Poaceae		√
261	*Indigofera tinctoria*	Me-yaing	Fabaceae	√	
262	*Indigofera tinctoria* L.	Taw-hne	Fabaceae	√	√
263	*Inonotus hispidus*	Not known	Hymenochaetaceae		√
264	*Ipomoea cairica*	Ka-zun	Convolvulaceae	√	
265	*Ipomoea cordatotriloba*	Ka-zun	Convolvulaceae	√	
266	*Isachne albens* Trin.	Myet	Poaceae	√	
267	*Ischaemum ciliare*	Not known	Poaceae	√	
268	*Ischnoderma benzoinum*	Hmo	Fomitopsidaceae	√	
269	*Jasminum multiflorum*	Taw-sa-bei	Oleaceae		√
270	*Justicia procumbens*	Not known	Acanthaceae	√	
271	*Kyllinga brevifolia*	Not known	Cyperaceae		√
272	*Lactarius glaucescens* Pk.	Not known	Russulaceae		√
273	*Lactarius volemus* Fr.	Not known	Russulaceae		√
274	*Lagerstroemia macrocarpa* Kurz	Pyin-ma-ywet-gyi	Lythraceae		√
275	*Lagerstroemia speciosa* (L.) Pers.	Pyin-ma-ywet-thay	Lythraceae	√	√
276	*Lagerstroemia villosa* Wall. ex Kurz	Zaung-palae	Lythraceae		√
277	*Lagerstroemia villosa* Wall.ex Kurz	Let-khwe	Lythraceae		√
278	*Lannea coromandelica* (Houtt.) Merrr.	Na-be	Anacardiaceae	√	√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
279	*Lantana camara* L.	Sein-na-pan	Verbenaceae	√	√
280	*Lasia aculeata* Lour.	Za-yit	Araceae		√
281	*Leea hirta* Banks	Naga-mauk-phyu/Hta-min-yae	Leeaceae	√	√
282	*Leea macrophylla* Roxb.	Na-ga-mauk-gyi	Leeaceae	√	√
283	*Leea rubra*	Na-ga-mauk-ni	Leeaceae	√	√
284	*Lentinus squarrosulus*	Not known	Polyporaceae		√
285	*Lenzites betulina*	Not known	Polyporaceae		√
286	*Lepiota cristata*	Not known	Agaricaceae		√
287	*Lepiota morgani* Pk.	Not known	Agraricaceae		√
288	*Leptadenia reticulata* Wight & Arn.	Gon-kha	Asclepiadaceae		√
289	*Leucaena leucocephala* (Lam.) De.Wit	Baw-sa-gaing	Mimosaceae	√	√
290	*Leucas cephalotes* Spreng.	Pin-gu-hteik-peik	Lamiaceae		√
291	*Lithocarpus craibianus* Barnett	Thit-ae	Fagaceae	√	
292	*Litsea glutinosa*	On-don	Lauraceae		√
293	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	√	√
294	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae	√	
295	*Luffa aegyptiaca* Mill.	Tha-but	Cucurbitaceae		√
296	*Lycoperdon pyriforme*	Not known	Agaricaceae		√
297	*Lygodium circinnatum*	Not known	Lygodiaceae	√	
298	*Lygodium japonicum*(Thunb.)Sw.	Not known	Lygodiaceae		√
299	*Mallotus philippensis*	Taw-thi-din	Euphorbiaceae		√
300	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	√	√
301	*Marasmium oreades*	Not known	Marasmiaceae		√
302	*Marasmius foetidum* Fr.	Not known	Marasmiaceae		√
303	*Markhamia stipulata* (Wall.) Seem. Ex K.Schum.	Ma-hlwa	Bignoniaceae		√
304	*Melanorrhoea usitata* Wall.	Thit-si	Anacardiaceae	√	√
305	*Merremia vitifolia* (Burm.f.) Hallier. f.	Kyet-hinga-lae-new	Convolvulaceae	√	
306	*Mesua ferrea* L.	Taw-gan-gaw	Hypericaceae	√	√
307	*Michelia baillonii* (Pierr)Finet & Gagnep.	Sa-ga-phyu	Magnoliaceae		√
308	*Micromelum minutum* (G. Forst.) Wight & Arn.	Pa-le-pan/Pauk-chaung	Rutaceae	√	
309	*Microporus xanthopus* (Fr.) Kuntze	Hmo	Polyporaceae	√	√
310	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	√	√
311	*Millettia extensa* Benth.	Win-u	Fabaceae	√	√
312	*Millettia ovalifolia* Kurz	Thin-win-pho	Fabaceae	√	√
313	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	√	√
314	*Mitragyna rotundifolia* (Roxb.) Kuntze	Bin-ga	Rubiaceae		√
315	*Morus indica* L.	Po-sa	Moraceae	√	√
316	*Mucuna pruriens* (L.)DC.	Khwe-la-ya	Fabaceae	√	√
317	*Murdannia bracteata*	Not known	Commelinaceae	√	√
318	*Musa balbisiana*	Nget-pyaw	Musaceae		√
319	*Musa* sp.	Nga-pyaw-yaing	Musaceae		√
320	*Mussaenda calycina* Wall. ex Kurz	Pwint-tu-ywet-tu	Rubiaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
321	*Myriopteron paniculatum* Griff	Ti-lay-na-tha	Asclepiadaceae	√	√
322	*Nauclea orientalis* L.	Ma-u-let-tan-to	Rubiaceae		√
323	*Nervilia plicata*	Tabin-ting-shwe-hti	Orchidaceae	√	√
324	*Ochna integerrima*	Indaing-seni	Ochnaceae	√	
325	*Oldenlandia diffusa*	Not known	Rubiaceae	√	
326	*Operculina turpethum* (L.) Silva Mansa	Kyar-hin-nwee	Convolvulaceae	√	√
327	*Ophioglossum nudicaule*	Addler's Tongue Fern	Ophioglossaceae		√
328	*Oroxylum indicum* (L.)Kurz	Kyaung-sha	Bignoniaceae	√	√
329	*Oxalis corniculata* L.	Hmo-chin	Oxalidaceae	√	√
330	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	√	√
331	*Paederia foetida*	Pe-bok-nwee-thay	Rubiaceae	√	
332	*Paederia scandens* Lour.	Pe-bok-nwee-gyi	Rubiaceae	√	
333	*Pandanus odoratissimus* L.f.	Sat-tha-phu	Pandanaceae	√	√
334	*Panus tigrinus*	Not known	Polyporaceae		√
335	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae	√	√
336	*Paxillus involutus* (Batsch.)Fr.	Hmo	Paxillaceae	√	
337	*Pennisetum purpureum*	Yon-sa-myet	Poaceae	√	√
338	*Peperomia pellucida*	Thit-ye-kyi	Piperaceae	√	
339	*Pericampylus glaucus* L.	Not known	Menispermaceae	√	
340	*Peristrophe roxburghiana*	Not known	Acanthaceae	√	
341	*Peristylus affinis* (D.Don)Seidenf.	Not known	Orchidaceae		√
342	*Peristylus goodyeroides* (D.Don)Lindl.	Simidauk	Orchidaceae		√
343	*Persicaria odorata*	Kywe-hna-khaung-gyate	Polygonaceae	√	√
344	*Phaseolus* sp.	Not known	Fabaceae	√	
345	*Phaseolus velutina* Grah.	Pauk-net	Fabaceae	√	√
346	*Phellinus tremulae*	Not known	Hymenochaetaceae		√
347	*Phoenix loureiri* Kunth	Thin-baung	Arecaceae		√
348	*Pholiota flammas* Pk.	Hmo	Strophariaceae	√	√
349	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae	√	√
350	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	√	√
351	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	√	√
352	*Physalis minima* L.	Bauk-thi	Solanaceae	√	√
353	*Pilea scripta* Langtang	Phet-ya	Urticaceae	√	√
354	*Piper cubebe* L. f.	Peik-chin	Piperaceae		√
355	*Pleurotus cornucopiae*	Not known	Pleurotaceae		√
356	*Ploiarium alternifolium*	Not known	Theaceae	√	√
357	*Poa sylvestris*	Myet	Poaceae	√	
358	*Pogostemon auricularius*	Not known	Lamiaceae	√	√
359	*Polyalthia viridis*	Not known	Annonaceae		√
360	*Polygonum barbatum*	Kywe-hna-khaung-gyate	Polygonaceae		√
361	*Polygonum plebeium*	Not known	Polygonaceae	√	√
362	*Polyporus ovinus* (Schaeff.)Fr.	Not known	Polyporaceae		√
363	*Portulaca grandiflora* Hook.	Shan-hnin-si	Portulacaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
364	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	√	
365	*Pouzolzia zeylanica*	Not known	Urticaceae	√	√
366	*Pouzolzia zeylanica* (L.) Benn.	Not known	Urticaceae		√
367	*Premna amplectens* Wall	Yin-bya-phyu	Verbenaceae		√
368	*Psalliota placomyces* (Pk.) Kauffm.	Not known	Agaricaceae		√
369	*Psalliota silvatica* (Schaeff.) Quel.	Not known	Agaricaceae		√
370	*Pseuderanthemum polyanthum*	Not known	Acanthaceae	√	√
371	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	√	√
372	*Pterospermum acerifolium*	Not known	Sterculiaceae	√	
373	*Pterospermum acerifolium* (L.) Willd.	Taung-phet-wun	Sterculiaceae		√
374	*Pterospermum diversifolium*	Not known	Sterculiaceae	√	√
375	*Pycnoporus cinnabarinus*	Not known	Polyporaceae		√
376	*Pycnoporus sanguineus*	Hmo	Polyporaceae	√	
377	*Quercus mespilifolia* Wall.	Yin-gu	Fagaceae		√
378	*Randia uliginosa* DC.	Hman-ni	Rubiaceae	√	√
379	*Rumex crispus* L.	Not known	Polygonaceae	√	√
380	*Rumex trisetiferus* Stokes	Not known	Polygonaceae	√	√
381	*Saccharum spontaneum* L.	Kaing	Poaceae	√	√
382	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	√	√
383	*Sapium baccata*	Aw-le	Euphorbiaceae		√
384	*Schima wallichii* (DC.) Korth.	Lauk-ya	Theaceae	√	√
385	*Schizophyllum commune*	Not known	Schizophyllaceae	√	√
386	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	√	√
387	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae	√	√
388	*Scindapsus officinalis* (Roxb.) Schott	Sin-peik-chin	Araceae	√	
389	*Scoparia dulcis* L.	Dana-thu-kha	Scrophulariaceae	√	√
390	*Scurrula parasitica* L.	Kyi-paung	Loranthaceae	√	
391	*Selaginella willdenowii*	Not known	Selaginellaceae	√	√
392	*Senna hirsuta* (L.) Irwin & Barneby	Ka-thaw-hmwe-htu	Caesalpiniaceae	√	√
393	*Senna tora* (L.*)* Roxb	Dan-gwe	Caesalpiniaceae	√	√
394	*Sesbania* sp.	Nyan	Fabaceae		√
395	*Setaria palmifolia* Stapf.	Myet	Poaceae	√	
396	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	√	√
397	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	√	√
398	*Sida acuta* Burm f.	Ta-byet-si-ywet-shae	Malvaceae		√
399	*Sida rhombifolia* L.	Ta-byet-se-ywet-waing	Malvaceae		√
400	*Sinomenium acutum* (Thunb.)Rehd.et Wils.	Nwee-war/Say-war	Menispermaceae		√
401	*Smilax aspericaulis* Wall ex A. D.C.	Sein-na-baw-thay	Smilacaceae		√
402	*Smilax china* L.	Not known	Smilacaceae		√
403	*Smilax macrophylla* Roxb.	Sein-na-baw-gyi	Smilacaceae		√
404	*Smilax*sp.	Sein-na-baw	Smilacaceae	√	
405	*Solanum aculeatissimum* Jacq.	Not known	Solanaceae	√	√
406	*Solanum coagulans*	Kha-yan	Solanaceae	√	

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
407	*Solanum indicum* L.	Ka-zaw-kha	Solanaceae	√	√
408	*Solanum nigrum* L.	Baung-laung-nyo	Solanaceae		√
409	*Solanum torvum* Swartz	Kha-yan-ka-zawt	Solanaceae	√	√
410	*Solanum verbascifolium*	Not known	Solanaceae		√
411	*Spermacoce remota*	Not known	Rubiaceae	√	
412	*Spirogyra* sp.	Algae	Zygnemataceae	√	
413	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	√	√
414	*Stemona burkillii* Prain	Tha-mya	Stemonaceae		√
415	*Stemona tuberosa*	Tha-mya	Stemonaceae	√	√
416	*Sterculia foetida* L.	Shaw-phyu	Sterculiaceae	√	√
417	*Sterculia villosa*	Shaw	Sterculiaceae	√	√
418	*Stereospermum suaveolens* (Roxb.) DC.	Kywe-ma-gyo-lein	Bignoniaceae	√	√
419	*Streptocaulon tomentosum* Wight & Arn.	Myin-sa-gon-ni	Asclepiadaceae	√	√
420	*Strobilanthes isophyllus*	Not known	Acanthaceae		√
421	*Strophanthus wallichii* A.DC.	Na-sha-gyi	Apocynaceae		√
422	*Strychnos nux-blanda* A.W.Hill	Kha-baung	Loganiaceae	√	√
423	*Syzygium grande* (Wight) Walp	Tha-bye	Myrtaceae	√	√
424	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae		√
425	*Tanacetum tibeticum* Hook.f. & Thomson	Not known	Asteraceae	√	√
426	*Taraxacum officinale*	Not known	Asteraceae	√	√
427	*Tectona grandis* L. f.	Kyun	Verbenaceae	√	√
428	*Terminalia alata* (Heyne) Roth	Htauk-kyant	Combretaceae	√	√
429	*Terminalia bellerica* Roxb.	Thit-seint	Combretaceae		√
430	*Terminalia chebula* Retz.	Phan-kha	Combretaceae		√
431	*Terminalia oliveri* Brandis	Than	Combretaceae	√	√
432	*Terminalia tripteroides* Craib	Than-bae	Combretaceae		√
433	*Termitomyces albuminosa*	Taung-po-hmo	Agaricaceae	√	√
434	*Tetrameles nudiflora* R.Br.	Thit-pok	Datiscaceae	√	√
435	*Tetrastigma leucostaphylum*	Not known	Vitaceae	√	√
436	*Thespesia lampas* Dalzell & A.Gibson	Taw-wa	Malvaceae	√	√
437	*Thunbergia fragrans* Roxb.	Pan-ye-sut	Acanthaceae		√
438	*Thunbergia grandiflora*	Kyi-hnok-thi-nwee	Acanthaceae	√	
439	*Thyrsostachys oliveri* Gamble	Tha-net-wa	Poaceae		√
440	*Tithonia diversifolia* A. Gray	Nay-kyar-yaing	Asteraceae	√	√
441	*Trametes versicolor*	Taung-po-hmo	Polyporaceae	√	√
442	*Trema orientalis* (L.) Blume	Khwe-sha	Ulmaceae		√
443	*Trichosanthes cordata* Roxb.	Kyi-ah	Cucurbitaceae	√	
444	*Tristaniopsis burmanica* (griff.)P.G.Wilson & J.T. Waterh.	Dauk-yat	Myrtaceae		√
445	*Triumfetta bartramia* L.	Kat-se-nae-thay	Tiliaceae		√
446	*Tylophora indica*	Not known	Apocynaceae	√	√
447	*Uraria crinita* (L.)Desv.ex DC.	Not known	Fabaceae	√	√
448	*Uraria lagopodioides* (L.)Desv.ex DC.	Not known	Fabaceae		√
449	*Urena sinuata*	Kat-se nae-gyi	Malvaceae		√

No.	Scientific Name	Common Name	Family Name	Right Bank	Left Bank
450	*Utricularia caerulea*	Ye-bu-baung	Lentibulariaceae	√	
451	*Uvaria cordata* Schum. & Thonn.	Tha-but-gyi	Annonaceae	√	
452	*Vanda coerulescens* Griff.	Mo-lon-hmying-apyar-lay	Orchidaceae	√	
453	*Vangueria spinosa* Roxb.	Ma-gyi-bauk	Rubiaceae	√	√
454	*Verpa cornica*	Not known	Morchellaceae		√
455	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	√	√
456	*Vitex vestita* Wall.	Tauk-sha	Verbenaceae	√	√
457	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	√	√
458	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae		√
459	*Xylia xylocarpa* (Roxb.) Taub.	Pyin-ka-doe	Mimosaceae		√
460	*Zephyranthes carinata* Herb.	Hnin-pan	Amaryllidaceae		√
461	*Zingibr zerumbet*	Linne-gyi	Zingiberaceae		√
462	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	√	√

A total of 20 flora species on the IUCN Red List can be found on the left bank. Most notably, *Curcuma alismatifolia* is classified as NT, *Dalbergia cultrata* Grah.is classified as NT, *Cycas siamensis* Miq. is classified as VU A2 cd, and *Dalbergia oliveri* Gamble is classified as EN A1cd. The other 16 species on the list are classified as either least concern or low risk/least concern.

Table 44: Flora IUCN Status (Entire Left Bank)

Scientific Name	Common Name	Family Name	IUCN Status
Bauhinia ornata Kurz	Myauk-hle-ga	Caesalpiniaceae	LC
Boesenbergia rotunda (L.) Mansf.	Seik-phu	Zingiberaceae	LC
Caesalpinia sappan L.	Tein-nyet	Caesalpiniaceae	LR/Lc
Colocasia esculenta	Pein-yaing	Araceae	LC
Curcuma alismatifolia	Ma-lar	Zingiberaceae	NT
Cycas siamensis Miq.	Mon-daing	Cycadaceae	VU A2cd
Dalbergia cultrata Grah.	Yin-daik	Fabaceae	NT
Dalbergia oliveri Gamble	Ta-ma-lan	Fabaceae	EN A1cd
Dendrocalamus membranaceus Munro	Hmyin-wa	Poaceae	LC
Dipterocarpus tuberculatus Roxb.	In	Dipterocarpaceae	LR/Lc
Engelhardtia spicata	Pan-swe-le	Juglandaceae	LR/Lc
Equisetum hyemale	Not known	Equisetaceae	LC
Holarrhena pubescens Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC
Homonoia riparia	Ye-mo-ma-kha/Ye-ma-nae	Euphorbiaceae	LC
Ludwigia hyssopifolia	Lay-nyin-thay	Onagraceae	LC
Mangifera sylvatica Roxb.	Taw-tha-yet	Anacardiaceae	LR/Lc
Mimosa pudica L.	Hti-ka-yone	Mimosaceae	LC
Saccharum spontaneum L.	Kaing	Poaceae	LC

Shorea obtusa Wall.	Thit-ya	Dipterocarpaceae	LR/Lc
Shorea siamensis(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/Lc

4. FAUNA

4.1 Insects and Other Invertebrate Species

A total of 86 insects and other invertebrate species were identified on the left bank. This includes 38 butterfly species, 15 beetle species, 11 dragonfly/damselfly species, 7 grasshopper species, 3 locust species, 5 true bug species, 5 spider species, 1 scorpion species and 1 praying mantis species. A total of 138 insect and invertebrate species were found on both the left and right banks combined. Of this total, 86 species of insects and other invertebrates where identified on the left bank as opposed to 74 found on the right bank. 22 species were found on both banks while 52 species were found on the right bank only and 65 species were found on the left bank only.

Table 45: Insect and Other Invertebrate Species on Left Bank

No.	Order	Family	Scientific Name	Common Name	Local Name
1	Lepidoptera	Papilionidae	*Papilio polytes Romulus*	Butterfly	Leik-pyar
2	Lepidoptera	Papilionidae	*Papilio hipponous pitmani*	Butterfly	Leik-pyar
3	Lepidoptera	Papilionidae	*Papilio memnon agenor*	Butterfly	Leik-pyar
4	Lepidoptera	Papilionidae	*Lamproptera curis curis*	Butterfly	Leik-pyar
5	Lepidoptera	Papilionidae	*Lamproptera merge*	Butterfly	Leik-pyar
6	Lepidoptera	Papilionidae	*Graphium nomius*	Butterfly	Leik-pyar
7	Lepidoptera	Nymphalidae	*Junonia lemonias lemonias*	Butterfly	Leik-pyar
8	Lepidoptera	Nymphalidae	*Junonia hierta*	Butterfly	Leik-pyar
9	Lepidoptera	Nymphalidae	*Phalanta phalanta*	Butterfly	Leik-pyar
10	Lepidoptera	Nymphalidae	*Phalanta alcipee*	Butterfly	Leik-pyar
11	Lepidoptera	Nymphalidae	*Neptis leucopharus*	Butterfly	Leik-pyar
12	Lepidoptera	Nymphalidae	*Kallima limborgii*	Butterfly	Leik-pyar
13	Lepidoptera	Nymphalidae	*Chersonesia rahriodes*	Butterfly	Leik-pyar
14	Lepidoptera	Nymphalidae	*Hypolimanas misippus*	Butterfly	Leik-pyar
15	Lepidoptera	Nymphalidae	*Cupha erymanthis lotis*	Butterfly	Leik-pyar
16	Lepidoptera	Nymphalidae	*Lexias pardalis dirteana*	Butterfly	Leik-pyar
17	Lepidoptera	Nymphalidae	*Argyreus hyperbius hyperbius*	Butterfly	Leik-pyar
18	Lepidoptera	Nymphalidae	*Tanaecia munda manata*	Butterfly	Leik-pyar
19	Lepidoptera	Nymphalidae	*Cethosia cyane auanthes*	Butterfly	Leik-pyar

20	Lepidoptera	Nymphalidae	*Charaxes solon sulphureu*	Butterfly	Leik-pyar
21	Lepidoptera	Pieridae	*Delias hyparete metarete*	Butterfly	Leik-pyar
22	Lepidoptera	Danaidae	*Danaus affinis*	Butterfly	Leik-pyar
23	Lepidoptera	Danaidae	*Euploea mulcibermulciber*	Butterfly	Leik-pyar
24	Lepidoptera	Satyridae	*Orsotriena medus medus*	Butterfly	Leik-pyar
25	Lepidoptera	Satyridae	*Mycalesis mineus mineus*	Butterfly	Leik-pyar
26	Lepidoptera	Satyridae	*Erites argentina delia*	Butterfly	Leik-pyar
27	Lepidoptera	Lycaenidae	*Byasa dasarada*	Butterfly	Leik-pyar
28	Lepidoptera	Lycaenidae	*Orsotriaena medus*	Butterfly	Leik-pyar
29	Lepidoptera	Lycaenidae	*Ypthima baldus*	Butterfly	Leik-pyar
30	Lepidoptera	Lycaenidae	*Laringa casteinaui*	Butterfly	Leik-pyar
31	Lepidoptera	Lycaenidae	*Discolampa ethion*	Butterfly	Leik-pyar
32	Lepidoptera	Lycaenidae	*Caleta elna*	Butterfly	Leik-pyar
33	Lepidoptera	Lycaenidae	*Caleta decidia decidia*	Butterfly	Leik-pyar
34	Lepidoptera	Lycaenidae	*Lorura arynnaus*	Butterfly	Leik-pyar
35	Lepidoptera	Lycaenidae	*Moduza procris*	Butterfly	Leik-pyar
36	Lepidoptera	Lycaenidae	*Zeltus amasa amasa*	Butterfly	Leik-pyar
37	Lepidoptera	Lycaenidae	*Rapala pheretima*	Butterfly	Leik-pyar
38	Lepidoptera	Lycaenidae	*Heliophorus brahma*	Butterfly	Leik-pyar
39	Coleoptera	Chrysomelidae	*Aulacophora foveicollis*	Beetle	Poe-taung-mar
40	Coleoptera	Chrysomelidae	*Aulacophora lewisii*	Beetle	Poe-taung-mar
41	Coleoptera	Chrysomelidae	*Aspidomorpha miliaris*	Beetle	Poe-taung-mar
42	Coleoptera	Chrysomelidae	*Cassida circumdata*	Beetle	Poe-taung-mar
43	Coleoptera	Chrysomelidae	*Agetocera filicorhis*	Beetle	Poe-taung-mar
44	Coleoptera	Scarabaeidae	*Catharsius mollossus*	Beetle	Poe-taung-mar
45	Coleoptera	Scarabaeidae	*Enoplotrupes sharpi*	Beetle	Poe-taung-mar
46	Coleoptera	Scarabaeidae	*Anomala grandis*	Beetle	Poe-taung-mar
47	Coleoptera	Meloidae	*Mylabris cichorii*	Beetle	Poe-taung-mar
48	Coleoptera	Meloidae	*Mylabris phalerata*	Beetle	Poe-taung-mar
49	Coleoptera	Cerambycidae	*Zonopterus flavitarsis*	Beetle	Poe-taung-mar

50	Coleoptera	Eumolpidae	*Platycorynus peregrinus*	Beetle	Poe-taung-mar
51	Coleoptera	Cicindelidae	*Tricodyla annulicornis*	Beetle	Poe-taung-mar
52	Coleoptera	Cocinellidae	*Coccinella transversalis*	Beetle	Poe-taung-mar
53	Coleoptera	Carabidae	*Dischissus mirandus*	Beetle	Poe-taung-mar
54	Odonata	Libellulidae	*Neurothemis fulvia*	Dragonfly	Ba-zine
55	Odonata	Libellulidae	*Neurothemis tullia tullia*	Dragonfly	Ba-zine
56	Odonata	Libellulidae	*Neurothemis inquirendae*	Dragonfly	Ba-zine
57	Odonata	Libellulidae	*Neurothemis atlanta*	Dragonfly	Ba-zine
58	Odonata	Libellulidae	*Neurothemis intermedia Atlanta*	Dragonfly	Ba-zine
59	Odonata	Libellulidae	*Rhyothemis plutonia*	Dragonfly	Ba-zine
60	Odonata	Libellulidae	*Rhodothemis rufa*	Dragonfly	Ba-zine
61	Odonata	Libellulidae	*Brachythemis contaminate*	Dragonfly	Ba-zine
62	Odonata	Libellulidae	*Trithemis aurora*	Dragonfly	Ba-zine
63	Odonata	Lestidae	*Coeliccia cyanomelas*	Damselfly	Ba-zine
64	Odonata	Lestidae	*Platycnemis foliaces*	Damselfly	Ba-zine
65	Orthoptera	Pyrgomorphidae	*Sp.1*	Grasshopper	Hnan-kaung
66	Orthoptera	Locustidae	*Sp. 1*	Grasshopper	Hnan-kaung
67	Orthoptera	Locustidae	*Sp. 2*	Grasshopper	Hnan-kaung
68	Orthoptera	Cantantopidae	*Sp. 1*	Grasshopper	Hnan-kaung
69	Orthoptera	Cantantopidae	*Sp. 2*	Grasshopper	Hnan-kaung
70	Orthoptera	Arcypteridae	*Sp. 1*	Grasshopper	Hnan-kaung
71	Orthoptera	Arcypteridae	*Sp. 2*	Grasshopper	Hnan-kaung
72	Orthoptera	Tettigidae	*Sp. 1*	Locusts	Kyaing-kaung
73	Orthoptera	Tettigidae	*Sp. 2*	Locusts	Kyaing-kaung
74	Mantodea	Mantidae	*Sp. 1*	Praying Mantes	Shit-khoe-kaung
75	Hemiptera	Reduviidae	*Platymeris sp.*	True bug	Gya-boe
76	Hemiptera	Tessaratomidae	*Eurostus validus*	True bug	Gya-boe
77	Hemiptera	Cercopidae	*Cosmoscarta sp.*	True bug	Gya-boe
78	Hemiptera	Cercopidae	*Pyrrhocoridae sp.*	True bug	Gya-boe
79	Hemiptera	Corixidae	*Sphedanolestes impressicollis*	True bug	Gya-boe

80	Homoptera	Cicadidae	*Sp. 1*	Locusts	Kyaing-kaung
81	Araneida	Ctenidae	*Anahita sp.*	Spider	Pint-ku
82	Araneida	Salticidae	*Telamonia festiva*	Spider	Pint-ku
83	Araneida	Araneidae	*Nephila antipodiana*	Spider	Pint-ku
84	Araneida	Araneidae	*Nephila maculate*	Spider	Pint-ku
85	Araneida	Araneidae	*Crytophora beccarii*	Spider	Pint-ku
86	Scorpiones	Scorpiones	*Sp. 1*	Scorpion	Kin-myee-kauk

Table 46: Habitat Preference of Butterfly Species on Left Bank

No.	Scientific Name	Habitat Type				No. of Observations
		Near Water	Forest	Flowering Plant	Bushes	
1	*Papilio polytes romulus*	√	√	√		1
2	*Papilio hipponous pitmani*			√		*1*
3	*Papilio memnon agenor*	√		√		*2*
4	*Lamproptera curis curis*	√		√		*1*
5	*Lamproptera merge*			√		*5*
6	*Graphium nomius*	√			√	*2*
7	*Junonia lemonias lemonias*	√		√	√	*10*
8	*Junonia hierta*	√		√	√	*10*
9	*Phalanta phalanta*		√	√		*2*
10	*Phalanta alcipee*		√	√		*2*
11	*Neptis leucopharus*	√	√	√		5
12	*Kallima limborgii*		√			*1*
13	*Chersonesia rahriodes*			√		*1*
14	*Hypolimanas misippus*			√		*2*
15	*Cupha erymanthis lotis*	√			√	*2*
16	*Lexias pardalis dirteana*			√	√	*1*
17	*Argyreus hyperbius hyperbius*			√		*1*

18	*Tanaecia munda manata*		√			*1*
19	*Cethosia cyane auanthes*			√	√	*1*
20	*Charaxes solon sulphureu*	√				2
21	Delias hyparete metarete	√		√	√	5
22	*Danaus affinis*		√	√		5
23	*Euploea mulcibermulciber*		√	√		3
24	*Orsotriena medus medus*	√			√	1
25	*Mycalesis mineus mineus*	√	√	√		3
26	*Erites argentina delia*	√		√		2
27	*Byasa dasarada*	√		√	√	2
28	*Orsotriaena medus*			√		3
29	*Ypthima baldus*	√		√		5
30	*Laringa casteinaui*	√		√	√	2
31	*Discolampa ethion*	√		√		5
32	*Caleta elna*	√		√		5
33	*Caleta decidia decidia*	√			√	2
34	*Lorura arynnaus*	√		√	√	3
35	*Moduza procris*			√		2
36	*Zeltus amasa amasa*	√			√	1
37	*Rapala pheretima*		√			2
38	*Heliophorus brahma*	√		√		1
	TOTAL	**26**	**11**	**31**	**15**	**127**

Table 47: Habitat Preference of Beetle and Dragonfly Species on Left Bank

No.	Scientific Name	Habitat Types				No. of Observations
		Tree Leaves	Ground	Tree Trunk	Near Water	
1	*Aulacophora foveicollis*	√				5
2	*Aulacophora lewisii*	√				*5*
3	*Aspidomorpha miliaris*	√				*3*

4	*Cassida circumdata*	√				*2*
5	*Agetocera filicorhis*	√				*5*
6	*Catharsius mollossus*		√			*2*
7	*Enoplotrupes sharpi*		√			*2*
8	*Anomala grandis*		√			*2*
9	*Mylabris cichorii*	√				*2*
10	*Mylabris phalerata*	√				*5*
11	*Zonopterus flavitarsis*			√		*2*
12	*Platycorynus peregrinus*	√				*1*
13	*Tricodyla annulicornis*				√	*2*
14	*Coccinella transversalis*	√				*2*
15	*Dischissus mirandus*		√	√		*1*
16	*Neurothemis fulvia*				√	*10*
17	Neurothemis tullia tullia				√	*5*
18	Neurothemis inquirendae				√	*10*
19	Neurothemis atlanta				√	*5*
20	Neurothemis intermedia atlanta				√	*10*
21	Rhyothemis plutonia				√	*3*
22	Rhodothemis rufa				√	*3*
23	Brachythemis contaminate				√	*5*
24	Trithemis aurora				√	*5*
25	*Coeliccia cyanomelas*				√	*5*
26	*Platycnemis foliaces*				√	*3*
	TOTAL	**9**	**4**	**2**	**12**	**105**

Table 48: Habitat Preference of Grasshoppers, Locusts, True bug, and Spiders Species on Left Bank

Scientific Name					Habitat Types			
					near the stream	in foorest	grassland	bushes
1	Orthoptera	Pyrgomorphidae	*Sp.1*	Grasshopper		√	√	√
2	Orthoptera	Locustidae	*Sp. 1*	Grasshopper		√	√	
3	Orthoptera	Locustidae	*Sp. 2*	Grasshopper		√	√	
4	Orthoptera	Cantantopidae	*Sp. 1*	Grasshopper		√	√	
5	Orthoptera	Cantantopidae	*Sp. 2*	Grasshopper		√	√	
6	Orthoptera	Arcypteridae	*Sp. 1*	Grasshopper		√	√	
7	Orthoptera	Arcypteridae	*Sp. 2*	Grasshopper		√	√	
8	Orthoptera	Tettigidae	*Sp. 1*	Locusts			√	√
9	Orthoptera	Tettigidae	*Sp. 2*	Locusts			√	√
10	Mantodea	Mantidae	*Sp. 1*	Praying Mantes			√	√
11	Hemiptera	Reduviidae	*Platymeris sp.*	True bug		√	√	√
12	Hemiptera	Tessaratomidae	*Eurostus validus*	True bug		√	√	√
13	Hemiptera	Cercopidae	*Cosmoscarta sp.*	True bug		√	√	√
14	Hemiptera	Cercopidae	*Pyrrhocoridae sp.*	True bug		√	√	√
15	Hemiptera	Corixidae	*Sphedanolestes impressicollis*	True bug		√	√	√
16	Homoptera	Cicadidae	*Sp. 1*	Locusts			√	
17	Araneida	Ctenidae	*Anahita sp.*	Spider	√	√		√
18	Araneida	Salticidae	*Telamonia festiva*	Spider	√	√		√
19	Araneida	Araneidae	*Nephila antipodiana*	Spider	√			√
20	Araneida	Araneidae	*Nephila maculate*	Spider	√			√
21	Araneida	Araneidae	*Crytophora beccarii*	Spider	√			√
22	Scorpiones	Scorpiones	*Sp. 1*	Scorpion				√

Table 49: Insect and Invertebrate Species on Right and Left Banks

No.	Scientific Name	Right Bank	Left Bank
1	*Pachlioptaaristolochiaegoniopeltis*	√	
2	*Papiliopolytes Romulus*	√	√
3	*Papiliohipponouspitmani*		√
4	*Chilasclytiaclytia*	√	
5	*Lampropteracuriscuris*	√	√
6	*Lamproptera merge*	√	√
7	*Papilioiswaraiswara*	√	
8	*Papiliomemnonagenor*	√	√
9	*Graphiumnomius*	√	√
10	*Junonialemoniaslemonias*	√	√
11	*Junoniahierta*		√
12	*Neptishylaskamarupa*	√	
13	*Chersonesiarisarisa*	√	
14	*Chersonesiarahriodes*		√
15	*Hypolimanasbolinajacintha*	√	
16	*Hypolimanasmisippus*		√
17	*Ariadne ariadnepallidor*	√	
18	*Junoniaiphitaocyale*	√	
19	*Cuphaerymanthislotis*	√	√
20	*Pantoporiahordoniahordonia*	√	
21	*Neptisleucoporosleucoporos*	√	
22	*Neptisleucopharus*	√	√
23	*Phalantaphalanta*	√	√
24	*Phalantaalcipee*		√
25	*Junoniaalmanaalmana*	√	
26	*Lassipavirajaviraja*	√	
27	*Chersonesiaperaka*	√	

28	*Lexiaspardalisdirteana*	√	√
29	*Kallimalimborgii*	√	√
30	*Argyreushyperbiushyperbius*		√
31	*Tanaeciamundamanata*		√
32	*Cethosiacyaneauanthes*		√
33	*Charaxes solon sulphureu*		√
34	*Pieriscanidiaindica*	√	
35	*Euremahecabecontubernails*	√	
36	*Deliaspasithoepasithoe*	√	
37	*AppiasLalassislalassis*	√	
38	*Artogenianaganumnagunum*	√	
39	*Deliasdescombidescombi*	√	
40	*Deliashyparetemetarete*	√	√
41	*Danausgenutiagenutia*	√	
42	*Danausaffinis*	√	√
43	*Euploeacamaralzemancamaralzeman*	√	
44	*Euploeasylvesterharisii*	√	
45	*Euploeamulcibermulciber*		√
46	*Danauslimniacelimniace*	√	
47	*Danauschrysippus*	√	
48	*Danausmelanippus*	√	
49	*Melanitisziteniusauletes*	√	
50	*Orsotrienamedusmedus*		√
51	*Mycalesismineusmineus*		√
52	*Eritesargentinadelia*		√
53	*Byasadasarada*	√	√
54	*Orsotriaenamedus*	√	√
55	*Ypthimabaldus*	√	√
56	*Laringacasteinaui*	√	√
57	*Discolampaethion*	√	√

58	*Caletaelna*	√	√
59	*Caletadecidiadecidia*		√
60	*Loruraarynnaus*	√	√
61	*Moduzaprocris*	√	√
62	*Prosotasnoranora*	√	
63	*Arphpalavarro*	√	
64	*Acraeaviolae*	√	
65	*Zeltusamasaamasa*		√
66	*Rapalapheretima*		√
67	*Heliophorus brahma*		√
68	*Hydrophilusaccuminatus*	√	
69	*Athemusvitellinus*	√	
70	*Prothemusciusianus*	√	
71	*Driloniusosawai*	√	
72	*Aulacophorafoveicollis*		√
73	*Aulacophoralewisii*		√
74	*Aspidomorphamiliaris*		√
75	*Cassidacircumdata*		√
76	*Agetocerafilicorhis*		√
77	*Catharsiusmollossus*		√
78	*Enoplotrupessharpi*		√
79	*Anomalagrandis*		√
80	*Mylabriscichorii*		√
81	*Mylabrisphalerata*		√
82	*Phymatodesmaaki*	√	
83	*Zonopterusflavitarsis*		√
84	*Platycorynusperegrinus*		√
85	*Tricodylaannulicornis*		√
86	*Coccinellatransversalis*		√
87	*Dischissusmirandus*		√

88	*Neurothemisfulvia*	√	√
89	Neurothemistulliatullia		√
90	Neurothemisinquirendae		√
91	Neurothemisfulvia		√
92	Neurothemisatlanta		√
93	Neurothemisintermediaatlanta		√
94	Rhyothemisplutonia		√
95	Rhodothemisrufa		√
96	Brachythemis contaminate		√
97	Trithemis aurora		√
98	*Pantalaflavescens*	√	
99	*Coelicciacyanomelas*	√	√
100	*Platycnemisfoliaces*		√
101	*Gryllus sp.*	√	
102	*Dissosteiralongipenis*	√	
103	*Brachystola magna.*	√	
104	*Dissosteiralongipennis*	√	
105	*Paratenodera sp.*	√	
106	Pyrgomorphidae Sp.1		√
107	Locustidae Sp. 1		√
108	Locustidae Sp. 2		√
109	Cantantopidae Sp. 1		√
110	Cantantopidae Sp. 2		√
111	Arcypteridae Sp. 1		√
112	Arcypteridae Sp. 2		√
113	Tettigidae Sp. 1		√
114	Tettigidae Sp. 2		√
115	Mantidae (Praying mantis) Sp. 1		√
116	*Paratenedera sp.*	√	
117	*Platymeris sp.*		√

118	*Gerris sp.*	√	
119	*Paratriozon*	√	
120	*Anasa sp.*	√	
121	*Eurostusvalidus*		√
122	*Cosmoscarta sp.*		√
123	*Pyrrhocoridae sp.*		√
124	Sphedanolestesimpressicollis		√
125	*Callibaetis sp.*	√	
126	*Forficulaauricularis*	√	
127	Homoptera: Cicadidae Sp. 1		√
128	*Lycosa sp.*	√	
129	*Anahita sp.*		
130	*Telamoniafestiva*		√
131	*Camponotus sp.*	√	
132	*Aphis mellifera*	√	
133	*Macrotermsspp:*	√	
134	*Domaliniaornis*	√	
135	Scorpions Sp. 1		√
136	*Nephilaantipodiana*		√
137	*Nephila maculate*		√
138	*Crytophorabeccarii*		√
	Total	**74**	**86**

4.1.1. Photographic Documentation of Insects and Other Invertebrate Species

(A)*Chersonesiarisarisa*

(B) *Lampropteracuriuscurius*

(C) *Cethosiacyaneauanthes*

(D) *Neurothemisfulvia*

(E) *Trithemis aurora*

(F) *Coelicciacyanomelas*

(G) *Zonopterusflavitarsis* (Beetle)

(H) *Nephilaantipodiana*(Spider)

(I) *Eurostusvalidus* (True Bug)

(J) Mantidae (Praying mantis)

(K) *Sphedanolestesimpressicollis*

(L) *Cosmoscarta* sp. (Frog hopper)

4.2 Fish and and Other Aquatic Species

Thirty-six fish species were identified during the left bank survey. Eighteen were identified by voucher specimens (i.e. caught by fishermen and presented to the fauna team for identification. An additional 18 species were identified by interviewing fishermen and asking them what types of fishes and aquatic species live in the Myitnge River. Of the fish species identified during the left bank survey, *Botiarostrata* is classified by the IUCN Red List as vulnerable, *Wallago attu* and *Anguilla bicolor* are both classified as near threatened and all other species are classified as least concern, data deficient or not evaluated.

Thirty-two fish and other aquatic species were identified during the right bank survey, and the two surveys combined yielded a total of 45 fish and other aquatic species. Naturally, a fair amount of overlap (23 species) exists between the two surveys, because both surveys covered the same body of water, the Myitnge River. The difference between the two surveys in terms of species identified is likely due to the different seasons in which the left and right bank surveys took place as well as variation in answers of interview respondents. Different people will likely remember and identify different fish and aquatic species.

Table 50: Fish and Other Aquatic Species Identified During Left Bank Survey

No.	Phyllum Class	Order	Family	Species	Common name	Local name
1	Actinopterygii	Cypriniformes	Cyprinidae	*Barbushexastichus*	Nga Kyaung	Nga kyaung
2	Actinopterygii	Cypriniformes	Cyprinidae	*Rohteecotio*	Carplet	nga-phan-ma
3	Actinopterygii	Cypriniformes	Cyprinidae	*Rohtebelangerii*	-	Nga phal aung
4	Actinopterygii	Cypriniformes	Cyprinidae	*Foliferbrevifilis*	Barbus brevifilis	Kyout ngalu
5	Actinopterygii	Cypriniformes	Cyprinidae	*Puntiusamphibious*	Pool barb	Nga khane ma
6	Actinopterygii	Cypriniformes	Cyprinidae	*Puntius oligolipis*	Checker barb	Nga khane ma wah
7	Actinopterygii	Cypriniformes	Cyprinidae	*Cirrhinamrigala*	Mrigal	Nga gyin
8	Actinopterygii	Cypriniformes	Cyprinidae	*Siloniasilondia*	Buttet catfish	Nga myin
9	Actinopterygii	Cypriniformes	Cyprinidae	*Puntius sp.*	Barb	Nga khone ma
10	Actinopterygii	Cypriniformes	Cyprinidae	*Danio aequipinnutus*	Giant danio	Yay pawe nga
11	Actinopterygii	Cypriniformes	Cyprinidae	*Crossochelius burmanicus*	Burmese latia	Nga din lone
12	Actinopterygii	Cypriniformes	Cyprinidae	*Bariliusguttatus*	-	Nga la war
13	Actinopterygii	Cypriniformes	Cyprinidae	*Barilius sp.*	-	Nga lettu
14	Actinopterygii	Cypriniformes	Cyprinidae	*Labeostoliczkae*	-	Nfa lu
15	Actinopterygii	Cypriniformes	Cyprinidae	*Burbusburmanicus*	Barb	Nga khone ma

16	Actinopterygii	Cypriniformes	Cyprinidae	*Nemacheilusbotia*	Loach	Nga thalae htoe
17	Actinopterygii	Cypriniformes	Cyprinidae	*Ophiocephalusstriatus*	Striped snake head	Nga yant
18	Actinopterygii	Cypriniformes	Cyprinidae	*Chela sladoni*	-	Nga mot twat
19	Actinopterygii	Cypriniformes	Cyprinidae	*Belonecancila*	Gar fish	Nga pha
20	Actinopterygii	Cypriniformes	Bagridae	*Mystusgulio*	Long whisker cat fish	Nga ywae
21	Actinopterygii	Perciformes	Cobitidae	*Lepidocephalusguntea*	Loach	Nga thale htoe
22	Actinopterygii	Perciformes	Cobitidae	*Botiarostrata*	Golden loach	Nga sin pyawt
23	Actinopterygii	Perciformes	Cobitidae	*Botiaberdmorei*	Loach	Nga sin pyawt kyar
24	Actinopterygii	Perciformes	Cobitidae	*Lepidocephalichthys Berdmori*	Loach	Nga thale htoe
25	Actinopterygii	Perciformes	Cobitidae	*Neonoemacheilus Labeosus*	Loach	Nga thale htoe
26	Actinopterygii	Perciformes	Channidae	*Channagachua*	Channa	Nga yant goung toe
27	Actinopterygii	Perciformes	Channidae	*Channaaurolineata*	Channa	Nga yant
28	Actinopterygii	Perciformes	Channidae	*Sillagodomina*	Whiting	Nga palwae
29	Actinopterygii	Siluriformes	Siluridae	Wallagoattu	Butter fish	Nga but
30	Actinopterygii	Siluriformes	Siluridae	*Clarirasbatrichus*	Walking catfish	Nga khue
31	Actinopterygii	Symbranchiformes	Symbranchidae	*Monopterus javanensis*	Eel	Nga shint
32	Actinopterygii	Anguilliformes	Anguillidae	*Anguilla bicolor*	Level finned fish	Nga myae
33	Malacostraco	Decapoda	Palaemonidae	*Cryphiops sp.*	Palaemon	Puzon
34	Malacostraco	Decapoda	Portunidae	*Chaybtissp.*	Crab	Gonan lone
35	Actinopterygii	Beloniformes	Belonidae	*Exocoetuspoecilopterus*	Flying fish	Nga pyan
36	Mollusca	Gastropoda	Bursidae	*Bufonaria sp.*	Frog shell	Khayu phin chan

Table 51: Habitat Type, Data Source, and IUCN Status

No.	Species	Habitat Type	# of Obv.	Data source	IUCN[5] Status
1	Barbushexastichus	Shallow water with sandy bottom		IS	
2	Rohteecotio	River and marshland		IS	LC
3	Rohtebelangerii	River and marshland		IS	LC
4	*Foliferbrevifilis*	clear water with rockt bottom riparian forest	1	VS	
5	*Puntiusamphibious*	sandy bottom & riparion	20	VS	DD
6	*Puntius oligolipis*	Riparian water plants	3	VS	
7	*Cirrhina mrigala*	Fast flowing stream and river with rocky bottom		IS	LC
8	*Siloniasilondia*	Shoals and freshwater		IS	LC
9	*Puntius sp.*	Sandy and riparian water	30	VS	LC
10	*Danio aequipinnutus*	Sandy and gravel beds in riparian	15	VS	LC
11	*Crossochelius burmanicus*	Fast flowing stream and river with rocky bottom	30	VS	LC
12	*Raiamas guttatus*	Fast flowing stream and river with rocky bottom		IS	LC
13	*Barilius sp.*	Fast flowing stream and river with rocky bottom	30	VS	
14	*Labeostoliczkae*	Large rivers and flatted plains	22	VS	
15	Burbusburmanicus	Shallow water and sandy bottom		IS	DD
16	Nemacheilusbotia	Sandy bottom and riparian water		IS	LC
17	*Ophiocephalus striatus*	Rivers and streams with riparian forest		IS	LC
18	*Chela sladoni*	Shallow water		IS	LC
19	*Belonecancila*	Shallow water		IS	
20	*Mystusgulio*	Large rivers	3	VS	LC
21	*Lepidocephalusguntea*	Main streams with rocky rapids		IS	LC

[5] Species without a IUCN classification have not yet been assessed by IUCN and are not in its database.

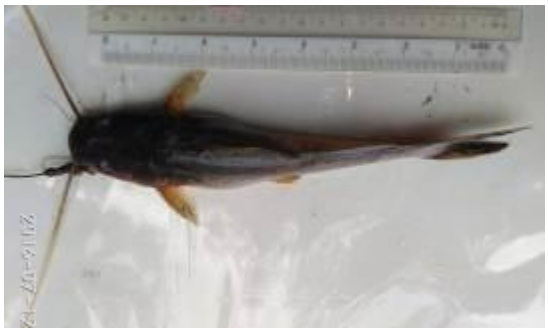
22	*Botiarostrata*	Main streams with rocky rapids	4	VS	VU
23	*Botiaberdmorei*	Rapid and hill stream	3	VS	NE
24	*Lepidocephalichthys Berdmori*	Stream with hill to low land	3	VS	LC
25	*Neonoemacheilus Labeosus*	Rocky rapid and hill stream	2	VS	LC
26	*Channa gachua*	Rivers and streams with riparian forest	40	VS	LC
27	*Channa aurolineata*	Rivers and streams with riparian forest		IS	
28	*Sillago domina*	Rivers and streams with riparian forests		IS	NE
29	Wallago attu	Rivers and streams with riparian forests		IS	NT
30	*Clariras batrichus*	Rivers and marshland	7	VS	LC
31	*Monopterus javanensis*	Streams , river and muddy		IS	
32	*Anguilla bicolor*	Adult inhabit upper rich & main stream		IS	NT
33	*Cryphiops sp.*	Clean water with sandy and rocky bottom	50	VS	
34	*Chaybtissp.*	Sandy and rocky bottom	10	VS	
35	*Exocoetus poecilopterus*	Streams and sandy bottom		IS	
36	*Bufonaria sp.*	Main rivers with sandy and rocky bottom	70	VS	

Table 52: Fish and Other Aquatic Species Identified During Right Bank and Left Bank Surveys

No.	Species	Right Bank	Left Bank
1	*Barbus hexastichus*	√	√
2	*Morulius calbasu*	√	
3	*Rohtee cotio*	√	√
4	*Rohtebe langerii*	√	√
5	*Crossochelius burmanicus*	√	
6	*Folifer brevifilis*	√	√
7	*Puntius amphibious*	√	√
8	*Puntius oligolipis*	√	√
9	*Cirrhina mrigala*		√
10	*Silonia silondia*		√
11	*Puntius sp.*	√	√
12	*Daniokaerri*	√	
13	*Danio aequipinnutus*	√	√
14	*Garra lamta*	√	
15	*Crossochelius burmanicus*	√	√
16	*Cabdiomoror*	√	
17	*Raiamas guttatus*		√
18	*Barilius sp.*	√	√
19	*Labeostoliczkae*	√	√
20	*Labeodyocheilus*	√	
21	*Amblypharyngodon mola*	√	
22	*Hemibagrus microphthalmus*	√	
23	*Glyptothorax trilineatus*	√	
24	*Burbus burmanicus*		√
25	*Nemacheilus botia*		√
26	*Ophiocephalus striatus*		√
27	*Chela sladoni*		√

28	*Belonecancila*		√
29	*Mystus gulio*	√	√
30	*Lepidocephalus guntea*		√
31	*Botia rostrata*	√	√
32	*Botia berdmorei*	√	√
33	*Lepidocephalichthys berdmori*	√	√
34	*Neonoemacheilus labeosus*	√	√
35	*Channa gachua*	√	√
36	*Channa aurolineata*	√	√
37	*Sillago domina*		√
38	*Wallago attu*	√	√
39	*Clariras batrichus*	√	√
40	*Monopterus javanensis*		√
41	*Anguilla bicolor*	√	√
42	*Cryphiops sp.*	√	√
43	*Chaybtissp.*	√	√
44	*Exocoetus poecilopterus*		√
45	*Bufonaria* sp.	√	√
		32	36

4.2.1. Photographic Documentation of Fish and Other Aquatic Species



A. *Mystus gulio* (Dorsal view)

B. *Mystus gulio* (Ventral view)

C .*Mystus gulio*

D. *Mystus gulio*

E. *Mystus gulio* (Dorsal fin)

F. *Mystus gulio* (Gill slit)

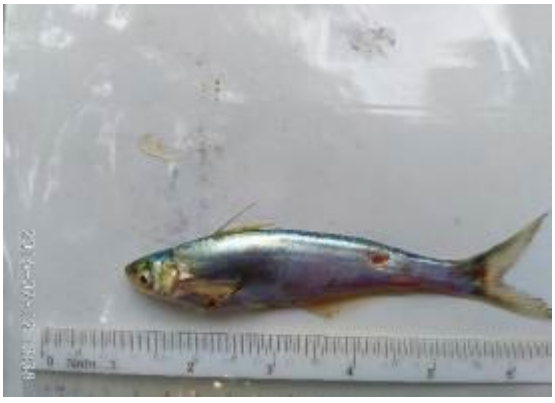
G. *Mystus seengala*

H. *Mystus seengala* (Front view)

I. *Mystus seengala* (Head)

J. *Mystus seengala*

K. *Barilius guttatus*



L. *Silonia silondia*

M. *Clarias batrachus*

N. *Clarias batrachus*

4.3 Herpet Species

Thirty-one herpet species were identified in the left bank survey. Of this total, 13 were identified via voucher specimen, 3 by visual observation, and the remaining 14 by interviews. According to the IUCN Red List, *Indotes tudoelongata* is endangered, *Melanoche lystrijuga* and *Python moluras* are both near threatened and the remaining 28 species are either least concern or not evaluated. It should be noted that the near threatened and endangered species were identified through interviews and not confirmed by direct visual observation.

A total of 45 herpet species were identified on both the left and right banks combined. Of this total thirty-one were identified on the left bank as opposed to 39 on the right bank. Twenty-five species were found on both banks while 14 species were found on the right bank only and 6 species were found on the left bank only.

Table 53: Herpet Species Left Bank

No.	Phylum Class	Order	Family	Scientific Name	Common name	Local name
1	Amphibia	Anura	Bufonidae	*Duttaphrynus melanostictus*	Common toad	Pher pyoke
2	Amphibia	Anura	Bufonidae	*Bufo sp.1*	Common toad	Pher pyoke
3	Amphibia	Anura	Ranidae	*Fejervaryalimnocharislimnocharis*	Paddy or swamp frog	Sar pher
4	Amphibia	Anura	Ranidae	*Kaloulapulchra*	Narrow mouth frog	Pher gone nyin
5	Amphibia	Anura	Ranidae	*Occido zygous*	Green paddle frog	Thae par
6	Amphibia	Anura	Rhachphoridae	*Polypedatesleucomystaxs*	Common free frog	Pher
7	Reptilia	Lacertilia	Agamidae	*Calotesversicolor*	Garden fence lizard	Pake thin nye
8	Reptilia	Lacertilia	Agamidae	*Calotesmystaceus*	Blue crested lizard	Pake thin nye
9	Reptilia	Lacertilia	Agamidae	*Calotesemmaattricristatus*	Emmagray's lizard	Pake thin nye
10	Reptilia	Lacertilia	Agamidae	*Calotesema*	Forest crested lizard	Pake thin nye
11	Reptilia	Lacertilia	Agamidae	*Branchocela cristatella*	Lizard	Te-too
12	Reptilia	Squmato	Gekkonidae	*Gekko gecko*	Tockay	Tack tae
13	Reptilia	Squmata	Gekkonidae	*Hemidactylusfrenatus*	Common house gecko	Eain myaung

14	Reptilia	Squmata	Varinidae	*Varanus bengalensis*	Bengal monitor	Bengal phut
15	Reptilia	Squmata	Varinidae	*Varanussalvator*	Asian water	Manitor phut
16	Reptilia	Squmata	Typhlopidae	*Typhlopsdiardi*	Diard' s blint snake	Khae mwe
17	Reptilia	Squmata	Colubridae	*Ptyaskorros*	Indo Chinese rat snake	Lin mwe
18	Reptilia	Squmata	Colubridae	*Ptyascarinatus*	Keeled rat snake	Lin mwe
20	Reptilia	Squmata	Colubridae	*Coelognathus radiata*	Snake	Hmwe
21	Reptilia	Squmata	Colubridae	*Dendrelaphisformosus*	Elegant branze snake	Snake
22	Reptilia	Squmata	Colubridae	*Elapheradiata*	Rodiated rat snake	Snake
23	Reptilia	Squmata	Colubridae	*Elapheprasina*	Rodiated rat snake	Snake
24	Reptilia	Squmata	Elapidae	*Ophiophagus hannah*.	King cobra	Taw-gyi-mwe-hauk
25	Reptilia	Squmata	Boidae	*Python moluras*	Burmese python	Saba ohn
26	Reptilia	Squmata	Geamydidae	*Melanochelystrijuga*	Myanmar black turtle	Lake chaepan
27	Reptilia	Squmata	Geamydidae	*Cyclemysoldhamii*	Oldham's leaf turtle	Late poat
28	Squmata	Testudines	Testudinidae	*Indotestudoelongata*	Yellow tortoise	Taung late
29	Squmata	Testudines	Scincidae	*Mabuyamultifasciata*	Many lined sun skink	Kin late chaw
30	Squmata	Testudines	Scincidae	*M. longicaudata*	Lang tailed sun skink	Kin late chaw
31	Squmata	Testudines	Scincidae	*Sphenomrphusmaculatus*	Stream side skink	Kin late chaw

Table 54: Habitat Type, Number of Observations, Data Source, and IUCN Status

No.	Species	Habitat Type	No. of Obv.	Data source	IUCN Status
1	*Duttaphrynusmelanostictus*	Under rock, near river	3	VO	LC
2	*Bufo sp.1*	Under rock, near river	2	VO	LC
3	*Fejervaryalimnocharislimnocharis*	In grass	4	VS	LC
4	*Kaloulapulchra*	Dwelling house	4	VS	LC
5	*Occido zygous*	Sandy land, near river	5	VS	LC
6	*Polypedatesleucomystaxs*	Under rock	3	VS	LC
7	*Calotesversicolor*	Tree hole	2	VS	LC
8	*Calotesmystaceus*	Tree	6	VS	LC
9	*Calotesemmaattricristatus*	Tree	5	VS	LC
10	*Calotesema*	Tree	4	VS	LC
11	*Branchocela cristatella*	Tree	3	VS	LC
12	*Gekko gecko*	Tree hole	1	VS	LC
13	*Hemidactylusfrenatus*	Dwelling house	2	VS	LC
14	*Varanus bengalensis*	Under stone		IS	LC
15	*Varanussalvator*	Ground		IS	LC
16	*Typhlopsdiardi*	Forest	1	IS	LC
17	*Ptyaskorros*	Agriculture land	1	IS	LC
18	*Ptyas carinatus*	Agriculture land	1	IS	LC
19	*Ptyas sp.*	Agriculture land	1	IS	LC
20	*Dendrelaphisformosus*	Forest	1	IS	LC
21	*Elaphe radiate*	Ground	1	IS	LC
22	*Elaphep rasina*	Forest	1	IS	LC

23	*Ophiophagus hannah*	Forest	1	IS	LC
24	*Python moluras*	Forest		IS	NT
25	*Melanoche lystrijuga*	Near river side		IS	NT
26	*Cyclemy soldhamii*	Near river side		IS	NE
27	*Indotes tudoelongata*	Ground	1	IS	EN
28	*Mabuya multifasciata*	Tree	1	VO	LC
29	*M. longicaudata*	Tree	1	VS	LC
30	*Sphenomrphusmaculatus*	Under log	1	VS	LC

Table 55: Herpet Species on Right and Left Banks

No.	Scientific Name	Right Bank	Left Bank
1	*Duttaphrynusmelanostictus*	√	√
2	*Bufo sp 1*		√
3	*Fejervaryalimnocharislimnocharis*	√	√
4	*Kaloulapulchra*	√	√
5	*Occido zygous*	√	√
6	*Polypedatesleucomystaxs*	√	√
7	*Calotesversicolor*	√	√
8	*Calotesmystaceus*	√	√
9	*Calotesemmaattricristatus*		√
10	*Pseudoclotesmicrolepis*	√	
11	*Branchocela cristatella*		√
12	*Calotesema*	√	√
13	*Gekko gecko*	√	√
14	*Hemidactylusfrenatus*	√	√
15	*Gehyramultilata*	√	
16	*Sphenomrphus maculatus*	√	√
17	*Eutropismultifaciata*	√	
18	*Varanus sp.*	√	

19	*Gecko moonarchus*	√	
20	*Varanus bengalensis*	√	√
21	*Varanussalvator*	√	√
22	*Typhlopsdiardi*	√	√
23	*Ophiophagus hannah*		√
24	*Ptyaskorros*	√	√
25	*Ptyascarinatus*	√	√
26	*Coelognathus radiata*	√	√
27	*Ahaetulla nasuta*	√	
28	*Chrysopelea ornata*	√	
29	*Dendrelaphis caudolineatus*	√	
30	*Dendrelaphis formosus*	√	√
31	*Rhabdophis subminiatus*	√	
32	*Xenochrophis piscator*	√	
33	*Elaphe taeiura*	√	
34	*Elaphe radiata*	√	√
35	*Elaphe prasina*	√	√
36	*Xenochrophis piscator*	√	
37	*Ophiophagus hannah*	√	√
38	*Amphiesmasp*	√	
39	*Python moluras*	√	√
40	*Melanochelys trijuga*	√	√
41	*Cyclemys oldhamii*	√	√
42	*Indotestudo elongata*	√	√
43	*Lissemys scutata*	√	
44	*Mabuyamult ifasciata*		√
45	*M. longicaudata*		√
	TOTAL	**39**	**31**

4.3.1. Photographic Documentation of Hepto Species

A. *Rana sp. 1*

B. Fejervarya limnocharis

C. *Bufo sp. 1*

D. *Ptyas korros*

E. *Coelognathus radiata*

F. *Calotes emma*

G. *Calotes vesicolor*

H. *Sphenomorphus maculatus*

I. *Calotes vesicular*

J. Calotes emma

K. *Ptyas korros*

L. *Coelognathus radiata*

4.4 Bird Species

Sixty-five bird species were identified in the left bank survey, all of which were identified by visual observation. According to the IUCN Red List, *Pavo muticus* is classified as endangered and *Psittacula eupatria, Psittacula finschii* and *Pisttacula krameri* are classified as near threatened. The rest are classified as least concern.

A total of 80 bird species were identified on both the left and right banks combined. Of this total sixty-five were identified on the left bank as opposed to 74 on the right bank. Naturally, there is a considerable amount of overlap between the two surveys with 59 species identified on both banks. This is likely due to the fact that, unlike flightless animals, the river does not constitute a significant barrier to the movement of birds across the research area.

Table 56: Bird Species on Left Bank

No.	Phylum Class	Order	Family	Scientific Name	Common name	Local name
1	Aves	Falconiformes	Falaconidae	*Microhieraxcaerulescens*	Collared falconet	Thein
2	Aves	Gallifornmes	Phasianidae	*Pavomuticus*	Green peafowl	Down
3	Aves	Pelecanifornes	Ardeidae	*Egrettacasmerodius*	Great egret	Byine
4	Aves	Pelecanifornes	Ardeidae	*Egrettagarzetta*	Little egret	Byine
5	Aves	Pelecanifornes	Ardeidae	*Bubulcus ibis*	Cattle egret	Kyawl kyaung byine
6	Aves	Accipitriformes	Accipitridae	*Milvusmigrans*	Black kite	Son
7	Aves	Columbiformes	Columbidae	*Streptopeliachinensis*	Spotted dove	Gyoe lae pyauk
8	Aves	Columbiformes	Columbidae	*Treronphoenicopterus*	Yellow- footed green pigeon	-
9	Aves	Columbiformes	Columbidae	*Columba liva*	Rock pigeon	Kho
10	Aves	Columbiformes	Columbidae	*Duculaaenea*	Green- imperial pigeon	Hnet nga nwar
11	Aves	Columbiformes	Columbidae	*Streptopeliaorientalis*	Oriental turtle dove	Gyoe ni pu
12	Aves	Cuculiformes	Cuculidae	*Clamatorcoromandus*	Chestnut-winged cuckoo	-
13	Aves	Cuculiformes	Cuculidae	*Centropussinensis*	Greater coucal	Bote
14	Aves	Camprimulgiformes	Apodiformes	*Cypsiurusbalasiensis*	Asian palm swift	Pyan hlwar

15	Aves	Coraciiformes	Coraciidae	*Coraciasbenghalensis*	Indian roller	Hnet khar
16	Aves	Coraciiformes	Coraciidae	*Eurystomusorientalis*	Dollar bird	Moe kaung
17	Aves	Piciformes	Megalaimidae	*Megalaimahaemacephala*	Coppersmith barbet	Hnet pa htein
18	Aves	Piciformes	Megalaimidae	*Megalaimalineata*	Lineated barbet	Phoe khaung
19	Aves	Piciformes	Megalaimidae	*Megalaimaasiatica*	White-throated barbet	Koat ka laung
20	Aves	Coraciiformes	Alcedinidae	*Halcyon smymensis*	White throated king fisher	Pain nyin yin phyu
21	Aves	Coraciiformes	Meropidae	*Meropsorientalis*	Green bee-eater	Pa zin htoe
22	Aves	Coraciiformes	Meropidae	*Meropsleschenaulti*	Chestnut-headed bee-eater	Pa zin htoe
23	Aves	Coraciiformes	Meropidae	*Meropsphilippinus*	Blue tailed bee-eater	Pa zin htoe
24	Aves	Piciformes	Picidae	*Dinopiumjavanense*	Common flameback	Thit toauk
25	Aves	Piciformes	Picidae	*Dinopiumraffesii*	Himalayan flameback	Thit toauk
26	Aves	Psittaciformes	Psittacidae	*Psittacula eupatria*	Alexandrine parakeet	Kyet tu ywe
27	Aves	Psittaciformes	Psittacidae	*Psittaculafinschii*	Grey-headed parakeet	Kyet tu ywe
28	Aves	Psittaciformes	Psittacidae	*Pisttaculakrameri*	Rose ring parakeet	Kyae kyote
29	Aves	Apodiformes	Apodidae	*Apuspacificus*	Forked tailed swift	Pyan hlwar
30	Aves	Apodiformes	Apodidae	*Apusaffinis*	House swift	Pyan hlwar
31	Aves	Passeriformes	Oriolodae	*Oriolus xanthomus*	Black-hooded oriole	Hnet war
32	Aves	Passeriformes	Dicruridae	*Dicrurusmacrocercus*	Black drongo	Hnet taw
33	Aves	Passeriformes	Dicruridae	*DicrurusIeucophaeus*	Ashy drongo	Hnet taw
34	Aves	Passeriformes	Corvidae	*Corvus splendens*	House crow	Kyee kan
35	Aves	Passeriformes	Corvidae	*Corvus macrorhynchos*	Large-billed crow	Taw kyee kan

36	Aves	Passeriformes	Oriolidae	*Oriolus tenuirostris*	Slender billed oriole	Hnet war
37	Aves	Passeriformes	Dicruridae	*Dicrurusaeneus*	Bronzed drongo	Hnet taw
38	Aves	Passeriformes	Motacillidae	*Motacilla alba*	White wagtail	Myee nyaunt kaung
39	Aves	Passeriformes	Estrildae	*Lonchurapunctulata*	Scaly breasted munia	Sar pa dee
40	Aves	Passeriformes	Estrildae	*Lonchuramalacca*	Black-headed munia	Sar pa dee
41	Aves	Passeriformes	Passeridae	*Passer domesticus*	House sparrow	Eain sar
42	Aves	Passeriformes	Passeridae	*Passer mmtanus*	Eurasian tree sparrow	Pa shue sar
43	Aves	Passeriformes	Muscicapidae	*Copsychussaularis*	Oriental magpie robin	Tha pate lwal
44	Aves	Passeriformes	Muscicapidae	*Saxicolacaprata*	Pied bushchat	Hnet kyar
45	Aves	Passeriformes	Sturnidae	*Acridotheresfuscus*	Jungle myna	Taw Zayet
46	Aves	Passeriformes	Sturnidae	*Acridotheresgrandis*	White vented myna	-
47	Aves	Passeriformes	Sturnidae	*Sturnusburmannicus*	Binous breaed starling	Zayet gaung phyu
48	Aves	Passeriformes	Sturnidae	*Graculareligiosa*	Common hill myna	Tha li kar
49	Aves	Passeriformes	Pycnonotidae	*Pycnonotusatriceps*	Black headed bulbul	-
50	Aves	Passeriformes	Pycnonotidae	*Pycnonotuscafer*	Red-vented bulbul	Bout phin ni
51	Aves	Passeriformes	Pycnonotidae	*Pycnonotusblanfordi*	Streak eared bulbul	Bout Chwal
52	Aves	Passeriformes	Pycnonotidae	*Pycnonotusjocosus*	Red-whichered bulbul	Bout Ka lon
53	Aves	Passeriformes	Pycnonotidae	*Pycnonotusmelanicterus*	Black-crested bulbul	-
54	Aves	Passeriformes	Hirundinidae	*Hirundorustica*	Barn swallow	Pyan hlwar gyi
55	Aves	Passeriformes	Nectarinidae	*Nectariniajugularis*	Olived- backed Sunbird	Pan Yi Sote

56	Aves	Passeriformes	Nectarinidae	*Nectariniaasiatica*	Purple sunbird	Pan Yi Sote
57	Aves	Passeriformes	Nectarinidae	*Aethopygasiparaja*	Cromson sunbird	Pan Yi Sote
58	Aves	Passeriformes	Cisticolidae	*Priniahodgsonii*	Grey breasted prinia	-
59	Aves	Passeriformes	Cisticolidae	*Priniarufescens*	Rufescent prinia	-
60	Aves	Passeriformes	Chloropseidae	*Chloropsisaurifrons*	Gonden fronted leafbird	Hnet sein
61	Aves	Passeriformes	Sturnidae	*Acridotherestristis*	Common myna	Zayet
62	Aves	Coraciiformes	Upupidae	*Upupaepops*	Common hoopoe	Taung pee sue
63	Aves	Passeriformes	Timaliidae	*Pellorenumruficeps*	Puff-throated babbler	-
64	Aves	Passeriformes	Campephagidae	*Pericrocotuscinnamomeus*	Small minived	-
65	Aves	Guriformes	Rallidae	*Gallinulachloropus*	Common moorhen	Yae Kyat

Table 57: Habitat Type, Number of Observations, Data Source, and IUCN Status

No.	Scientific Name	Habitat Type	No. of Obv.	Data Source	IUCN Status
1	*Microhierax caerulescens*	Top canopy	1	VO	LC
2	*Pavo muticus*	Near river bank	2	VO	EN
3	*Egretta casmerodius*	Near river site	4	VO	LC
4	*Egretta garzetta*	Near river site	3	VO	LC
5	*Bubulcus ibis*	Near river site/on sky	16	VO	LC
6	*Milvus migrans*	Top canopy/ on sky	1	VO	LC
7	*Streptopeli achinensis*	Cultivation/tree	18	VO	LC
8	*Treronphoeni copterus*	Top canopy	8	VO	LC
9	*Columba liva*	Building	22	VO	LC
10	*Ducula aenea*	Middle canopy	3	VO	LC
11	*Streptopeliaorientalis*	Cuitivation/middle canopy	20	VO	LC
12	*Clamatorcoro mandus*	Middle canopy	1	VO	LC

13	*Centropussinensis*	Shrub and bushes	5	VO	LC
14	*Cypsiurus balasiensis*	Tree/ on sky	30	VO	LC
15	*Coracias benghalensis*	Cultivation/middle canopy	4	VO	LC
16	*Eurystomus orientalis*	Top canopy	3	VO	LC
17	*Megalaima haemacephala*	Top canopy	12	VO	LC
18	*Megalai malineata*	Top canopy	15	VO	LC
19	*Megalaima asiatica*	Middle canopy	10	VO	LC
20	*Halcyon smymensis*	Tree/near river bank	6	VO	LC
21	*Merops orientalis*	Tree/ cultivation	10	VO	LC
22	*Merops leschenaulti*	Tree/ cultivation	18	VO	LC
23	*Merops philippinus*	Tree/ cultivation	5	VO	LC
24	*Dinopium javanense*	Middle canopy	2	VO	LC
25	*Dinopium raffesii*	Middle canopy	2	VO	LC
26	*Psittacula eupatria*	Tree	3	VO	NT
27	*Psittacula finschii*	Tree	12	VO	NT
28	*Pisttacula krameri*	Tree	2	VO	NT
29	*Apus pacificus*	On sky	35	VO	LC
30	*Apus affinis*	On sky	40	VO	LC
31	*Oriolus xanthomus*	Top canopy	2	VO	LC
32	*Dicrurus macrocercus*	Middle canopy	6	VO	LC
33	*Dicrurus Ieucophaeus*	Middle canopy	4	VO	LC
34	*Corvus splendens*	Tree/ cultivatuion	15	VO	LC
35	*Corvus macrorhynchos*	Cultivation	20	VO	LC
36	*Oriolus tenuirostris*	Top canopy	2	VO	LC
37	*Dicrurus aeneus*	Top canopy	5	VO	LC
38	*Motacilla alba*	Near river site/bank	4	VO	LC
39	*Lonchura punctulata*	Shrub and bushes/ Tree	15	VO	LC
40	*Lonchura malacca*	Shrub and bushes/ Tree	12	VO	LC
41	*Passer domesticus*	Tree	25	VO	LC
42	*Passer mmtanus*	Tree	25	VO	LC

43	*Copsychus saularis*	Shrub and bushes	5	VO	LC
44	*Saxicola caprata*	Cultivation/shrub and bushes	4	VO	LC
45	*Acridotheres fuscus*	Top canopy	20	VO	LC
46	*Acridotheres grandis*	Middle /top canopy	15	VO	LC
47	*Sturnus burmannicus*	Middle canopy/cultivation	10	VO	LC
48	*Gracula religiosa*	On sky	8	VO	LC
49	*Pycnonotusatriceps*	Top canopy/cultivation	2	VO	LC
50	*Pycnonotus cafer*	Top canopy/ shrub and bushes	3	VO	LC
51	*Pycnonotus blanfordi*	shrub and bushes	2	VO	LC
52	*Pycnonotus jocosus*	Top canopy/ shrub and bushes	2	VO	LC
53	*Pycnonotus melanicterus*	Middle /top canopy	3	VO	LC
54	*Hirundo rustica*	On sky	25	VO	LC
55	*Nectariniajugularis*	Top/ Middle canopy and bushes	6	VO	LC
56	*Nectariniaasiatica*	Top canopy and bushes	4	VO	LC
57	*Aethopygas iparaja*	Top canopy	2	VO	LC
58	*Priniahodgsonii*	shrub and bushes	2	VO	LC
59	*Priniarufescens*	shrub and bushes	4	VO	LC
60	*Chloropsisaurifrons*	Middle /top canopy	2	VO	LC
61	*Acridotherestristis*	Top canopy/ grassland	20	VO	LC
62	*Upupaepops*	Top canopy	2	VO	LC
63	*Pellorenumruficeps*	Shrub and bushes	6	VO	LC
64	*Pericrocotusc innamomeus*	Top canopy	2	VO	LC
65	*Gallinula chloropus*	Near water	3	VO	LC

Table 58: Bird Species on Right and Left Bank

No.	Scientific Name	Right Bank	Left Bank
1	*Francolinuspintadeanus*	√	
2	*Microhieraxcaerulescens*		√
3	*Cotumixchinensis*	√	
4	*Pavomuticus*	√	√
5	*Gallus gallus*	√	
6	*Egrettacasmerodius*	√	√
7	*Egrettagarzetta*	√	√
8	*Bubulcus ibis*	√	√
9	*Milvusmigrans*	√	√
10	*Accipiter badius*	√	
11	*Streptopeliachinensis*	√	√
12	*Treronphoenicopterus*	√	√
13	*Columba liva*	√	√
14	*Duculaaenea*	√	√
15	*Streptopeliaorientalis*	√	√
16	*Treroncurvirostra*	√	
17	*Clamatorcoromandus*	√	√
18	*Eudynamysscolopaceus*	√	
19	*Centropussinensis*	√	√
20	*Cypsiurusbalasiensis*	√	√
21	*Coraciasbenghalensis*	√	√
22	*Eurystomusorientalis*		√
23	*Anthracocerosalbirostris*	√	
24	*Megalaimahaemacephala*	√	√
25	*Megalaimalineata*	√	√

26	*Megalaimaasiatica*	√	√
27	*Halcyon smymensis*	√	√
28	*Meropsorientalis*	√	√
29	*Meropsleschenaulti*	√	√
30	*Meropsphilippinus*	√	√
31	*Dinopiumjavanense*	√	√
32	*Dinopiumraffesii*		√
33	*Psittacula eupatria*	√	√
34	*Psittaculafinschii*	√	√
35	*Pisttaculakrameri*	√	√
36	*Apuspacificus*	√	√
37	*Apusaffinis*	√	√
38	*Oriolus xanthomus*	√	√
39	*Dicrurusmacrocercus*	√	√
40	*DicrurusIeucophaeus*	√	√
41	*Corvus splendens*		√
42	*Corvus macrorhynchos*	√	√
43	*Oriolus tenuirostris*	√	√
44	*Urocissa erythrorhyncha*	√	
45	*Dicrurusaeneus*	√	√
46	*Pericrocotusflammeus*	√	
47	*Motacilla alba*	√	√
48	*Ploceusphilippinus*	√	
49	*Lonchurapunctulata*	√	√
50	*Lonchuramalacca*	√	√
51	*Passer domesticus*	√	√
52	*Passer mmtanus*	√	√
53	*Copsychussaularis*	√	√
54	*Saxicolacaprata*	√	√
55	*Acridotheresfuscus*	√	√

56	*Acridotheresgrandis*	√	√
57	*Sturnusburmannicus*	√	√
58	*Graculareligiosa*	√	√
59	*Pycnonotusatriceps*	√	√
60	*Pycnonotuscafer*	√	√
61	*Pycnonotusblanfordi*	√	√
62	*Pycnonotusjocosus*	√	√
63	*Pycnonotusmelanicterus*	√	√
64	*Hirundorustica*	√	√
65	*Vamellusindicus*	√	
66	*Nectariniajugularis*		√
67	*Nectariniaasiatica*		√
68	*Aethopygasiparaja*	√	√
69	*Priniahodgsonii*	√	√
70	*Priniarufescens*		√
71	*Chloropsisaurifrons*	√	√
72	*Chloropsiscochinchinensis*	√	
73	*Ketupazeylanensis*	√	
74	*Vanelluscinereus*	√	
75	*Turnixsuscitator*	√	
76	*Acridotherestristis*	√	√
77	*Upupaepops*	√	√
78	*Pellorenumruficeps*	√	√
79	*Pericrocotuscinnamomeus*	√	√
80	*Gallinulachloropus*	√	√
	TOTAL	**74**	**65**

4.3.1. Photographic Documentation of Bird Species

A. *Pavomuticus*

B. *Splaeornis spp.*

C. *Pellorneumruficeps*

D. *Gracularegigiosa*

F. *Merpsleschenaulti*

G. *Pycnonotuscafer*

H.*Corvusmacrorhynchos*

I. *Halcyon smyrnensis*

J. Oriolustenuirostris

L. Lonchurapunctulata

M. *Pycnonotusjococsus*

N. Treronphenicopterus

P. *Dicrurusmacrocercus*

Q. *Streptopelia chinensis*

R. Microhierax caerulescens

4.5. Mammal Species

Twenty-five mammal species were identified in the left bank survey. Ten were identified by voucher specimen, four were identified by visual observation and the remaining eleven were identified by interviews. According to the IUCN Red List, five of the species identified in the left bank survey are classified as endangered; *Pantheratigris, Bosjavenensis Trochypithecusphayrei, Trochypithecuspileatus and Hylobateslor.* Three species are classified as near threatened; *Pantherapardus, Macacaassamensis, and Presbytisfemoraliz.* Eight species are classified as vulnerable; *Ursusthibetanus, Pardofelisnebulosa, Bosgourus, Cervusunicolon, Naemorhedus baileyi, Macaca sp., Macacafascularis* and *Macacanemenstrina.* The remaining nine species are classified as least concern. It should be noted that during the survey all species classified as endangered were identified via interviews and not confirmed via visual observation. The same is true for many of the species classified as near threatened or vulnerable. Given the lack of confirmation on key species, it is recommended that a camera trap survey be conducted in the area to determine the prevalence of these species.

A total of 35 mammal species were identified on both the left and right banks combined. Of this total 25 were identified on the left bank as opposed to 23 on the right bank. Thirteen species were identified on both banks.

Table 59: Mammal Species on Left Bank

No.	Phylum Class	Order	Family	Scientific Name	Common Name	Local Name
1	Mammalia	Carnivora	Ursidae	*Ursusthibetanus*	Asian black bear	Wat won
2	Mammalia	Carnivora	Felidae	*Pantheratigris*	Tiger	Kyar
3	Mammalia	Carnivora	Felidae	*Pantherapardus*	Leopard	Kyar thit
4	Mammalia	Carnivora	Felidae	*Felischaus*	Jungle cat	Taw kyaung
5	Mammalia	Carnivora	Felidae	*Pardofelisnebulosa*	Clouded leopard	Inn kyar
6	Mammalia	Artiodactyla	Bovidae	*Bosgourus*	Gaur	Pyaung
7	Mammalia	Artiodactyla	Bovidae	*Bosjavenensis*	Bantang	Saing
8	Mammalia	Artiodactyla	Suidae	*Susscrofa*	Eurasian wild pig	Taw wat
9	Mammalia	Artiodactyla	Cervidae	*Muntiacusmuntjak*	Red muntia	Chae
10	Mammalia	Artiodactyla	Cervidae	*Cervusunicolon*	Sambar	Sat
11	Mammalia	Artiodactyla	Bovidae	Naemorhedus baileyi	Red goral	Taung sateni
12	Mammalia	Primate	Cercopithecidae	*Macaca sp.*	Monkey	Myauk

13	Mammalia	Primate	Cercopithecidae	*Macacaassamensis*	Assamese macaque	Arsam myuk
14	Mammalia	Primate	Cercopithecidae	*Macacafascularis*	Long Tailed Macaque	Myauk tangar
15	Mammalia	Primate	Cercopithecidae	*Macaca nemenstrina*	Pig tailed macaque	Myauk putee
16	Mammalia	Primate	Cercopithecidae	*Macacamulatta*	Rhesus Macaque	Myauk sut
17	Mammalia	Primate	Cercopithecidae	*Trochypithecusphayrei*	Pharyre's langur	Myauk myat kwin pyar
18	Mammalia	Primate	Cercopithecidae	*Trochypithecuspileatus*	Cappet langur	Myauk nyo
19	Mammalia	Primate	Cercopithecidae	*Hylobateslor*	Whited handed gibbon	Myauk hlwe kyaw
20	Mammalia	Primate	Cercopithecidae	*Presbytisfemoralis*	Banded langur	Myauk mhee shae
21	Mammalia	Rodentia	Sciuridae	*Callosciurus erythraeus*	Pallas's squirrel	Shint nga paw
22	Mammalia	Rodentia	Hystricidae	*Hystrix brachyuran*	Malayan porcupine	Phyu
23	Mammalia	Chiroptera	Hipposideridae	*Hipposideros armiger*	Great round leaf bat	Lin noet
24	Mammalia	Chiroptera	Megadermatidae	*Megaderma sposma*	Lesser false vampire bat	Lin noet
25	Mammalia	Scandentia	Tupaiidae	*Tupaia belangeri*	Tree shrew	swae

Table 60: Habitat Type, Number of Observations, Data Source, and IUCN Status

No.	Scientific Name	Habitat Type	No. of Obv.	Data Source	IUCN Status
1	*Ursusthibetanus*	Forest		IS	VU
2	*Pantheratigris*	Forest		IS	EN
3	*Pantherapardus*	Forest		IS	NT
4	*Felischaus*	Forest	Foot print	VS	LC
5	*Pardofelisnebulosa*	Forest	Skin	VS	VU
6	*Bosgourus*	Forest		IS	VU
7	*Bosjavenensis*	Forest		IS	EN
8	*Susscrofa*	Forest	Foot print	VS	LC

9	*Muntiacusmuntjak*	Forest	Foot print	VS	LC
10	*Cervusunicolon*	Forest		IS	VU
11	*Naemorhedus baileyi*	Forest		IS	VU
12	*Macaca sp.*	Tree		VS	VU
13	*Macacaassamensis*	Tree		VO	NT
14	*Macacafascularis*	Tree	Foot print	VS	VU
15	*Macacanemenstrina*	Tree	Foot print	VS	VU
16	*Macacamulatta*	Tree	Foot print	VS	LC
17	*Trochypithecusphayrei*	Tree		IS	EN
18	*Trochypithecuspileatus*	Tree		IS	EN
19	*Hylobateslor*	Tree		IS	EN
20	*Presbytisfemoralis*	Tree		IS	NT
21	*Callosciurus erythraeus*	Teak tree	2+	VS	LC
22	*Hystrix brachyuran*	Cave	Quill	VS	LC
23	*Hipposideros armiger*	Cave	30	VO	LC
24	*Megaderma sposma*	Tree	3	VO	LC
25	*Tupaia belangeri*	Forest	2	VO	LC

Table 61: Mammal Species on Right and Left Banks

No.	Scientific Name	Right Bank	Left Bank
1	*Hylomyssuillus*	√	
2	*Talpa micrura*	√	
3	*Ursusthibetanus*	√	√
4	*Cuonalpinus*	√	
5	*Viverrazibetha*	√	
6	*Panthera tigris*		√
7	*Panthera pardus*		√
8	*Felis chaus*	√	√
9	*Pardofelisnebulosa*		√
10	*Bosgourus*	√	√

11	*Bosjavenensis*	√	√
12	*Susscrofa*	√	√
13	*Muntiacusmuntjak*	√	√
14	*Cervusunicolon*	√	√
15	*Naemorhedus baileyi*	√	√
16	*Macaca sp.*	√	√
17	*Macacaassamensis*	√	√
18	*Macacafascularis*		√
19	*Macacanemenstrina*		√
20	*Macacamulatta*		√
21	*Trochypithecusphayrei*		√
22	*Trochypithecuspileatus*		√
23	*Hylobateslor*		√
24	*Presbytisfemoralis*	√	√
25	*Mnanispentadactyla*	√	
26	*Lepuspeguensis*	√	
27	*Callosciurus erythraeus*	√	√
28	*Petauristasp*	√	
29	*Rhizomys sp.*	√	
30	*Hystrixbrachyura*	√	√
31	*Taphozouslongimanus*	√	
32	Copriconissumatraensis	√	
33	*Hipposideros armiger*		√
34	*Megaderma sposma*		√
35	*Tupaia belangeri*		√
	Total	**23**	**25**

4.5.1. Photographic Documentation of Mammal Species

(A) Foot print of *Macaca fascicularis*

(B) *Muntiacus muntjak*

(C)Foot print of *Macaca nemestrina*

(D) Foot print of *Sus*

(E) *Hipposideros armiger*

(F) *Tupaia belangeri*

(G) *Megaderma spasma*

(H) spine of *Hystrix brachyura*

(I) *Muntiacus muntjak*

(J) *Droppings of a large cat*

(K) *Macaca spp.*

(L) Foot print of *Macaca fascicularis*

(M) *Habitat of Tupaia belanger*

(N) Hair of *Hystrix brachyura*

(O) Cave of *Hipposideros armiger*

(P) *Hipposideros armiger*

(Q) *Megaderma spasma*

4.6. Fauna Totals for Entire Project Area

A total of 242 fauna species were identified on the left bank survey over a 20-day period. This is closely comparable with the right bank survey which identified 243 fauna species. A total of 343 fauna species were found on the left and right banks combined. The left bank also had a number of species present that exist on the IUCN Red List. Most notably, seven species are classified as endangered, nine as vulnerable and ten as near threatened.

Table 62: Total Fauna Left and Right Banks

No.	Fauna	Left Bank	Right Bank	Both Banks
1	Insects and other invertebrates species	86	74	138
2	Fish and other aquatic species	36	32	45
3	Herpeto species	31	39	45
4	Bird species	65	74	80
5	Mammal species	25	23	35
	TOTAL	243	242	343

Table 63: Left Bank Fauna IUCN Classification Totals

No.	Fauna	IUCN Red List categories						
		EN	VU	NT	LC	NE	DD	TOTAL
1	Insects and other invertebrates species	-	-	-	-	-	-	0
2	Fish and other aquatic species	-	1	2	16	2	2	23
3	Herpeto species	1	-	2	26	1	-	30
4	Bird species	1	-	3	61	-	-	65
5	Mammal species	5	8	3	9	-	-	25
	TOTAL	7	9	10	112	3	2	143

5. CONCLUSION AND RECOMMENDATIONS

5.1. Flora

The flora team conducted 38 sample plots and numerous transect walks on the left bank of the river to determine the flora species present as well as their density and common occurrence. The data were collected using the same methodology and team of researchers as the EIA for the right bank of the river. As such the data collected proves statistically robust and can offer an accurate representation of the flora species present on the left bank and how it compares in terms of biodiversity to the right bank.

At present the forest ecosystems on the left bank of the river are more substantial and diverse than those on the right. As noted earlier in the report, a total of 462 species of flora were identified across the entire project area on both banks. Of these species, 289 can be found on the right bank and 383 can be found on the left bank. This means that the left bank has more diversity than the right bank with an additional 94 species (or 33% more species) than the right bank. A total of 20 flora species on the IUCN Red List can be found on the left bank. Most notably, both *Curcuma alismatifolia* and *Dalbergia cultrata* Grah. are classified as near threatened (NT), *Cycas siamensis* Miq. is classified as Vulnerable (VU A2 cd) and *Dalbergia oliveri* Gamble is classified as endangered (EN A1cd). The other 16 species on the list are classified as either least concern or low risk/least concern.

Deforestation and forest fragmentation are more common on the right bank of the river. During fieldwork, no primary forests were found on the right bank; only the patches of secondary or degraded forest. Some patches of primary forest still exist on the left bank, but in general, left bank forests have also been degraded by small-scale logging operations of hardwoods as well as recent and substantial clearance of forests area for farmland. Due to these issues, bamboo forests with a low frequency of timber trees are beginning to replace the deciduous forests in the area; though, patches of deciduous Indine forest and deciduous teak forests still existing on the left bank to a limited extent. These remaining habitat blocks vary greatly in size, and it is foreseeable that many of them can continue to exist and expand if there is adequate protection and moderate restoration. Given these conditions the remaining patches could be enough to regenerate natural forests, given fifteen to twenty years. However, if the current process of small scale logging and land clearance for farmland continue without change, degradation of left bank forests will continue. In this scenario left bank flora cover will be degraded to the point where it is similar to that of the right bank within a few decades.

(small scale logging)

(recently cleared forests for farm land)

5.2. Fauna

A total of 242 fauna species were identified on the left bank survey over a 20-day period. This is closely comparable with the right bank survey which identified 243 fauna species. A total of 343 fauna species were found on the left and right banks combined. The left bank also had a number of species present that exist on the IUCN Red List. Most notably, seven species are classified as endangered (EN), nine as vulnerable (VU) and ten as near threatened (NT). It should be noted that all of the species classified as endangered were identified via interviews with the local population and not confirmed via visual observation. The same is true for many of the species listed as vulnerable and near threatened. The majority of the twenty-six species which fall in these three categories are mammals (16 species). A camera trap survey is highly recommended. Such a survey should be able to provide an accurate understanding of the prevalence of many of these large mammal species.

5.3. External Impacts

The survey identified a number of factors impacting biodiversity on the left and right banks that are external to the project and will continue regardless of whether or not the Middle Yeywa HPP is implemented. Although not directly related to the project addressing them through selected interventions should be an integral part of SNPs measures to offset environmental damage caused by the project.

Loss of biodiversity and habitat

The catchment forest of the Myitnge River is facing deforestation due to the expansion of farm-land by nearby villages. Sugarcane and corn plantations are growing rapidly in Naung Cho Township on the right bank and cultivation of corn in Yat Sauk Township is happening on the left bank. Much of the forest cover on the right bank has already been removed and forest cover on the left bank is declining. The land use change is rapid and continued deforestation is inevitable. Small-scale logging is also taking place on the left bank of the river. Although these are mostly in reserve forests, it is unlikely to expect that the logging will cease. The deforestation of the area will have a negative impact on fauna, which rely on the forests as their

natural habitat. As deforestation continues, fauna will compete over smaller areas of habitat and food sources, and many will be forced into more frequent contact with human populations as they look for alternative food sources. Fauna will also be more vulnerable to hunting.

Loss of fresh-water supply

The geology of the proposed Middle Yeywa reservoir consists of limestone bedrock covered by terra-rosa soil. The removal of surface vegetation due to forest clearance for farmland allows rain water to disappear quickly through the porous limestone, leaving the surface dry even after heavy rain. This may lead to the loss of the streams and springs and consequently, a shortage of freshwater supply in the area. This can have negative implications both for fauna and human populations in the area, particularly during the dry season.

Hunting by Local Populations

Wild game hunting is still practiced in the project area, particularly on the left bank. The present survey identified the presence of big cats, *Pantherapardus and Felischaus* and other mammals such as *Cervus unicolor, Muntiacus muntjak* and *Sus scrofa*. These species are facing extinction in the area due to the hunting practices of local populations.

5.4. Project Impacts

The survey provides enough evidence to predict that the Middle Yeywa HPP will have the following impacts on flora and fauna in the area.

Habitat loss

The reservoir will inundate all land located below 320 masl in the river valley. The steep slopes of the valley mean that much of the water volume will occupy vertical space and a relatively small surface area will be inundated. This area consists of riverine Indaine forests and is habitat for a variety of fauna species.

Changes in water quality and aquatic habitats

The project will transform a swift flowing section of the Myitnge River into a slow and stagnant reservoir. This could potentially have adverse effects on dissolved oxygen content (DOC) and consequently, affect the populations of various fish species living there. The inundated biomass can also have adverse effects on water quality, leading to eutrophication if proper preventative measures are not taken. Relatedly the project will also reduce sediment flow in the river. Much sediment will build up in the reservoir as opposed to being washed downstream. This can have adverse impacts on fish populations downstream which depend on the sediment load to fuel the base of their food chain.

Additional river fragmentation

The Lower Yeywa HPP has already fragmented the river and blocked potential migration routes for various fish species. Since this survey took place after the construction of the Lower Yeywa HPP, researchers were unable to determine the extent to which migration is already blocked. The addition of the Middle Yeywa HPP will lead to further river fragmentation, though impacts will be marginal relative to pre-existing fragmentation.

5.5. Recommendations

The EIA survey has identified several impacts on flora and fauna biodiversity in the project area. Some of these will be caused by the project while others will be the result of external factors. The following interventions are recommended to mitigate the effects of project impacts and external impacts, promote the sustainable use of natural resources in the project area and prevent the degradation of flora and fauna biodiversity. These interventions should be integrated parts of a wider Environmental Management Plan (EMP) to be financed and implemented by SN Power. The impacts, mentioned earlier in this section and the recommendations to follow are outlined in the 'Impact and Mitigation Matrix' (Section 6.6).

- Data collected from this survey can be used to calculate the habitat loss (both in terms of surface area and vegetation type) that the reservoir will inundate. SN Power should support community forest projects in the villages proximate to the river. Both reserve and productive forests should be created to offset habitat loss from the HPP and promote a more sustainable use of forest resources by the local population. To this end SNP should also help communities to establish a 'Conservation Fund'. This can be used to provide seed funding for the community forest projects as well as fund continued maintenance of community forests over the long-term.

- Biomass clearance should be conducted in the reservoir below the fill line of 320 masl. This will avoid oxygen deficiency and eutrophication and promote good water quality.

- Studies should be done to measure the cumulative impacts on water quality, sedimentation and dissolved oxygen content of the Middle Yeywa HPP and other current and planned HPP on the Myitnge River as a whole.

- The environmental survey carried out thus far on both the left and right banks of the river covered the direct impact zone of the project, especially the vegetation of the river valley and the river bank slope. The catchment forests are vital for the maintenance of sustainable water level in the dam. The present environmental survey points out the link between the catchment forests and river health but cannot identify the magnitude of impact. For the full environmental assessment, the indirect impact zone especially the catchment forest area of the river and the downstream ecosystem must be included.

- DOC should be closely monitored before, during and after the construction of the Middle Yeywa HPP. If approaches minimal acceptable levels, appropriate mitigation measures should be considered such as the construction of artificial waterfalls.

- An environmental audit should be conducted shortly after completion of the project. This will help to inform additional environmental protection measures where appropriate.

- Interviews with local villagers suggests the presence of several endangered fauna species. A camera trap survey should be conducted to confirm or disprove the existence of these species in the project area. Pending the findings of the camera trap survey, appropriate conservation efforts can then be determined and implemented.

5.6. Impacts and Mitigation Matrix

Project Impacts

Potential Impact to Biodiversity	Extent			Duration			Probability			Magnitude			Significance			Recommended Measures
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
1 Existing Indaing Forest and Teak forests in riverine area will be inundated.			√			√			√			√			√	The remaining Indaing forest above 320 masl should be protected from illegal logging and community forest projects should be conducted.
2 Eutrophication of water in dam reservoir due to biomass from inundated forests.		√			√			√			√			√		Biomass clearance should be conducted before reservoir is filled.
3 Decrease oxygen concentration in water due to the change of running water to stagnant water in reservoir.	√				√			√			√			√		To restore the DOC in the reservoir man-made falls and rapid should be constructed to get stable oxygen concentration in the inundated area along the river. DOC levels should be closely monitored before, during and after dam construction to determine if this measure is necessary or if DOC remains within acceptable levels without this intervention.
4 Food scarcity for aquatic fauna due to decrease nutrient transport from stagnant water in reservoir.		√			√			√			√			√		Reforestation of catchment forest so that the nutrition regime can be maintained

External Impacts

Potential Impact to Biodiversity	Extent			Duration			Probability			Magnitude			Significance			Recommended Measures
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	

1 Degradation of teak forests in catchment area due to small-scale logging and land clearance for farming.			√			√			√			√			√	Reforestation of teak plantation should be done.
2 Loss of nutrient regime from degraded catchment forest and transported from upstream to downstream			√		√			√		√				√		Reforestation of catchment forest should be carried out. A reforestation and conservation fund should be established and implemented.
3 Expansion of cultivated farm land into the forest area.		√				√			√			√			√	The remaining patches of forests should be conserved and regeneration of forest trees must be promoted in the deforested area. Further expansion of farm land in the forest area must be prevented.
4 Hunting of wild game is still practiced by local populations. Consequently, biodiversity of fauna is decreasing.			√			√			√			√			√	The enforcement of law and order should be strictly carried out and protection of wild animals, by forest ranger should also be promoted.

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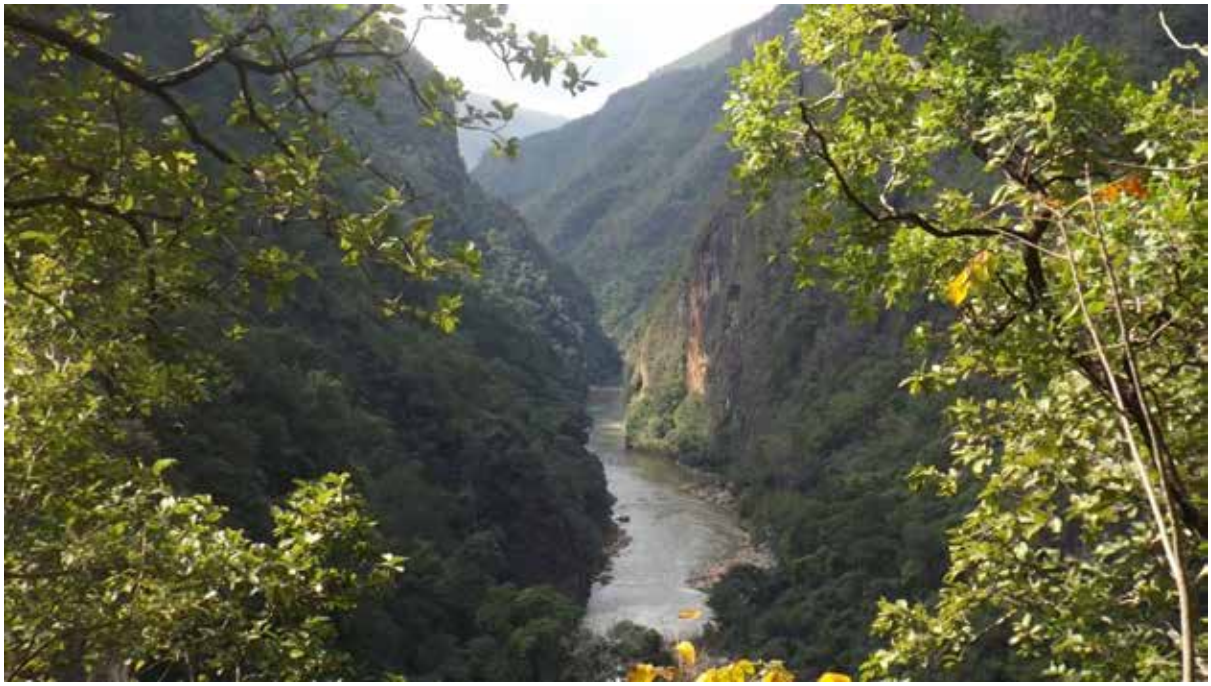
ANNEX 2C

Biodiversity Impact Assessment Report of Middle Yeywa Hydropower Dam

BIODIVERSITY IMPACT ASSESSMENT REPORT OF MIDDLE YEYWA HYDROPOWER DAM



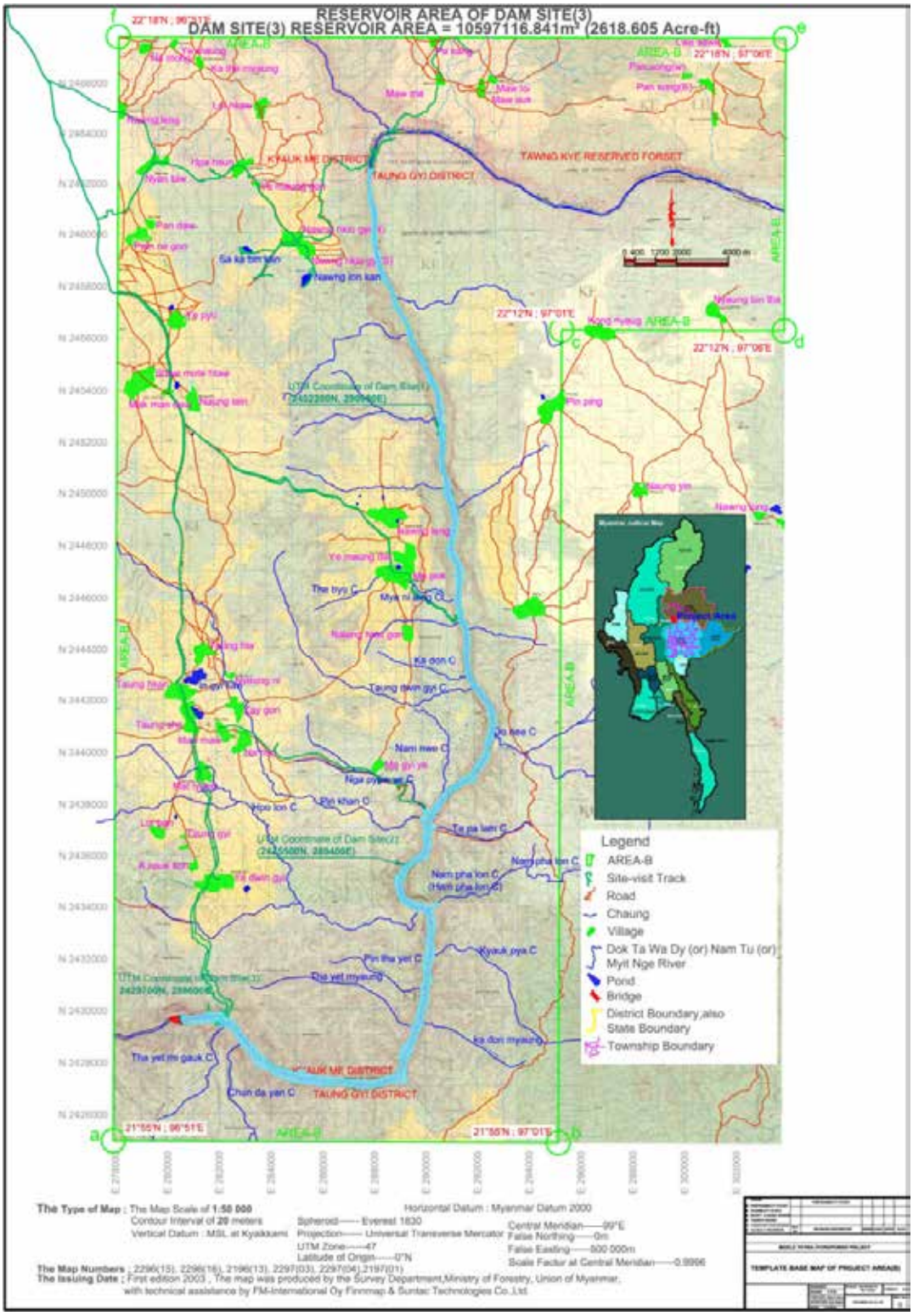
January, 2018

No.	CONTENTS	Pages

I. INTRODUCTION

The Middle Yeywa Hydropower Dam Project is located between 21˚55' N, 96˚51' E and 21˚55' N 97˚01' E near Yetwingyi Village in Naungcho Township, on downstream confluence with Tha-yet-migauk stream and Dokhtawaddy River. (Map I)

Map I.



A series of biodiversity impact assessment was conducted along the both sides of riverbank of Dokhtawaddy River (also called NanTu River and Myintnge River). From March to May of 2015 first biodiversity survey was conducted along the right bank of the river in dry season. From September to October of 2015, second biodiversity survey was conducted along the right bank of the river in raining season. From July to August of 2016 third biodiversity survey was conducted along the left bank of the river in these surveys a series of point quadrants, line transects and wandering transect were conducted and types of vegetation and habitat types in each ecosystem were analyzed and recorded. The habitat surveys include area along the roadsides, steep slope of riverbanks and catchment areas of the river. Datum were collected via visual observation and supported by GPS positioning, photographs and taking physical specimens of plants and animals.

The present survey consists of four representative areas and focus in inundated area (below 320m asl) along the river. The plant specimens were recorded and identified with a focus on rocks along the river, aquatic plants along the river, the river bank of Gohteik stream, the area around Namkam water fall and inundated area in the confluence of Namkam Stream and Dokhtawaddy River.

The fauna survey was focus on the mammals, insects, birds and reptiles in the four representative areas. For big mammals (big cat/Leopards) the camera traps were deployed in the possible representative areas on the both sides of the river especially on left bank. The local village headmen were requested to monitor and takecare the existing of cameras. The fish survey carried out by the expert from MIID was excluded in the present study. Multiple sampling techniques such as visual encounter and acoustic surveys, trapping (Camera traps), interviewing, collecting the wildlife remnant and track and sign surveys to increase the chances of detecting species that occur within the study area, were deployed.

1.1. Objectives

The field survey conducted for the present study has

1. To collect and identify the plant and animal species in the inundated area along the river especially the rocks and cliffs along the river, seasonally flooded area and spray zone of waterfall and wildlife in the direct impact zones.
2. To record the dominant tree species and evaluate the vegetation types.
3. To assess the potential impacts and to suggest the mitigation measure.

1.2. Topography of the research area

The elevation of the mountain ranges in the catchment area around the river is 1000m in height. The river flows in narrow V-shaped valley and has steep banks. The flooded area due to dam will be narrow and long. The flooded area is estimated to be approximately 1,100 hectare, according to the references. The normal pool level will be 320m asl.

The lower Yeywa Dam is located on the downstream 80.4km away from Middle Yeywa HPP dam site. The Upper Yeywa HPP dam is located on the upstream 49.6km away from the Middle Yeywa HPP dam. The lowest elevation in the Middle Yeywa dam area is 218m asl near Yetwingyi Village. The highest elevation of Middle Yeywa HPP dam in the inundated area is 320m asl. The elevation level near Naungchogyi Village is 325m asl. It is estimated 68km away

from the Upper Yeywa HPP dam. Therefore the tail of Middle Yeywa Dam may not reach the Upper Yeywa Dam.

The project area exists in a Monsoon climatic zone. The average annual rainfall is 1312mm.

II. MATERIALS AND METHOD

2.1 Survey Team

Flora Team

(1) Dr.Win Myint (Associated Professor, ex.), Ecologist

(2) U Nyo Maung (Retired Professor), Taxonomist

(3) Dr. Ei Ei Phyoe, Taxonomist

(4) U Tun Thura, Botanist & GIS/RS

(5) U Thein Phyoe Aung (Assistant Taxonomist)

Fauna Team

(1) U Tin Aung Tun (Bird and Mammal specialist and Fauna Team Leader)

(2) U Min Thein Htet (Amphibians and Reptiles Specialist)

(3) U Kyaw Naing Oo (Insect and other Invertebrates Specialist)

2.2. Methodology (Flora)

The floristic Survey in the project area had been divided into four representative areas.

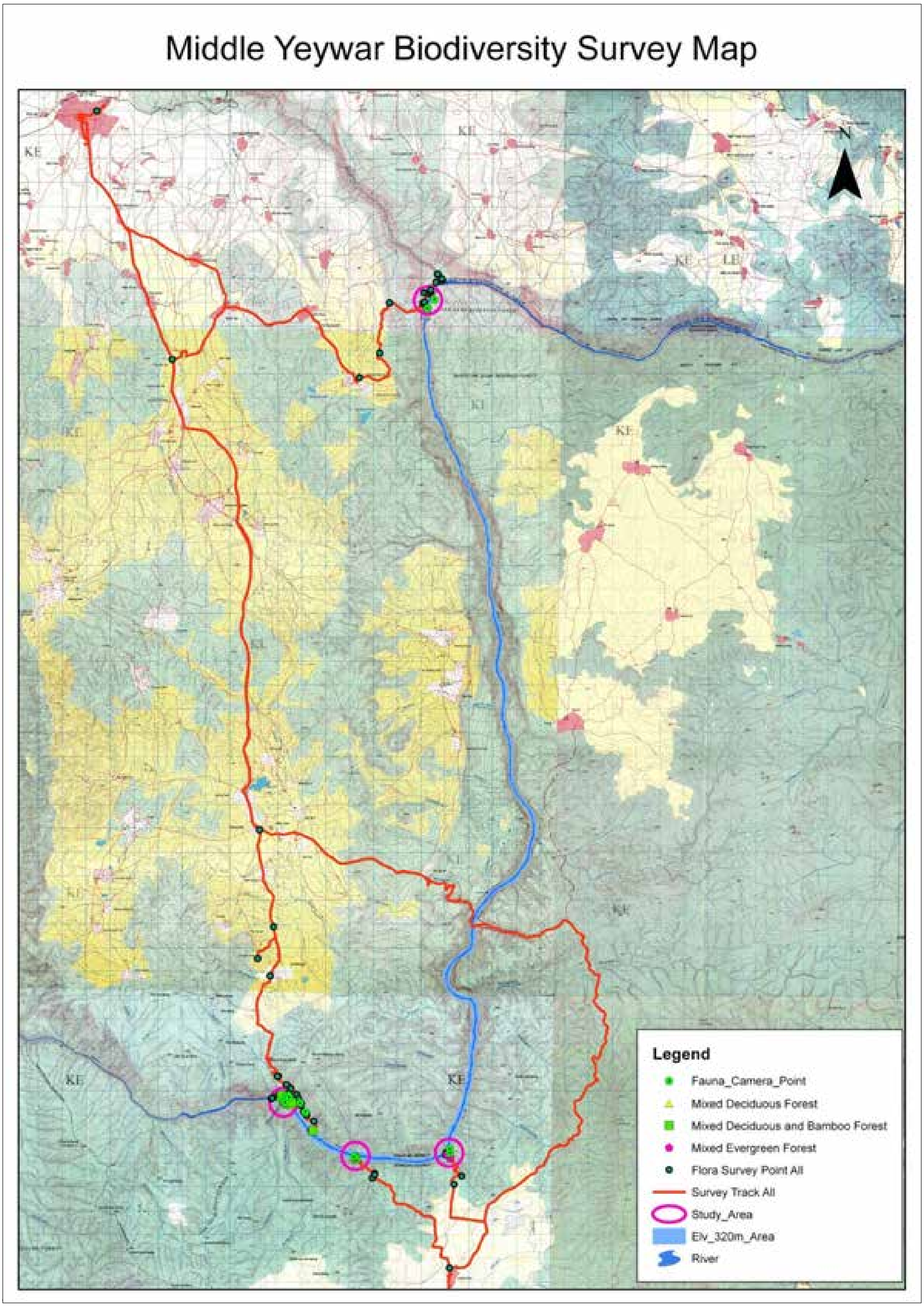
The first research area includes the inundated area closed to the dam site, estimate 6.4km away from Yetwingyi Village on the right bank of the river. The lowest elevation in this area is 222m asl.

The second research area includes the downstream confluence of Dokhtawaddy River and Gohteik Stream. The lowest elevation in this area is 320m asl.

The third research area includes the Namkam waterfall area and the inundated area at the confluence of Namkam Stream and Dokhtawaddy River. The lowest elevation in this area is 265m asl.

The fourth research area includes the previously used as boat jetty on the riverbank near Kyauk-sone Village. The lowest elevation in the area is 260m asl.

Map II.


Middle Yeywar Biodiversity Survey Map
N
Legend
Fauna_Camera_Point
Mixed Deciduous Forest
Mixed Deciduous and Bamboo Forest
Mixed Evergreen Forest
Flora Survey Point All
Survey Track All
Study_Area
Elv_320m_Area
River

The floristic data and ecological data collection were conducted by the following methods in the study Area.

2.2.1.1 Sample Plotting

The Global Positioning System was used to navigate and mark the coordinates of the sample plots. In order to obtain essential data for predicting of tree species composition in the forest and vegetation types, 20x20 and 30x30 meter quadrants, were set up and tree species in the plot were collected and population of each species were also counted. For the Bamboo survey, 20x20 and 30x30 meter quadrants were set up and bamboo species were collected and number of clump of each species were also counted. The species identification was carried out by using key to families of flowering plants and appropriate literature and confirmed by matching with herbarium specimens of Department of Botany, University of Yangon.

2.2.1.2 Random Transecting

To get representative checklists of the tree species and bamboo species, plant collection was also carried out by random transect lines along the roadside and between one plot and another wherever possible. Specimen collection was made within 10 meter on either side of the transect line.

2.2.1.3 Mapping

Location maps are set by the method based on the UTM map and coordinate system WGS 1984 UTM zone 47 to determine the forests of the proposed areas.

2.1.2 Materials

Materials used for recording are strings for sample plotting and transecting, digital camera for recording, GPS, maps, heavy duty plastic bags, old newspapers, corrugated paper, alcohol, spray jug (for fixing specimens), 10x lens, permanent marker, field note books, field press, drying press and dryers.

2.1.3 Data Analysis

After field survey, data entry was carried out in excel work sheet. Analysis of population per hectare percentage was conducted using excel work 2007.

2.1.3.1 Population of Individual Species (per hectare)

The population of species will show not only the composition of species but also the richness of the species in the study area. The population of individual species (per hectare) is determined by following formula. (Ref: R.He'dl, M Sva'tek, M. Dancak, Rodzay A.W., M. Salleh A.B., Kamariah A.S.(2009).

$$\text{Population of Individual Species} = \frac{\text{Total Individual species}}{\text{Total Plots Area } (m^2)} \times 10000 m^2 (1ha)$$

2.1.3.2 Relative Density of Tree species

The density of a species refers to the numerical representation of its individual and the availability of space in a unit area. The density index shows not only the richness of the texa but also the relative distribution of the individuals. According to Curtis (1959), the density index is determined by the following formula.

$$\text{Relative Density of Tree species} = \frac{\text{No. of Individual species}}{\text{Total no. of all individual Species}} \times 100$$

2.1.3.3 Relative frequency of Tree species

The relative frequency of a species refers to the percentage occurrence of its individuals and shows the frequency of different species growing in the study area. The species that fall in high frequency class can be considered as the most common species in the study area. According to Curtis (1959), the relative frequency is determined by the following formula.

$$\text{Relative frequency of Tree species} = \frac{\text{No. of sample plot occurs}}{\text{Total no. of all species occur}} \times 100$$

2.1.3.4 Species distribution by frequency class

According to Raunkiaer's Law of frequency (1934), each species was grouped into one of five-frequency class (FC); Frequency range (1-20%) represents rare species, (20 - 40%) represents seldom species, (40 - 60%) represents often species, (60 - 80%) represents mostly species, and (80 - 100%) represents constantly present species. This frequency class will also clarify the homogeneity or heterogeneity of the floristic distribution in the study area.

2.1.3.5 Tree species in DBH class interval

Tree species in DBH class interval is calculated by

$$\text{Population of DBH class interval} = \frac{\text{No. of species}}{\text{Total no. of all species}} \times 100$$

Low DBH class interval shows the degraded and secondary forest height DBH class interval shows the primary forest.

2.1.3.6 Tree species in Height class interval

Tree species in Height class interval is calculated by

$$\text{Population of Height class interval} = \frac{\text{No. of species}}{\text{Total no. of all species}} \times 100$$

Low height class interval shows the degraded and secondary forest and high height class interval shows the primary forest.

2.1.3.7. Impact Analysis

Potential threats have been assessed according to four parameters. The four parameters are assigned a score from 1 to 3 based on the grading, which is indicated in the table below; this then allows an assessment of overall significance to emerge.

Score	Extant	Duration	Magnitude	Probability
1.	Direct threats zone: within study side and immediate surrounding	Short term: 0 to 12 month	Low: No or negligible	Low
2.	Locally: measurable outside study area and immediate surrounding	Medium term: 1 to 2 years	Medium: modified the natural ecosystem	Medium
3.	Wide Area: threats activities on large scale.	Long term: Threats persists	High: Environmental function altered or Socio-economic condition highly modified	High

Based on the scores related to extent, duration, magnitude and probability of a specific threat, the significant of threat calculated.

Significance indicator = [Extant + Duration + Probability] x Magnitude

2.3. MATERIALS AND METHODS (Fauna)

The survey was conducted from 10th to 19th of December 2017. Survey sites were selected based on satellite images and on consultation held with international and local experts and local people. Four survey sites were divided base on habitats. Globally threatened status of Fauna species were categorized using The IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.)., i.e Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near threatened (NT) and Least Concern (LC). Equipment used for species identification included: binoculars (8x42), cameras with long telephoto lens, field guides, call recorders. Geographic coordinates for each location (tracks and waypoints) were recorded using GPS devices (Garmin etrex 10 receiver). Coordinates were recorded as latitude and longitude in decimal degrees, and referenced to the WGS84 (World Geodetic System of 1984) datum. Data were collected using a data collection sheet specifically developed for the purpose, and organized at a later stage using a specific archive in a Microsoft Excel spread sheet and analysed using a Geographic Information System. The open source software Quantum GIS (QGIS) was used for GIS data analysis.

Birds: Transects were performed on along the footpath, during the morning to late afternoon. Transect length varied between 3 km to 6 km. The population status of bird species and their habitats were carried out by line transects method. Binoculars 10x42, Camera and long telephoto lens, Garmin GPS etrex 10 receivers, Digital Audio Recorder, Bamboo Flute (Owlet sound) and Field Guide Books (Craig Robson, 2011) were used for identification of bird's species during the survey period. Binoculars are used for visual sighting and recorded birdcalls for further detail identification. Listening to bird's calls is for aural identification. Recording or play back of bird's calls, or using owlet sound with bamboo flute to attract birds. Camera was used for the photograph record of some bird species such as new record for Myanmar and Regional. The geographic co-ordinates for each line transect were recorded using GPS device. Data sheet was also used during the survey period.

Mammals: Survey was performed using two methods. These are tracks and signs surveys and interview survey method. Direct observations of tracks and signs was applied mainly on existing trails and following route across the forest identified by local people. The team collected and recorded animal tracks and signs in a systematic manner. Direct survey method includes direct sightings and hearings. Indirect survey includes observing of tracks and signs such as footprints/spoors, faeces/ scats/ dungs, resting sites, scratching places, eating signs etc. Records of structure and the measurements of footprints were also made for identification. The surveys were mainly conducted on the jungle paths and animal trails. Salt lick and small streams were also investigated during survey period. In addition, a number of local people such as hunter or ex hunter were interviewed from village near survey area. Verbal reports by reliable persons and old records from the area were also recorded. During the survey period, 12 camera traps were installed in four survey sites. The mammals were identified with the references to John W. K. Parr., U Tin Than., 2000. *A Field guide to the Large Mammals of Myanmar.* Yon Kyi Chat Sarpe Publisher, Myanmar, 274 pp and Francis, C. M. (2008). *A field*

guide to the mammals of South-East Asia. Asia Books, Bangkok, 392 pp. All data on the presence and species composition of mammal species were compiled.

Amphibian and Reptile: Surveys were conducted during the survey period. Specimens were observed by visual encounter surveys (Heyer et. al. 1994) supplemented with acoustic searching, turning rocks and logs, peeling bark, digging through leaf litter, and excavating burrows. Specimens were collected by hand or rubber ring and snake tongs were used to capture poisonous snakes. All species encountered are recorded during the survey period. Geographic coordinates for each survey site were determined in the field with Garmin GPS etrex 10 receivers. Coordinates were recorded as latitude and longitude in decimal degrees, and referenced to the WGS84 (World Geodetic System of 1984) datum.

Insect and other invertebrate: Survey applying standard method was conducted randomly around the survey area and along the trails or footpath in the survey area. Identification of Butterfly species was primarily made directly in the field. In some cases, if the encountered butterflies were not identified directly in the field, specimens were collected by using the long-handled aerial nets, net patch 1 millimetre, ring size 15 inches diameter. At the camp, collected specimens were observed and recorded for their morphological characters such as patterns, spots, stripes and colour. The mouth parts were carefully examined and the body and wing's length, measured. The specimens were taken picture and released back into the field. Some specimens were kept separately in the triangle envelopes. All separated envelopes were preserved in the airtight plastic containers to avoid humidity and also put mothballs inside containers to prevent from the growth of mould. Insects and other small invertebrates were taken voucher specimens although familiar species and some others were only taken picture.

III.RESULTS

3.1 Flora

3.1.1. First Research Area

Map III.

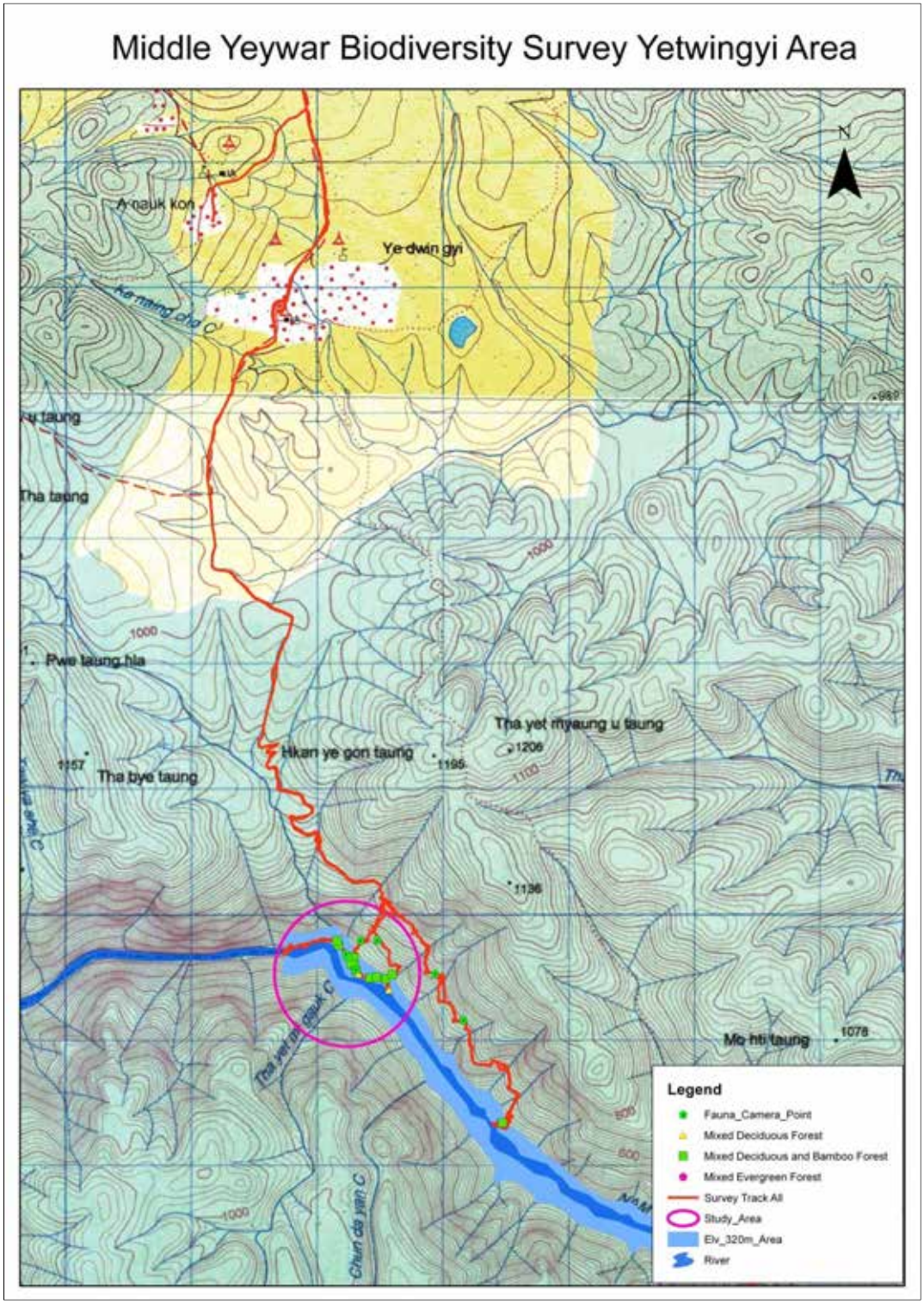
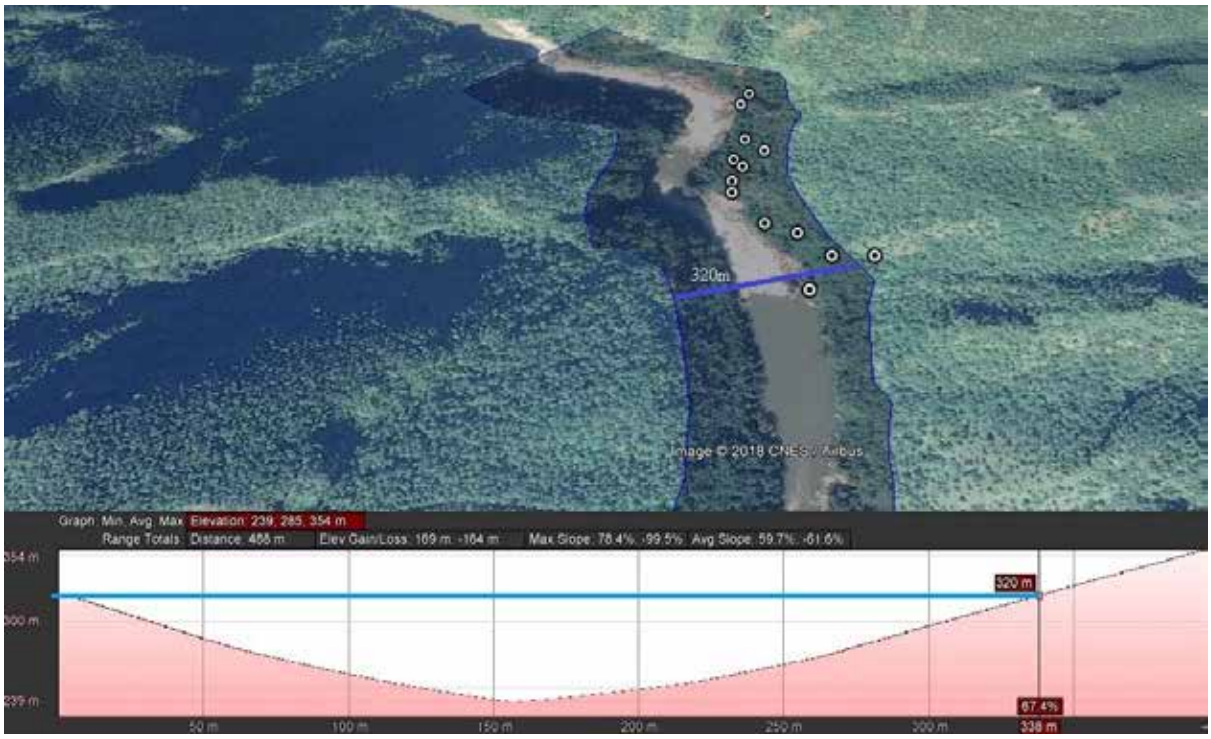


Photo Map IV.



Mixed Deciduous Forest

Mixed Deciduous Forest

3.1.1.1. Floristic composition

The total number of tree species collected in 14 representative sample plots in this area is 31 species belonging to 30 genera. The dominant tree species in this area are *Chukrasia velutina* Roem. (Taw-yin-ma) and *Pterocarpus indicus*Willd. (Taw-pa-dauk) followed by *Eugenia operculata* Roxb. (Ye-tha-bye), *Shorea siamensis*(Kurz)Miq. (In-gyin), and *Homonoia riparia* (Ye-mo-ma-kha/Gyin-ye).

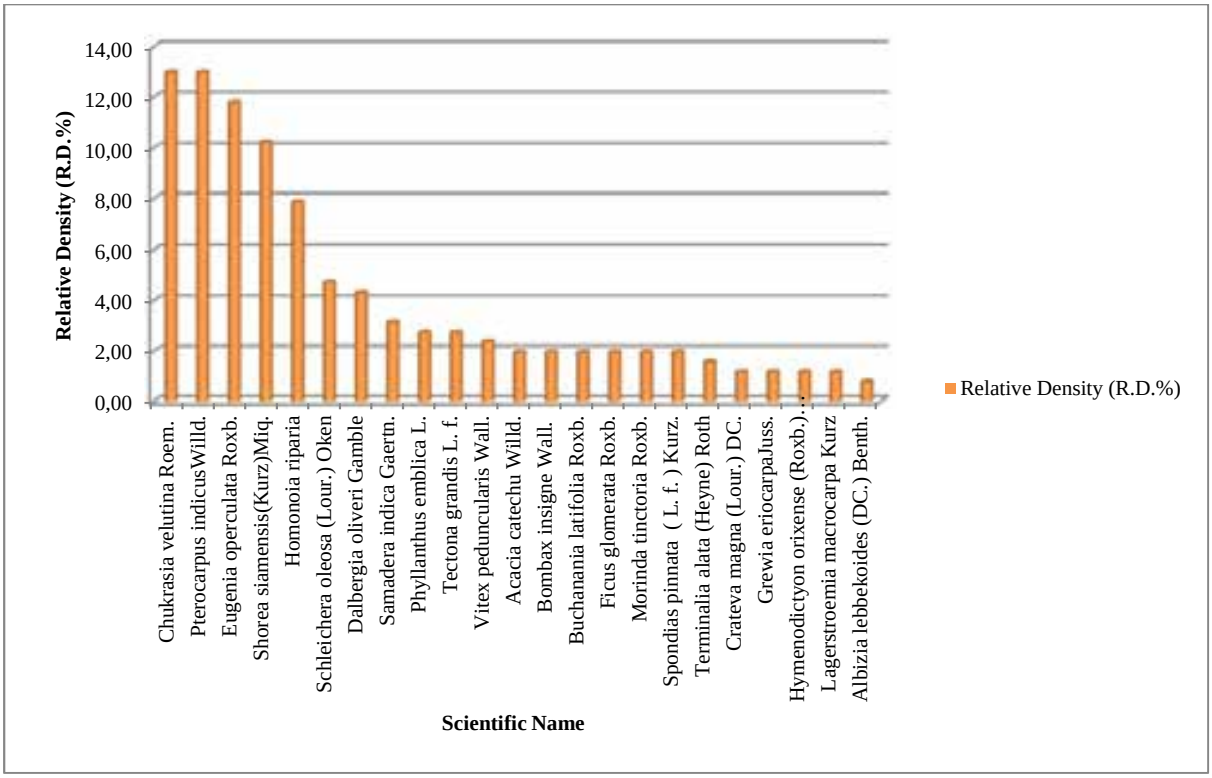
3.1.1.2. Tree Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Acacia catechu* Willd.	5	8.93	1.97
2	*Adina indivisa* Lance	1	1.79	0.39
3	*Albizia lebbekoides* (DC.) Benth.	2	3.57	0.79
4	*Anogeissus acuminata* Wall.	2	3.57	0.79
5	*Anthocephalus morindaefolius* Korth.	1	1.79	0.39
6	*Bombax insigne* Wall.	5	8.93	1.97
7	*Buchanania latifolia* Roxb.	5	8.93	1.97
8	*Chukrasia velutina* Roem.	33	58.93	12.99
9	*Crateva magna* (Lour.) DC.	3	5.36	1.18
10	*Dalbergia cultrata* Grah.	2	3.57	0.79
11	*Dalbergia oliveri* Gamble	11	19.64	4.33
12	*Eugenia operculata* Roxb.	30	53.57	11.81
13	*Ficus glomerata* Roxb.	5	8.93	1.97
14	*Flacourtia indica* (Burm. f.) Merr.	2	3.57	0.79
15	*Grewia eriocarpa*Juss.	3	5.36	1.18
16	*Homonoia riparia*	20	35.71	7.87
17	*Hymenodictyon orixense* (Roxb.) Mabb.	3	5.36	1.18
18	*Lagerstroemia macrocarpa* Kurz	3	5.36	1.18
19	*Millettia ovalifolia* Kurz	2	3.57	0.79
20	*Morinda tinctoria* Roxb.	5	8.93	1.97
21	*Phyllanthus emblica* L.	7	12.50	2.76
22	*Pterocarpus indicus*Willd.	33	58.93	12.99
23	*Samadera indica* Gaertn.	8	14.29	3.15
24	*Schleichera oleosa* (Lour.) Oken	12	21.43	4.72
25	*Schrebera swietenioides* Roxb.	1	1.79	0.39
26	*Shorea siamensis*(Kurz)Miq.	26	46.43	10.24
27	*Spondias pinnata* (L. f.) Kurz.	5	8.93	1.97
28	*Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.	2	3.57	0.79
29	*Tectona grandis* L. f.	7	12.50	2.76
30	*Terminalia alata* (Heyne) Roth	4	7.14	1.57
31	*Vitex peduncularis* Wall.	6	10.71	2.36
	Total	**254**	**453.57**	**100.00**

3.1.1.3. Relative density

Among the sample plots species density per hectare varied and the highest density was observed *Chukrasia velutina* Roem., and *Pterocarpus indicus*Willd followed by *Eugenia operculata* Roxb., *Shorea siamensis*(Kurz)Miq., and *Homonoia riparia*. This shows that these five species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Chukrasia velutina* Roem.	2.36	12.99
2	*Pterocarpus indicus*Willd.	2.36	12.99
3	*Eugenia operculata* Roxb.	2.14	11.81
4	*Shorea siamensis*(Kurz)Miq.	1.86	10.24
5	*Homonoia riparia*	1.43	7.87
6	*Schleichera oleosa* (Lour.) Oken	0.86	4.72
7	*Dalbergia oliveri* Gamble	0.79	4.33
8	*Samadera indica* Gaertn.	0.57	3.15
9	*Phyllanthus emblica* L.	0.50	2.76
10	*Tectona grandis* L. f.	0.50	2.76
11	*Vitex peduncularis* Wall.	0.43	2.36
12	*Acacia catechu* Willd.	0.36	1.97
13	*Bombax insigne* Wall.	0.36	1.97
14	*Buchanania latifolia* Roxb.	0.36	1.97
15	*Ficus glomerata* Roxb.	0.36	1.97
16	*Morinda tinctoria* Roxb.	0.36	1.97
17	*Spondias pinnata* (L. f.) Kurz.	0.36	1.97
18	*Terminalia alata* (Heyne) Roth	0.29	1.57
19	*Crateva magna* (Lour.) DC.	0.21	1.18
20	*Grewia eriocarpa*Juss.	0.21	1.18
21	*Hymenodictyon orixense* (Roxb.) Mabb.	0.21	1.18
22	*Lagerstroemia macrocarpa* Kurz	0.21	1.18
23	*Albizia lebbekoides* (DC.) Benth.	0.14	0.79
24	*Anogeissus acuminata* Wall.	0.14	0.79
25	*Dalbergia cultrata* Grah.	0.14	0.79
26	*Flacourtia indica* (Burm. f.) Merr.	0.14	0.79
27	*Millettia ovalifolia* Kurz	0.14	0.79
28	*Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.	0.14	0.79
29	*Adina indivisa* Lance	0.07	0.39
30	*Anthocephalus morindaefolius* Korth.	0.07	0.39
31	*Schrebera swietenioides* Roxb.	0.07	0.39

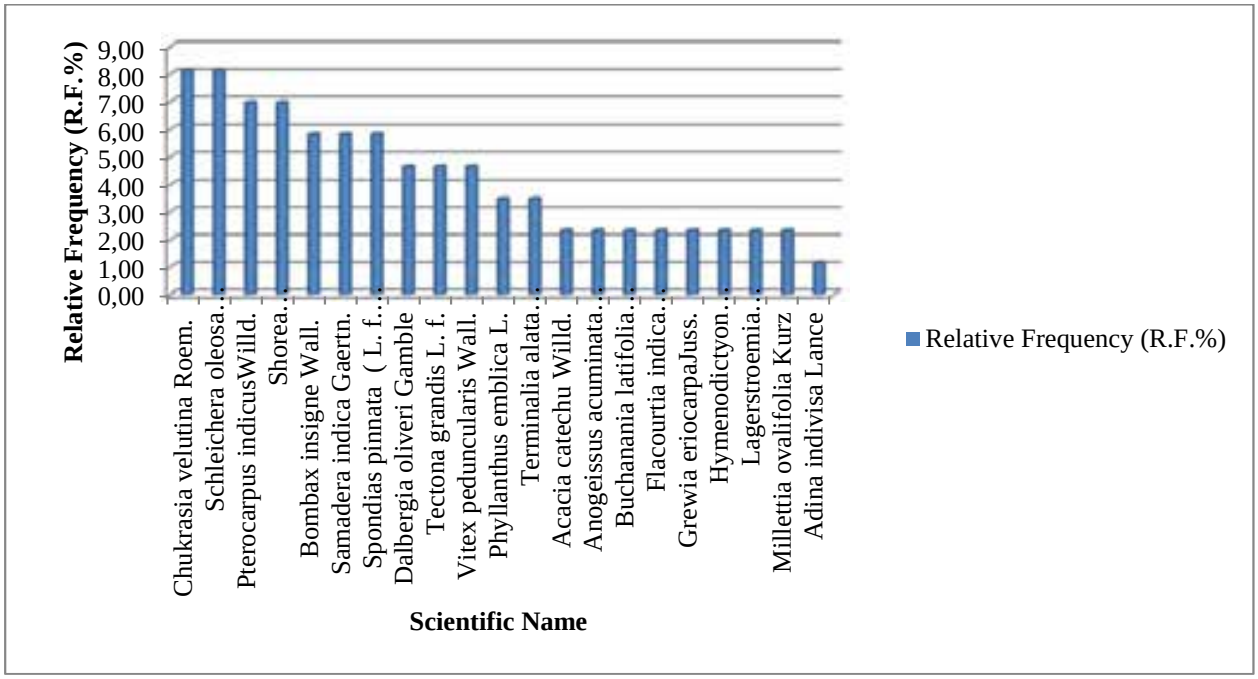


3.1.1.4. Relative frequency of Tree species

Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results**,** *Chukrasia velutina* Roem., and *Schleichera oleosa* (Lour.) Oken are (8%) high relative frequency class, followed by *Pterocarpus indicus*Willd. and *Shorea siamensis* (Kurz) Miq., (7%) are equally; *Bombax insigne* Wall., *Samadera indica* Gaertn. *and Spondias pinnata* (L. f.) Kurz., are (6%) respectively. Therefore these species occur everywhere in the study area. The lower frequency of some species is *Adina indivisa* Lance, *Homonoia riparia*, and *Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb., are demarcated as rare species in the area.

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Chukrasia velutina* Roem.	0.50	8.14
2	*Schleichera oleosa* (Lour.) Oken	0.50	8.14
3	*Pterocarpus indicus*Willd.	0.43	6.98
4	*Shorea siamensis*(Kurz)Miq.	0.43	6.98
5	*Bombax insigne* Wall.	0.36	5.81
6	*Samadera indica* Gaertn.	0.36	5.81
7	*Spondias pinnata* (L. f.) Kurz.	0.36	5.81
8	*Dalbergia oliveri* Gamble	0.29	4.65
9	*Tectona grandis* L. f.	0.29	4.65
10	*Vitex peduncularis* Wall.	0.29	4.65
11	*Phyllanthus emblica* L.	0.21	3.49
12	*Terminalia alata* (Heyne) Roth	0.21	3.49
13	*Acacia catechu* Willd.	0.14	2.33

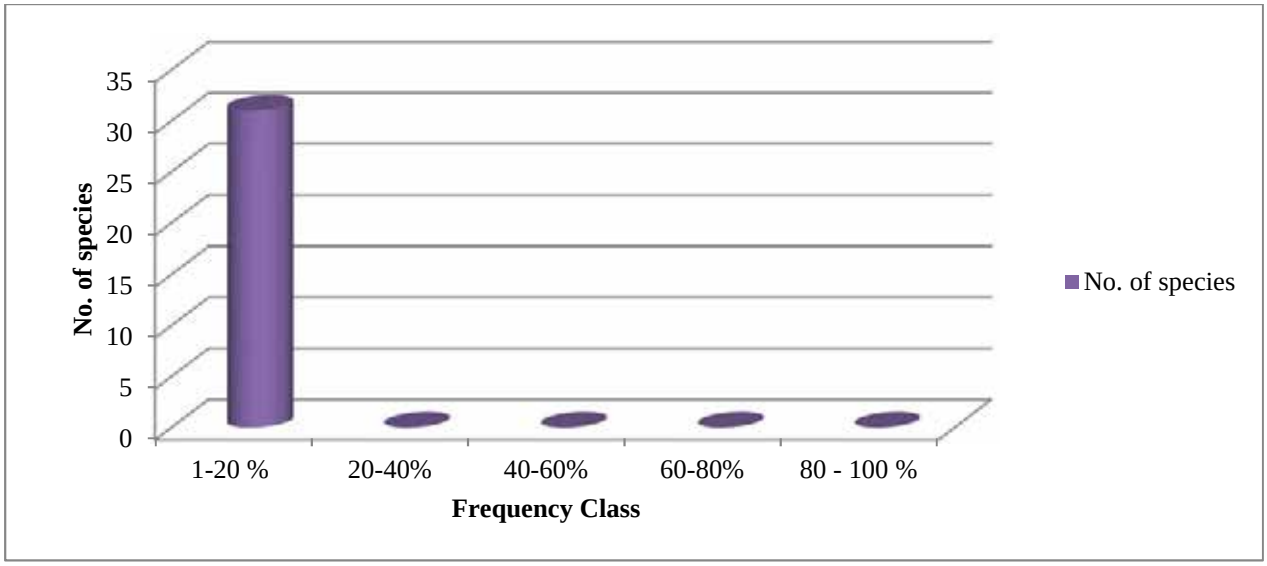
14	*Anogeissus acuminata* Wall.	0.14	2.33
15	*Buchanania latifolia* Roxb.	0.14	2.33
16	*Flacourtia indica* (Burm. f.) Merr.	0.14	2.33
17	*Grewia eriocarpa*Juss.	0.14	2.33
18	*Hymenodictyon orixense* (Roxb.) Mabb.	0.14	2.33
19	*Lagerstroemia macrocarpa* Kurz	0.14	2.33
20	*Millettia ovalifolia* Kurz	0.14	2.33
21	*Adina indivisa* Lance	0.07	1.16
22	*Albizia lebbekoides* (DC.) Benth.	0.07	1.16
23	*Anthocephalus morindaefolius* Korth.	0.07	1.16
24	*Crateva magna* (Lour.) DC.	0.07	1.16
25	*Dalbergia cultrata* Grah.	0.07	1.16
26	*Eugenia operculata* Roxb.	0.07	1.16
27	*Ficus glomerata* Roxb.	0.07	1.16
28	*Homonoia riparia*	0.07	1.16
29	*Morinda tinctoria* Roxb.	0.07	1.16
30	*Schrebera swietenioides* Roxb.	0.07	1.16
31	*Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.	0.07	1.16



3.1.1.5. Species distribution by frequency class

In order to clarify the homogeneity and heterogeneity of the floristic distribution in the area, the species distribution by frequency class was examined. According to the outcome of the frequency classes only zero species is in high frequency class and 31 species are in low frequency class. This shows that this area is floristically low degree of homogeneity.

Frequency class	No. of species
1-20 %	31
20-40%	0
40-60%	0
60-80%	0
80 - 100 %	0



3.1.1.6. Tree species in DBH class interval

The distribution of DBH interval class reveals the dominant of small stem individuals in the area 95% of the tree species are less than 40cm DBH. Large stem individuals with DBH more than 60cm are of 5 %. Majority of the trees are less than 40cm in diameter, which indicates that the forests secondary types.

DBH Class	No. of species	Total number of individual	% of total population
<40cm	241	430.36	94.88
41-60cm	7	12.50	2.76
61-80cm	3	5.36	1.18
81-100cm	3	5.36	1.18
>101cm	0	0.00	0.00
Total	**254**	**453.57**	**100.00**

3.1.1.7. Tree species in Height class interval

The distribution of Height shows that 228 individuals are less than 10 meter, comprising 90% of the total population and 26 individuals are 15meter and above, comprising the 10%. Since most canopy height classes are less than 10m, the forests in the area could be classified as secondary forests.

Height Class	No. of species	Total number of individual	% of total population
<10m	228	407.14	89.76
11-15m	17	30.36	6.69
16-20m	5	8.93	1.97
21-25m	4	7.14	1.57
>26m	0	0.00	0.00
Total	**254**	**453.57**	**100.00**

3.1.1.8. Vegetation type in the study area

No.	Sample Quadrant	Vegetation type	Longitude	Latitude	Altitude(m)	Dominant species
1	IQ I	Mixed Deciduous and Bamboo Forest	96.888356	21.960507	321	*Chukrasia velutina* Roem. , *Pterocarpus indicus*Willd., *Eugenia operculata* Roxb., *Shorea siamensis*(Kurz)Miq., *Homonoia riparia, Schleichera oleosa* (Lour.) Oken, *Dendrocalamus membranaceus* Munro, *Dalbergia oliveri* Gamble, *Samadera indica* Gaertn., *Phyllanthus emblica* L., *Tectona grandis* L. f.
2	IQ II	"	96.888381	21.959968	305	
3	IQ III	"	96.888141	21.960037	289	
4	IQ IV	"	96.887899	21.960583	282	
5	IQ V	"	96.887140	21.961363	262	
6	IQ VI	"	96.887027	21.961703	256	
7	IQ VII	"	96.888513	21.959573	260	
8	IQ VIII	Mixed Deciduous Forest	96.888706	21.959349	240	
9	IQ IX	Mixed Deciduous and Bamboo Forest	96.889599	21.959029	259	
10	IQ X	"	96.890125	21.959117	272	
11	IQ XI	Mixed Deciduous Forest	96.891060	21.958209	255	
12	IQ XII	Mixed Deciduous and Bamboo Forest	96.890841	21.958980	289	
13	IQ XIII	"	96.891319	21.959323	318	
14	IQ XIV	"	96.899976	21.948767	300	
IQ =Inundated Quadrant						

3.1.1.9. Species Inventory List of Inundated Area

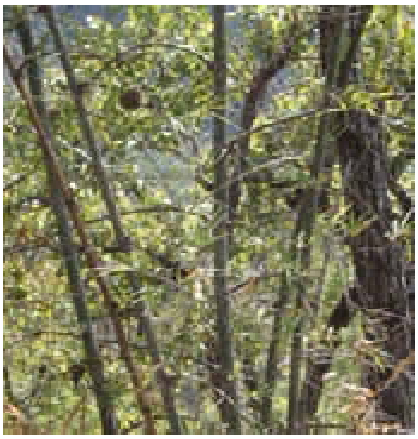
No	Scientific Name	Common Name	Family Name	Habits
1	*Acacia concinna* (Willd.) DC.	Ka-mon-chin	Mimosaceae	S
2	*Acacia pennata* (L.) Willd.	Su-yit	Mimosaceae	CL
3	*Adenanthera pavonina* L.	Ywe-gyi	Mimosaceae	T
4	*Adiantum latifolium*	Not known	Pteridaceae	F
5	*Adina indivisa* Lance	Hnaw	Rubiaceae	T
6	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae	T
7	*Anogeissus acuminata* Wall.	Yon	Combretaceae	T
8	*Anthocephalus morindaefolius* Korth.	Ma-u-let-tan-shae	Rubiaceae	T
9	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	CL
10	*Barleria cristata*	Pyo-ma-naing	Acanthaceae	S
11	*Bidens alba*	Not known	Asteraceae	H
12	*Boehmeria nivea* (L.) Gaud.	Phet-ya	Urticaceae	S

No	Scientific Name	Common Name	Family Name	Habits
13	*Bombax ceiba* L.	Let-pan	Bombacaceae	T
14	*Bombax insigne* Wall.	De-du	Bombacaceae	T
15	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae	T
16	*Canscora diffusa* (Vahl) R.Br.	Kyauk-pan	Gentianaceae	H
17	*Cassia fistula* L.	Ngu	Caesalpiniaceae	T
18	*Chukrasia velutina*	Taw-yin-ma	Meliaceae	T
19	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae	ST
20	*Crateva magna* (Lour.) DC.	Ye-ka-det	Capparaceae	T
21	*Cyperus exaltatus*	Not known	Cyperaceae	H
22	*Cyperus nutans*	Not known	Cyperaceae	H
23	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	T
24	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	T
25	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	B
26	*Dioscorea alata*	Myauk-u	Dioscoreaceae	CL
27	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae	CL
28	*Dioscorea* sp.	Kywe	Dioscoreaceae	CL
29	*Elatostema reticulatum*	Wet-sa	Urticaceae	H
30	*Entada scandens* Benth.	Doe-nwee	Mimosaceae	CL
31	*Equisetum hyemale*	Not known	Equisetaceae	H
32	*Eugenia operculata* Roxb.	Ye-tha-bye	Myrtaceae	T
33	*Euphorbia bifida*	Say-pa-le	Euphorbiaceae	H
34	*Euphorbia hypericifolia* L.	Seik-noe-ma-htwet	Euphorbiaceae	H
35	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae	T
36	*Ficus pumila* L.	Kyauk-kat-nyaung	Moraceae	CL
37	*Ficus variegate*	Kon-tha-phan	Moraceae	T
38	*Flacourtia indica* (Burm. f.) Merr.	Na-ywe	Flacourtiaceae	ST
39	*Flemingia strobilifera*	Se-laik-pya	Fabaceae	S
40	*Grewia eriocarpa*Juss.	Ta-yaw	Tiliaceae	ST
41	*Grimmia* sp.	Not known	Grimmiaceae	Br
42	*Grimmia trichophylla*	Not known	Grimmiaceae	Br
43	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae	S
44	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	S
45	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-san	Rubiaceae	T
46	*Indigofera pulchella* Roxb.	Taw-me	Fabaceae	S
47	*Lagerstroemia macrocarpa* Kurz	Pyin-ma-ywet-gyi	Lythraceae	T
48	*Leea hirta* Banks	Naga-mauk-phyu	Leeaceae	ST
49	*Leea rubra* Blume.	Na-ga-mauk-ni	Leeaceae	S
50	*Lygodium circinnatum*	Not known	Lygodiaceae	F
51	*Marchantia berteroana*	Not known	Marchantiaceae	Br
52	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL
53	*Millettia ovalifolia* Kurz	Thin-win-phyu	Fabaceae	T
54	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
55	*Morinda persicaefolia* Buch.-Ham.	Ni-ba-sae	Rubiaceae	S

No	Scientific Name	Common Name	Family Name	Habits
56	*Najas minor*	Brittleleaf	Najadaceae	AqH
57	*Neyraudia reynaudiana* (Kunth) Keng ex Hitchc.	Kyu	Poaceae	G
58	*Pentasachme caudatum* Wall. Ex Wight	Not known	Asclepiadaceae	H
59	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae	H
60	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	ST
61	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae	H
62	*Plagiochila obscura*	Not known	Plagiothecieae	Br
63	*Pogonatherum crinitum* (Thunb.) Kunth	Not known	Poaceae	G
64	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	AqH
65	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	T
66	*Saccharum spontaneum* L.	Thet-kel-gyi	Poaceae	G
67	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	ST
68	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	T
69	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae	ST
70	*Selaginella willdenowii*	Peacock Fern	Selaginellaceae	F
71	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	T
72	*Spirogyra* sp.	Algae	Zygnemataceae	Al
73	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	T
74	*Stephania venosa* (Blume) Spreng.	Taung-kya	Menispermaceae	CL
75	*Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.	Than-de	Bignoniaceae	T
76	*Strobilanthes* sp.	Pan-thin	Acanthaceae	S
77	*Tadehagi triquetrum* (L.)H. Ohashi	Lauk-thay	Fabaceae	S
78	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae	T
79	*Tectona grandis* L. f.	Kyun	Verbenaceae	T
80	*Triumfetta rotundifolia* Lam.	Kat-se-ne-thay	Tiliaceae	S
81	*Utricularia* sp.	Ye-bu-baung	Lentibulariaceae	AqH
82	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae	ST
83	*Vitex pubescens* Vahl	Kyet-yo	Verbenaceae	T
84	*Vitis trifolia*	Not known	Vitaceae	CL
85	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae	ST

Al=Algae, AqH=Aquatic Herbs, B=Bamboo, Br=Bryophyte, CL=Climber, F=Fern, G=Grass, H=Herbs, S=Shrubs, ST=Small Tree, T=Tree

3.1.1.10. Bamboo Forest




Bamboo Forest

3.1.1.10.1 Bamboo Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Dendrocalamus membranaceus* Munro	108	225.00	100.00

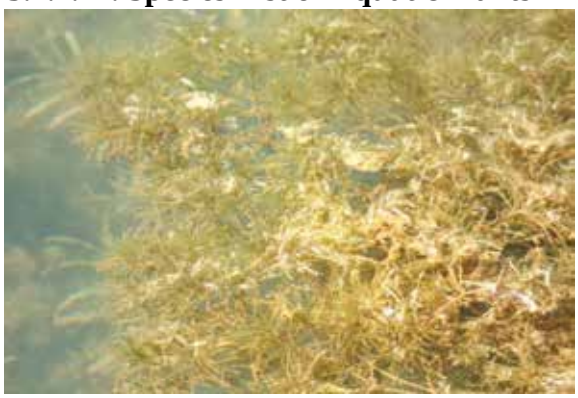
3.1.1.10.2. Relative density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Dendrocalamus membranaceus* Munro	9.00	100.00

3.1.1.10.3. Species distribution

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Dendrocalamus membranaceus* Munro	1.00	100.00

3.1.1.11. Species List of Aquatic Plants




Najas minor

Potamogeton crispus L.

No	Scientific Name	Common Name	Family Name
1	*Equisetum hyemale*	Not known	Equisetaceae
2	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae
3	*Najas minor*	Brittleleaf	Najadaceae
4	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae
5	*Spirogyra* sp.	Algae	Zygnemataceae
6	*Utricularia* sp.	Ye-bu-baung	Lentibulariaceae

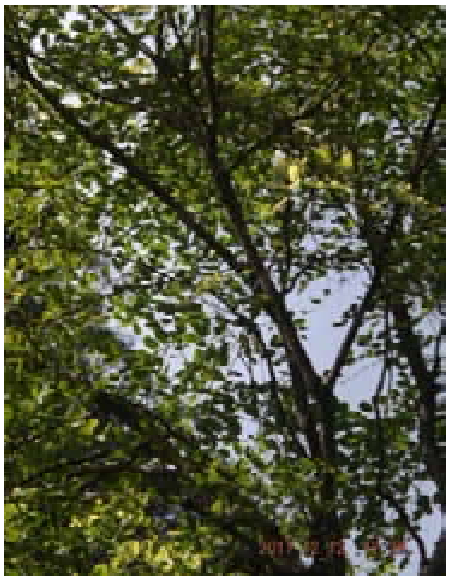
3.1.1.12. Species List of Bryophytes and Algae

Plagiochila obscura

Grimmia trichophylla

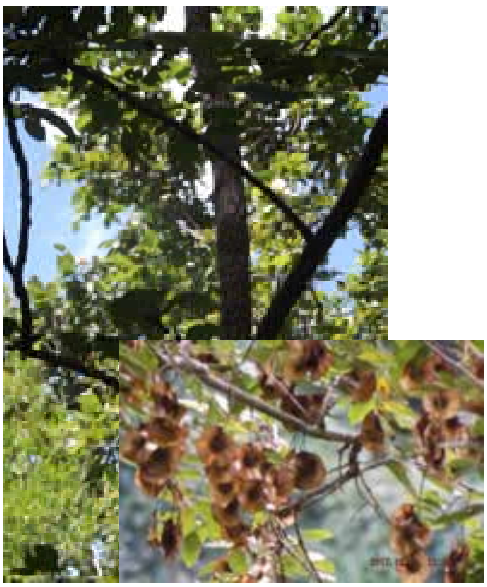
No	Scientific Name	Common Name	Family Name
1	*Grimmia* sp.	Not known	Grimmiaceae
2	*Grimmia trichophylla*	Not known	Grimmiaceae
3	*Marchantia berteroana*	Not known	Marchantiaceae
4	*Plagiochila obscura*	Not known	Plagiothecieae

3.1.1.13. IUCN red list species, 2017-3

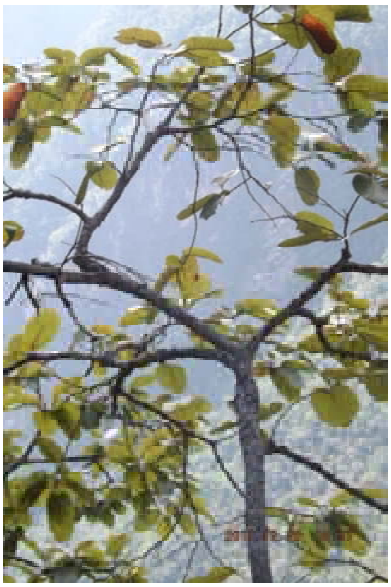


Dalbergia cultrata Grah.

Dalbergia oliveri Gamble



*Pterocarpus indicus*Willd.



Shorea siamensis(Kurz)Miq.

No	Scientific Name	Common Name	Family Name	IUCN Criteria (2017-3)
1	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT ver 3.1
2	***Dalbergia oliveri* Gamble**	**Ta-ma-lan**	**Fabaceae**	**EN A1cd ver 2.3**
3	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC ver 3.1
4	*Equisetum hyemale*	Not known	Equisetaceae	LC ver 3.1
5	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	LC ver 3.1
6	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC ver 3.1
7	*Najas minor*	Brittleleaf	Najadaceae	LC ver 3.1
8	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	LC ver 3.1
9	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	VU A1d ver 2.3
10	*Saccharum spontaneum* L.	Thet-kel-gyi	Poaceae	LC ver 3.1
11	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/lc ver 2.3
12	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae	LC ver 3.1
EN=Endangered, LC=Least Concern, LR/lc=Lower Risk/least concern, NT=Near Threatened, VU=Vulnerable				

3.1.2. Second Research Area

Map V.

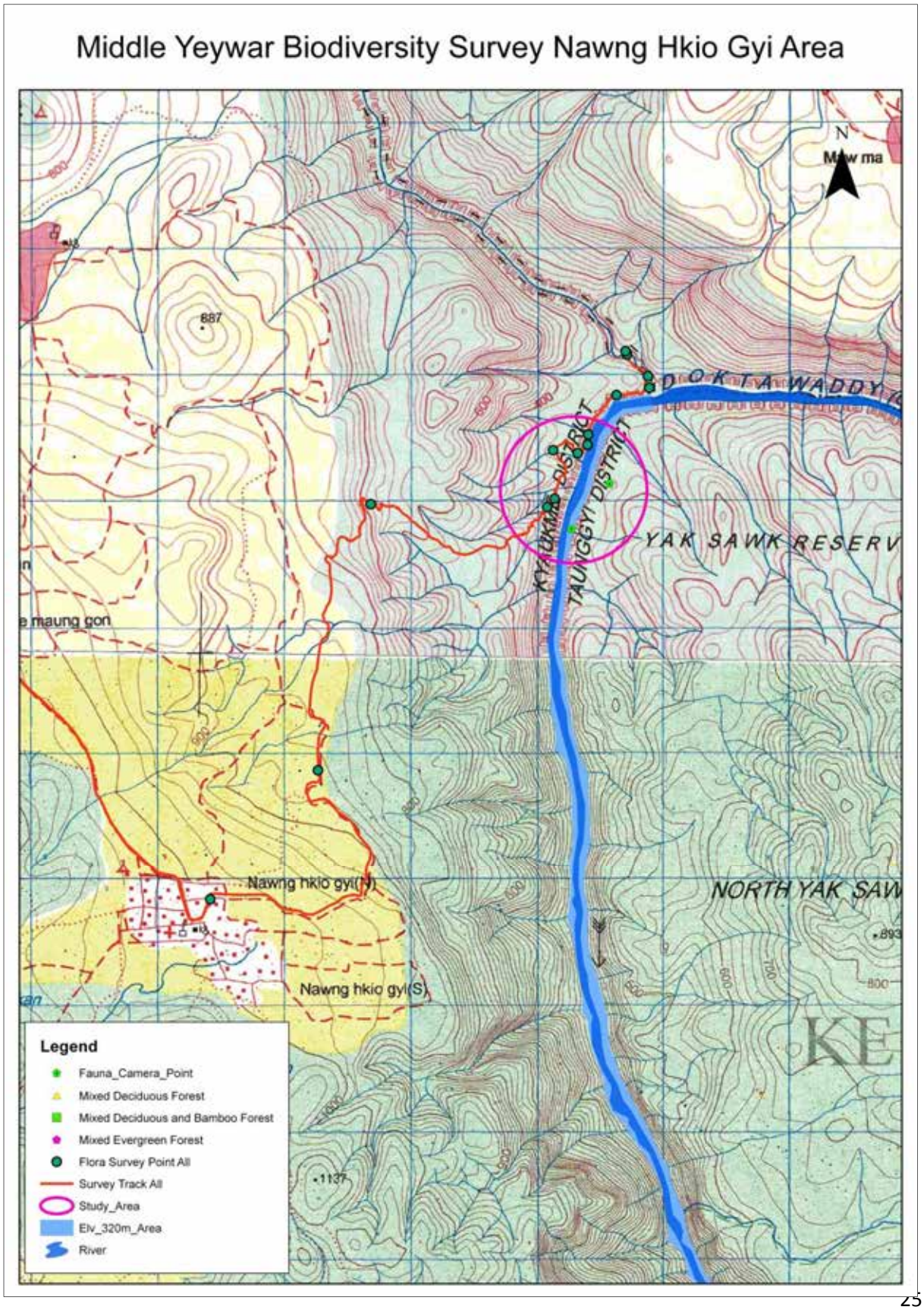
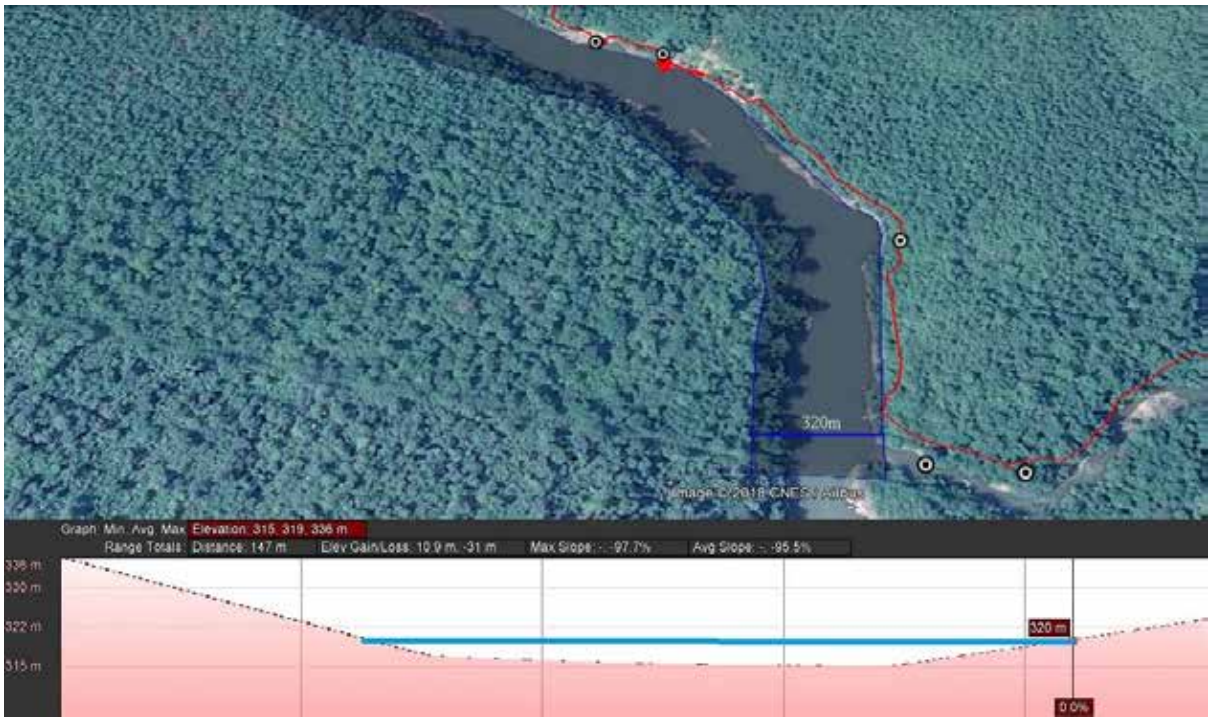


Photo Map VI.



D am

Vegetation at the confluence of Dokhtawaddy River and Gohteik Stream

3.1.2.1. Species Inventory List at the confluence of Dokhtawaddy River and Gohteik Stream

No	Scientific Name	Common Name	Family Name	Habits
1	*Acer oblongum* Wall.	Himalayan maple	Aceraceae	ST
2	*Adiantum peruvianum*	Adiantum	Pteridaceae	F
3	*Alternanthera sessilis*	Pa-zun-sa-yaing	Amaranthaceae	H
4	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae	S
5	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae	CL
6	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae	F

No	Scientific Name	Common Name	Family Name	Habits
7	*Desmodium gangeticum* L.	Not known	Fabaceae	S
8	*Echinodorus quadricostatus*	Not known	Alismataceae	AqH
9	*Equisetum hyemale*	Not known	Equisetaceae	H
10	*Eriochloa procera* (Retz.) C.E. Hubb.	Myet-kha	Poaceae	F
11	*Eugenia operculata* Roxb.	Ye-tha-bye	Myrtaceae	ST
12	*Ficus carica*	Not known	Moraceae	S
13	*Ficus pumila* L.	Kyauk-kat-nyaung	Moraceae	CL
14	*Flemingia strobilifera*	Se-laik-pya	Fabaceae	S
15	*Flueggea leucopyrus* Willd.	Ye-chin-ya	Euphorbiaceae	S
16	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	S
17	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL
18	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
19	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae	CL
20	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	AqH
21	*Pteris esquirolii* Christ	Not known	Pteridaceae	F
22	*Schistostega pennata*	Not known	Schistostegaceae	Br
23	*Selaginella willdenowii*	Peacock Fern	Selaginellaceae	F
24	*Solanum indicum*L.	Ka-zaw-kha	Solanaceae	H
25	*Tetrastigma planicaule*	Not known	Vitaceae	CL
AqH=Aquatic Herbs, Br=Bryophyte,CL=Climber,F=Fern,H=Herbs,S=Shrubs,ST=Small Tree				

3.1.2.2. Species List of Aquatic Plants

Potamogeton crispus L.

Echinodorus quadricostatus

No	Scientific Name	Common Name	Family Name
1	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae
2	*Echinodorus quadricostatus*	Not known	Alismataceae
3	*Flueggea leucopyrus* Willd.	Ye-chin-ya	Euphorbiaceae
4	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae
5	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae

3.1.2.3. Species List of Bryophyte


Schistostega pennata

No	Scientific Name	Common Name	Family Name
1	*Schistostega pennata*	Not known	Schistostegaceae

3.1.2.4. IUCN red list species, 2017-3

Homonoia riparia

Equisetum hyemale

Acer oblongum Wall.

Eriochloa procera (Retz.) C.E. Hubb.

No	Scientific Name	Common Name	Family Name	IUCN Criteria (2017-3)
1	*Acer oblongum* Wall.	Himalayan maple	Aceraceae	LC ver 3.1
2	*Alternanthera sessilis*	Pa-zun-sa-yaing	Amaranthaceae	LC ver 3.1
3	*Equisetum hyemale*	Not known	Equisetaceae	LC ver 3.1
4	*Eriochloa procera* (Retz.) C.E. Hubb.	Myet-kha	Poaceae	LC ver 3.1
5	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	LC ver 3.1
6	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC ver 3.1
7	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae	LC ver 3.1
LC=Least Concern				

3.1.3. Third Research Area

Map VII.

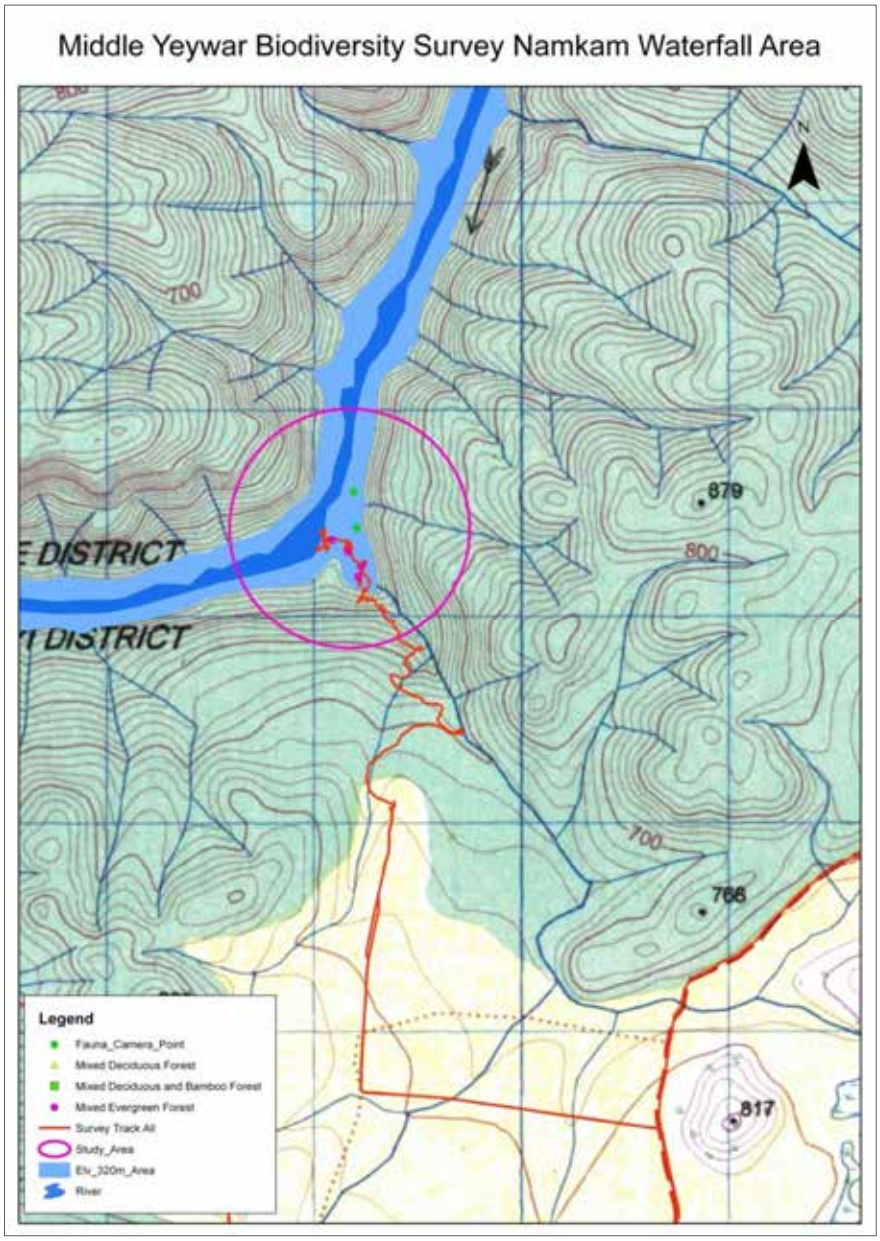
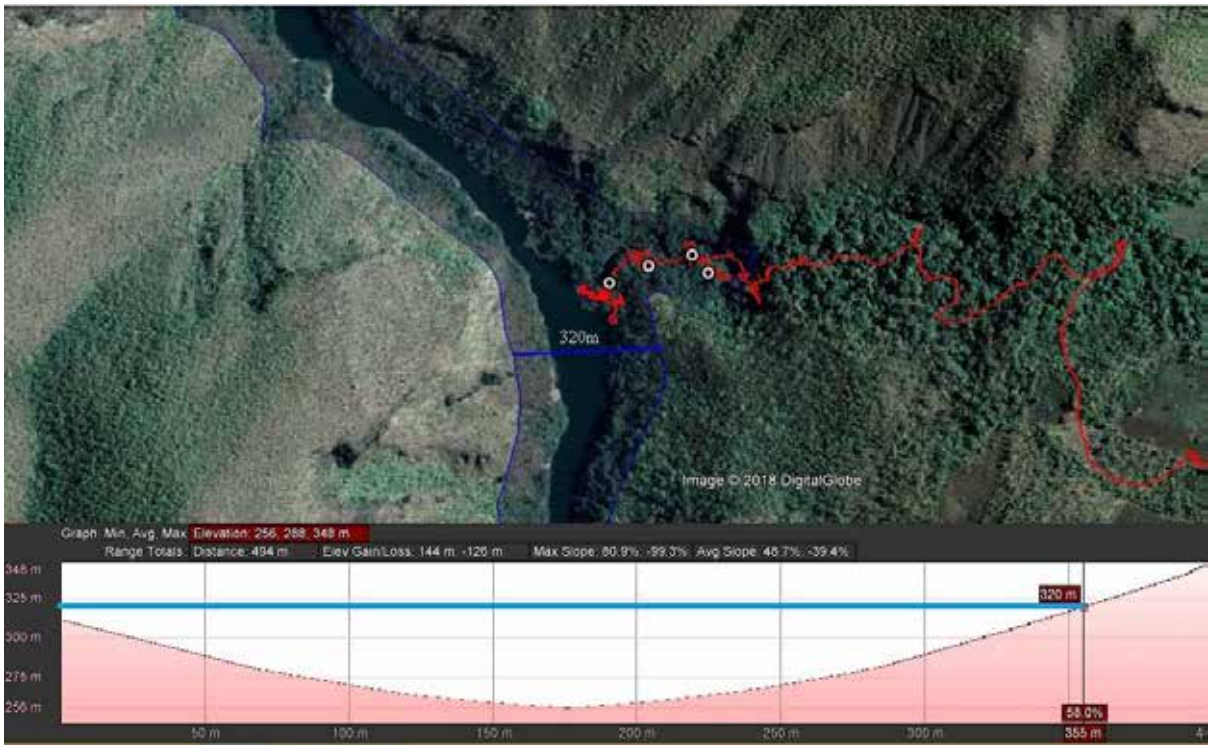


Photo Map VIII.



Mixed Evergreen Forest

Mixed Evergreen Forest

3.1.3.1. Floristic composition

The total number of tree species collected in 4 representative sample plots in this area is 18 species belonging to 18 genera. The dominant tree species in this area are *Polyalthia viridis* (Ka-naing-thit) followed by *Mesua nervosa* Planch. & Triana (Taw-gan-gaw) and *Mangifera indica* L.(Taw-tha-yet), *Anthocephalus morindaefolius* Korth. (Ma-u-let-tan-shae), *Bombax ceiba* L. (Let-pan), and *Garcinia cowa* Roxb. (Tha-le).

3.1.3.2. Tree Species Population

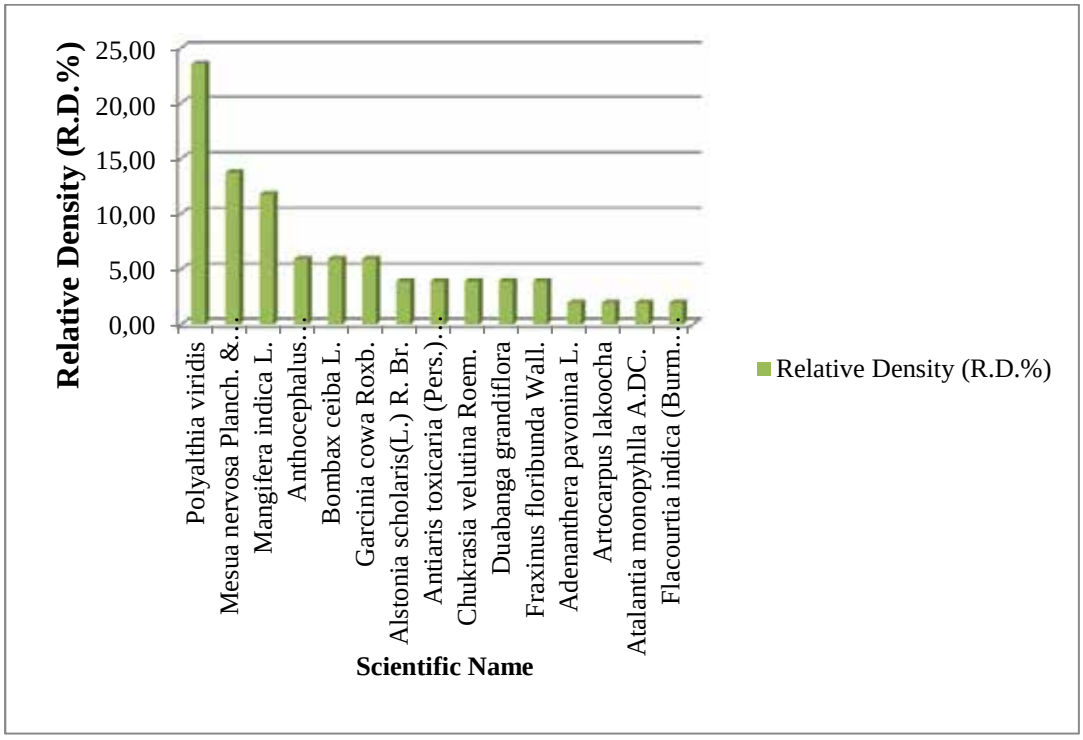
No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Adenanthera pavonina* L.	1	6.25	1.96
2	*Alstonia scholaris*(L.) R. Br.	2	12.5	3.92
3	*Anthocephalus morindaefolius* Korth.	3	18.75	5.88
4	*Antiaris toxicaria* (Pers.) Lesch.	2	12.5	3.92
5	*Artocarpus lakoocha*	1	6.25	1.96
6	*Atalantia monopyhlla* A.DC.	1	6.25	1.96
7	*Bombax ceiba* L.	3	18.75	5.88
8	*Chukrasia velutina* Roem.	2	12.5	3.92
9	*Duabanga grandiflora*	2	12.5	3.92
10	*Flacourtia indica* (Burm. f.) Merr.	1	6.25	1.96
11	*Fraxinus floribunda* Wall.	2	12.5	3.92
12	*Garcinia cowa* Roxb.	3	18.75	5.88
13	*Gmelina arborea* Roxb.	1	6.25	1.96
14	*Mangifera indica* L.	6	37.5	11.76
15	*Mesua nervosa* Planch. & Triana	7	43.75	13.73
16	*Pandanus odoratissimus* L.f.	1	6.25	1.96
17	*Polyalthia viridis*	12	75	23.53
18	*Trevesia palmate*	1	6.25	1.96
	Total	**51**	**318.75**	**100.00**

3.1.3.3. Relative density

Among the sample plots, species density per hectare is varied and the highest density was observed the *Polyalthia viridis*, *Mesua nervosa* Planch. & Triana, *Mangifera indica* L., and *Anthocephalus morindaefolius* Korth., followed by *Bombax ceiba* L., and *Garcinia cowa* Roxb.. This shows that these five species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Polyalthia viridis*	3	23.53
2	*Mesua nervosa* Planch. & Triana	1.75	13.73
3	*Mangifera indica* L.	1.5	11.76
4	*Anthocephalus morindaefolius* Korth.	0.75	5.88
5	*Bombax ceiba* L.	0.75	5.88
6	*Garcinia cowa* Roxb.	0.75	5.88
7	*Alstonia scholaris*(L.) R. Br.	0.5	3.92
8	*Antiaris toxicaria* (Pers.) Lesch.	0.5	3.92
9	*Chukrasia velutina* Roem.	0.5	3.92
10	*Duabanga grandiflora*	0.5	3.92
11	*Fraxinus floribunda* Wall.	0.5	3.92
12	*Adenanthera pavonina* L.	0.25	1.96

13	*Artocarpus lakoocha*	0.25	1.96
14	*Atalantia monopyhlla* A.DC.	0.25	1.96
15	*Flacourtia indica* (Burm. f.) Merr.	0.25	1.96
16	*Gmelina arborea* Roxb.	0.25	1.96
17	*Pandanus odoratissimus* L.f.	0.25	1.96
18	*Trevesia palmata*	0.25	1.96

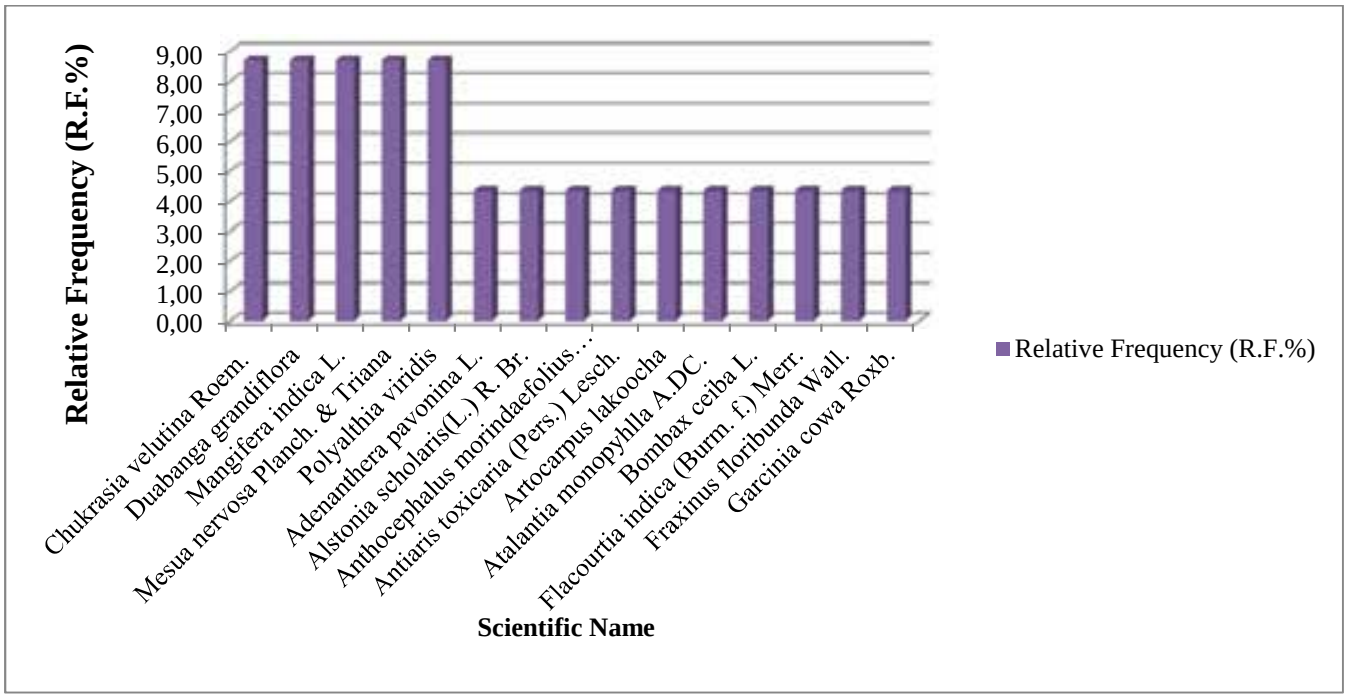


3.1.3.4. Relative frequency of Tree species

Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results**,** *Chukrasia velutina* Roem., *Duabanga grandiflora*, *Mangifera indica* L., *Mesua nervosa* Planch. & Triana and *Polyalthia viridis*, are high relative frequency value (9%). Therefore these species occur everywhere in the study area. The lower frequency of *Adenanthera pavonina* L., and other twelve species are demarcated as rare species in the area.

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Chukrasia velutina* Roem.	0.5	8.70
2	*Duabanga grandiflora*	0.5	8.70
3	*Mangifera indica* L.	0.5	8.70
4	*Mesua nervosa* Planch. & Triana	0.5	8.70
5	*Polyalthia viridis*	0.5	8.70
6	*Adenanthera pavonina* L.	0.25	4.35
7	*Alstonia scholaris*(L.) R. Br.	0.25	4.35
8	*Anthocephalus morindaefolius* Korth.	0.25	4.35

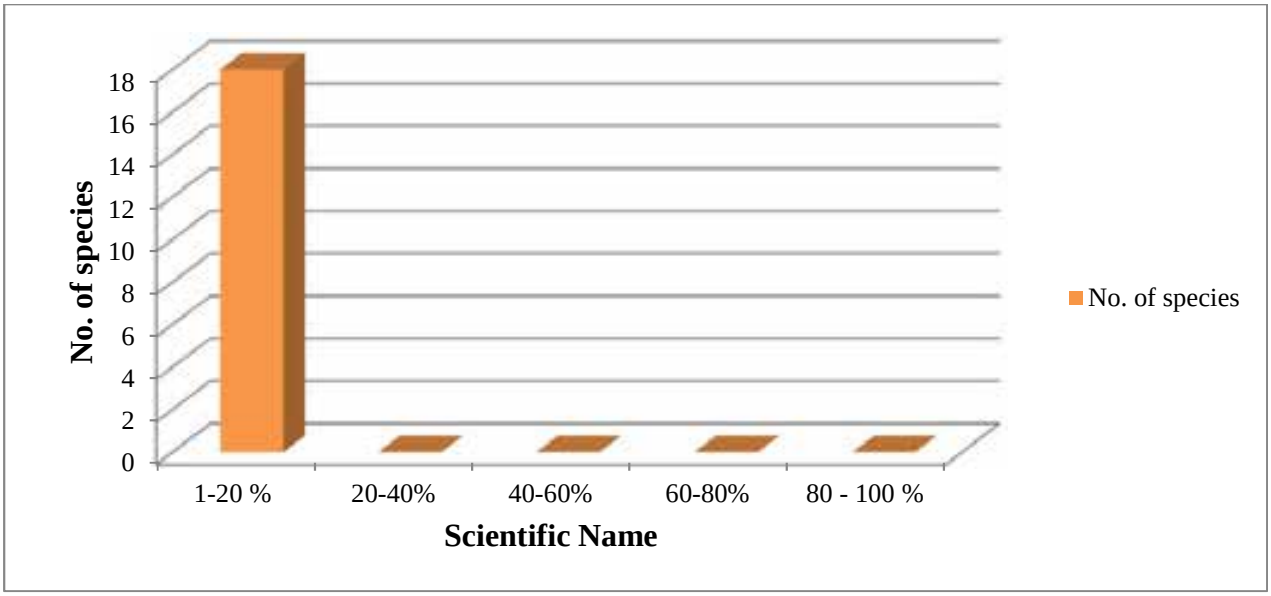
9	*Antiaris toxicaria* (Pers.) Lesch.	0.25	4.35
10	*Artocarpus lakoocha*	0.25	4.35
11	*Atalantia monopyhlla* A.DC.	0.25	4.35
12	*Bombax ceiba* L.	0.25	4.35
13	*Flacourtia indica* (Burm. f.) Merr.	0.25	4.35
14	*Fraxinus floribunda* Wall.	0.25	4.35
15	*Garcinia cowa* Roxb.	0.25	4.35
16	*Gmelina arborea* Roxb.	0.25	4.35
17	*Pandanus odoratissimus* L.f.	0.25	4.35
18	*Trevesia palmate*	0.25	4.35



3.1.3.5. Species distribution by frequency class

In order to clarify the homogeneity and heterogeneity of the floristic distribution in the area, the species distribution by frequency class was examined. According to the outcome of the frequency classes zero specie is in high frequency class and 18 species are in low frequency class. This shows that this area is floristically low degree of homogeneity.

Frequency class	No. of species
1-20 %	18
20-40%	0
40-60%	0
60-80%	0
80 - 100 %	0



3.1.3.6. Tree species in DBH class interval

The distribution of DBH interval class reveals the dominant of small stem individuals in the area 76% of the tree species are less than 40cm DBH. Large stem individuals with DBH 60cm and above are of 24 %. Majority of the trees are less than 40cm in diameter, which indicates that the forests secondary types.

DBH Class	No. of species	Total number of individual	% of total population
<40cm	39	243.75	76.47
41-60cm	7	43.75	13.73
61-80cm	2	12.50	3.92
81-100cm	2	12.50	3.92
>101cm	1	6.25	1.96
Total	**51**	**318.75**	**100.00**

3.1.3.7. Tree species in Height class interval

The distribution of Height shows that 213 individuals are less than 10 meter, comprising 67% of the total population and 106 individuals are 15meter and above, comprising the 33%. Since most canopy height classes are less than 10m, the forests in the area could be classified as secondary forests.

Height Class	No. of species	Total number of individual	% of total population
<10m	34	212.50	66.67
11-15m	8	50.00	15.69
16-20m	4	25.00	7.84
21-25m	5	31.25	9.80
>26m	0	0.00	0.00
Total	**51**	**318.75**	**100.00**

3.1.3.8. Vegetation type in the study area

No.	Sample Quadrant	Vegetation type	Longitude	Latitude	Altitude(m)	Dominant species
1	IQ XV	Mixed Evergreen Forest	96.955661	21.939188	315	*Chukrasia velutina* Roem. , *Pterocarpus indicus*Willd., *Eugenia operculata* Roxb., *Shorea siamensis*(Kurz)Miq., *Homonoia riparia, Schleichera oleosa* (Lour.) Oken, *Dalbergia oliveri* Gamble, *Samadera indica* Gaertn., *Phyllanthus emblica* L., *Tectona grandis* L. f.
2	IQ XVI	"	96.955818	21.939636	295	
3	IQ XVII	"	96.955150	21.940265	283	
4	IQ XVIII	"	96.954427	21.940764	283	
IQ =Inundated Quadrant						

3.1.3.9. Species Inventory List of Inundated Area

No.	Scientific Name	Common Name	Family Name	Habit
1	*Acer oblongum* Wall.	Himalayan maple	Aceraceae	T
2	*Adenanthera pavonina* L.	Ywe-gyi	Mimosaceae	T
3	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae	ST
4	*Anthocephalus morindaefolius* Korth.	Ma-u-let-tan-shae	Rubiaceae	T
5	*Antiaris toxicaria* (Pers.) Lesch.	Aseik-pin	Moraceae	T
6	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	CL
7	*Artocarpus lakoocha*	Taung-pein-ne	Moraceae	T
8	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	ST
9	*Balanophora indica* Wall.	Not known	Balanophoraceae	SP H
10	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae	H
11	*Bombax ceiba* L.	Let-pan	Bombacaceae	T
12	*Chukrasia velutina* Roem.	Taw-yin-ma	Meliaceae	ST
13	*Crateva magna* (Lour.)DC.	Ye-ka-det	Capparaceae	ST
14	*Dichodontium pellucidum* (Hedw.) Schimp	Not known	Dicranaceae	Br
15	*Dracaena sanderiana*	Zaw-sein	Asparagaceae	H
16	*Duabanga grandiflora*	Myauk-ngo	Lythraceae	T
17	*Dumortiera hirsuta* (Swaegr.) Nees ssp. *nepalensi*s (Tay.) Frye & Clark	Not known	Marchantiaceae	Br
18	*Equisetum hyemale*	Not known	Equisetaceae	H
19	*Euphorbia bifida*	Say-pa-le	Euphorbiaceae	H
20	*Ficus benguetensis*	Not known	Moraceae	S
21	*Ficus pumila* L.	Kyauk-kat-nyaung	Moraceae	CL
22	*Flacourtia indica* (Burm. f.) Merr.	Na-ywe	Flacourtiaceae	ST
23	*Flemingia strobilifera*	Se-laik-pya	Fabaceae	S
24	*Fraxinus floribunda* Wall.	Say-kha-gyi	Oleaceae	T
25	*Garcinia cowa* Roxb.	Tha-le	Hypericaceae	T
26	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae	T
27	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	S
28	*Mangifera indica* L.	Taw-tha-yet	Anacardiaceae	T

No.	Scientific Name	Common Name	Family Name	Habit
29	*Mesua nervosa* Planch. & Triana	Taw-gan-gaw	Hypericaceae	ST
30	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL
31	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
32	*Oxyspora paniculata* (D. Don) DC.	Not known	Melastomataceae	S
33	*Pandanus odoratissimus* L.f.	Set-thwa-phu	Pandanaceae	ST
34	*Piper cubebe* L. f.	Peik-chin	Piperaceae	Cl
35	*Polyalthia viridis*	Ka-naing-thit	Annonaceae	T
36	*Pteris esquirolii* Christ	Not known	Pteridaceae	F
37	*Saccharum spontaneum* L.	Thet-kel-gyi	Poaceae	G
38	*Schistostega pennata*	Not known	Schistostegaceae	Br
39	*Selaginella willdenowii*	Peacock Fern	Selaginellaceae	F
40	*Sphagnum* sp.	Not known	Sphagnaceae	Br
41	*Trevesia palmata* (Roxb. ex Lindl.) Vis.	Phaw-bu	Araliaceae	ST
Br=Bryophyte, CL=Climber, F=Fern, G=Grass, H=Herbs, S=Shrubs, SP H= Saprophytic Herb, ST=Small Tree, T=Tree				

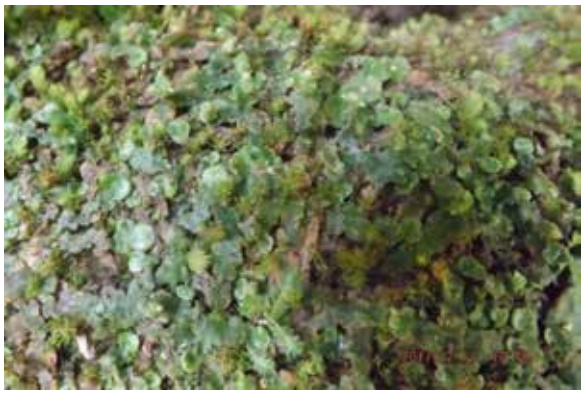
3.1.3.10. Species List of Aquatic Plants

Homonoia riparia

Acer oblongum Wall.

No.	Scientific Name	Common Name	Family Name
1	*Acer oblongum* Wall.	Himalayan maple	Aceraceae
2	*Crateva magna* (Lour.)DC.	Ye-ka-det	Capparaceae
3	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae
4	*Saccharum spontaneum* L.	Thet-kel-gyi	Poaceae

3.1.3.11. Species List of Bryophyte



Dumortiera hirsuta (Swaegr.) Nees ssp. *nepalensis* (Tay.) Frye & Clark *Dichodontium pellucidum* (Hedw.) Schimp

No.	Scientific Name	Common Name	Family Name
1	*Dichodontium pellucidum* (Hedw.) Schimp	Not known	Dicranaceae
2	*Dumortiera hirsuta* (Swaegr.) Nees ssp. *nepalensis* (Tay.) Frye & Clark	Not known	Marchantiaceae
3	*Schistostega pennata*	Not known	Schistostegaceae
4	*Sphagnum* sp.	Not known	Sphagnaceae

3.1.3.12. IUCN red list species, 2017-3

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

Mimosa pudica L. *Equisetum hyemale*

No.	Scientific Name	Common Name	Family Name	IUCN Criteria (2017-3)
1	*Acer oblongum* Wall.	Himalayan maple	Aceraceae	LC ver 3.1
2	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae	LR/lc ver 2.3
3	*Equisetum hyemale*	Not known	Equisetaceae	LC ver 3.1
4	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	LC ver 3.1
5	*Mangifera indica* L.	Taw-tha-yet	Anacardiaceae	DD ver 2.3
6	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC ver 3.1
7	*Saccharum spontaneum* L.	Thet-kel-gyi	Poaceae	LC ver 3.1
DD=Data Deficient, LC=Least Concern, LR/lc=Lower Risk/least concern				

3.1.4. Fourth Research Area

Map IX.

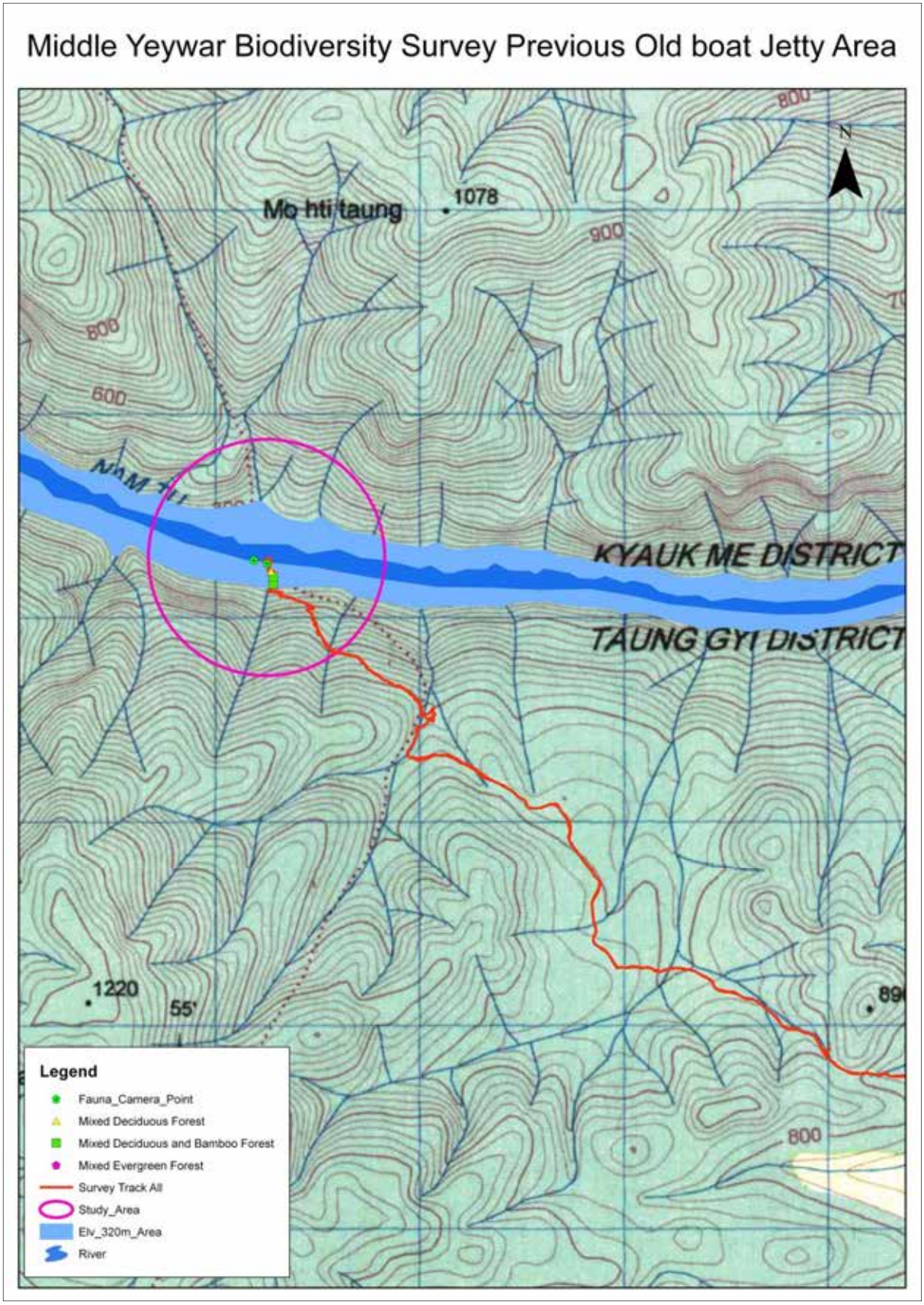
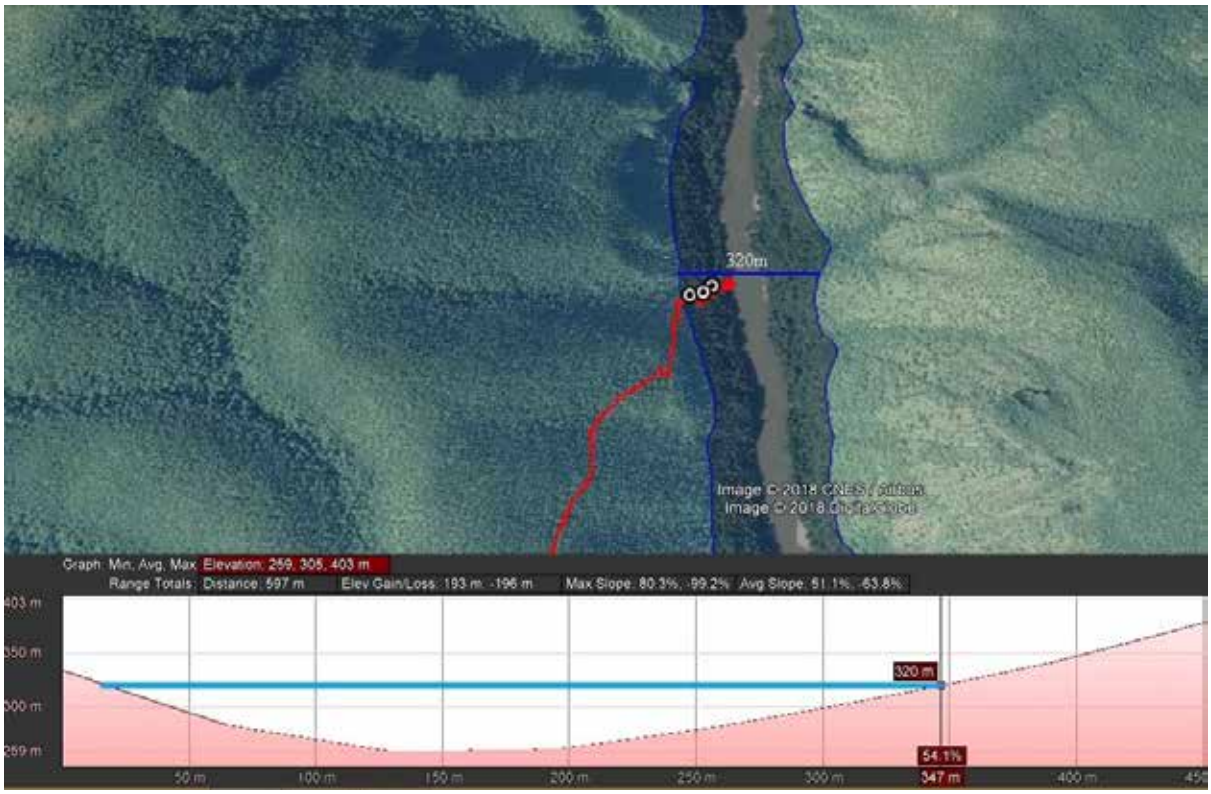


Photo Map X.



Mixed Deciduous Forest

Mixed Deciduous Forest

3.1.4.1. Floristic composition

The total number of tree species collected in 3 representative sample plots in this area is 17 species belonging to 17 genera. The dominant tree species in this area are *Tectona grandis* L.f. (Kyun) and *Shorea siamensis* (Kurz)Miq., (In-gyin), *Pterocarpus indicus*Willd. (Taw-pa-dauk), and *Atalantia monopyhlla* A.DC. (Taw-shauk).

3.1.4.2. Tree Species Population

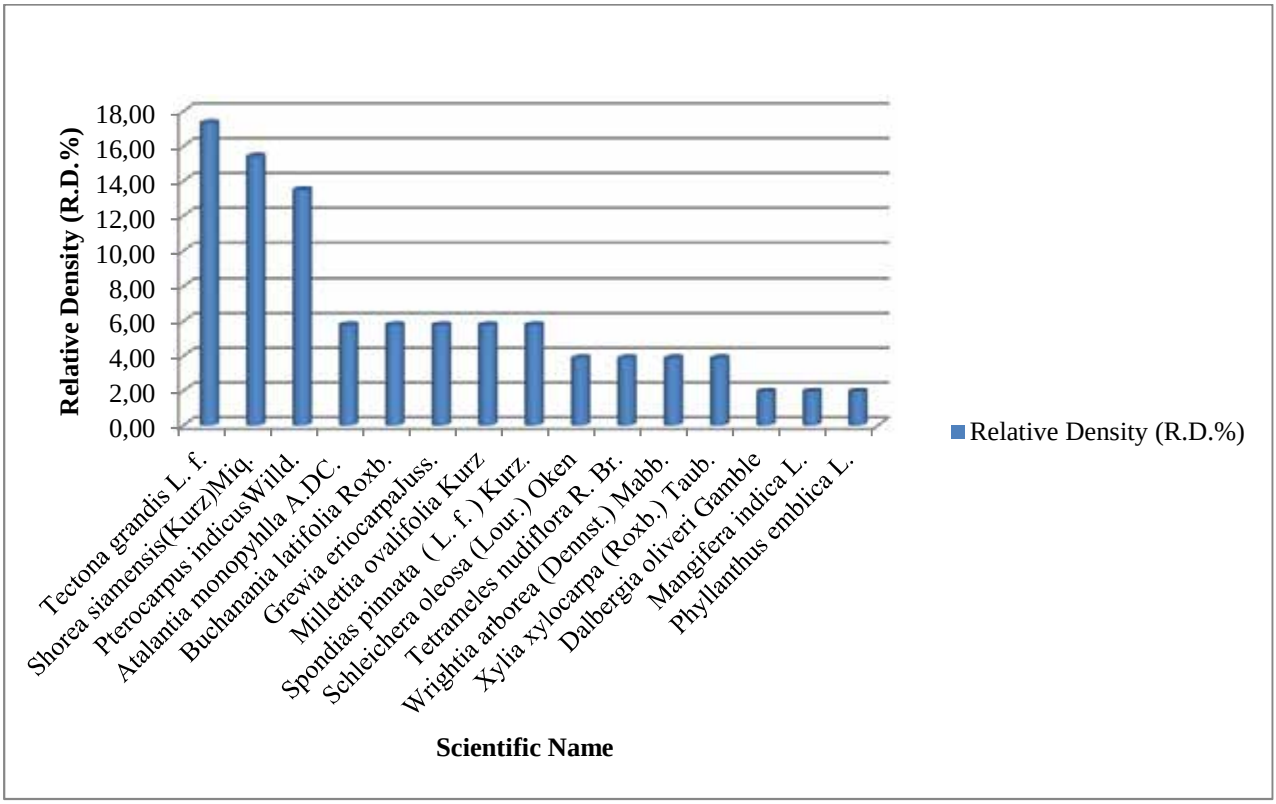
No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Atalantia monopyhlla* A.DC.	3	25.00	5.77
2	*Buchanania latifolia* Roxb.	3	25.00	5.77
3	*Dalbergia oliveri* Gamble	1	8.33	1.92
4	*Grewia eriocarpa*Juss.	3	25.00	5.77
5	*Mangifera indica* L.	1	8.33	1.92
6	*Millettia ovalifolia* Kurz	3	25.00	5.77
7	*Phyllanthus emblica* L.	1	8.33	1.92
8	*Polyalthia viridis*	1	8.33	1.92
9	*Pterocarpus indicus*Willd.	7	58.33	13.46
10	*Samadera indica* Gaertn.	1	8.33	1.92
11	*Schleichera oleosa* (Lour.) Oken	2	16.67	3.85
12	*Shorea siamensis*(Kurz)Miq.	8	66.67	15.38
13	*Spondias pinnata* (L. f.) Kurz.	3	25.00	5.77
14	*Tectona grandis* L. f.	9	75.00	17.31
15	*Tetrameles nudiflora* R. Br.	2	16.67	3.85
16	*Wrightia arborea* (Dennst.) Mabb.	2	16.67	3.85
17	*Xylia xylocarpa* (Roxb.) Taub.	2	16.67	3.85
	Total	**52**	**433.33**	**100.00**

3.1.4.3. Relative density

Among the sample plots species density per hectare was varied and the highest density was observed *Tectona grandis* L.f., followed by *Shorea siamensis* (Kurz)Miq., and *Pterocarpus indicus*Willd..The result shows that these three species are abundant in this area.

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Tectona grandis* L. f.	3.00	17.31
2	*Shorea siamensis*(Kurz)Miq.	2.67	15.38
3	*Pterocarpus indicus*Willd.	2.33	13.46
4	*Atalantia monopyhlla* A.DC.	1.00	5.77
5	*Buchanania latifolia* Roxb.	1.00	5.77
6	*Grewia eriocarpa*Juss.	1.00	5.77
7	*Millettia ovalifolia* Kurz	1.00	5.77
8	*Spondias pinnata* (L. f.) Kurz.	1.00	5.77
9	*Schleichera oleosa* (Lour.) Oken	0.67	3.85
10	*Tetrameles nudiflora* R. Br.	0.67	3.85
11	*Wrightia arborea* (Dennst.) Mabb.	0.67	3.85
12	*Xylia xylocarpa* (Roxb.) Taub.	0.67	3.85
13	*Dalbergia oliveri* Gamble	0.33	1.92

14	*Mangifera indica* L.	0.33	1.92
15	*Phyllanthus emblica* L.	0.33	1.92
16	*Polyalthia viridis*	0.33	1.92
17	*Samadera indica* Gaertn.	0.33	1.92

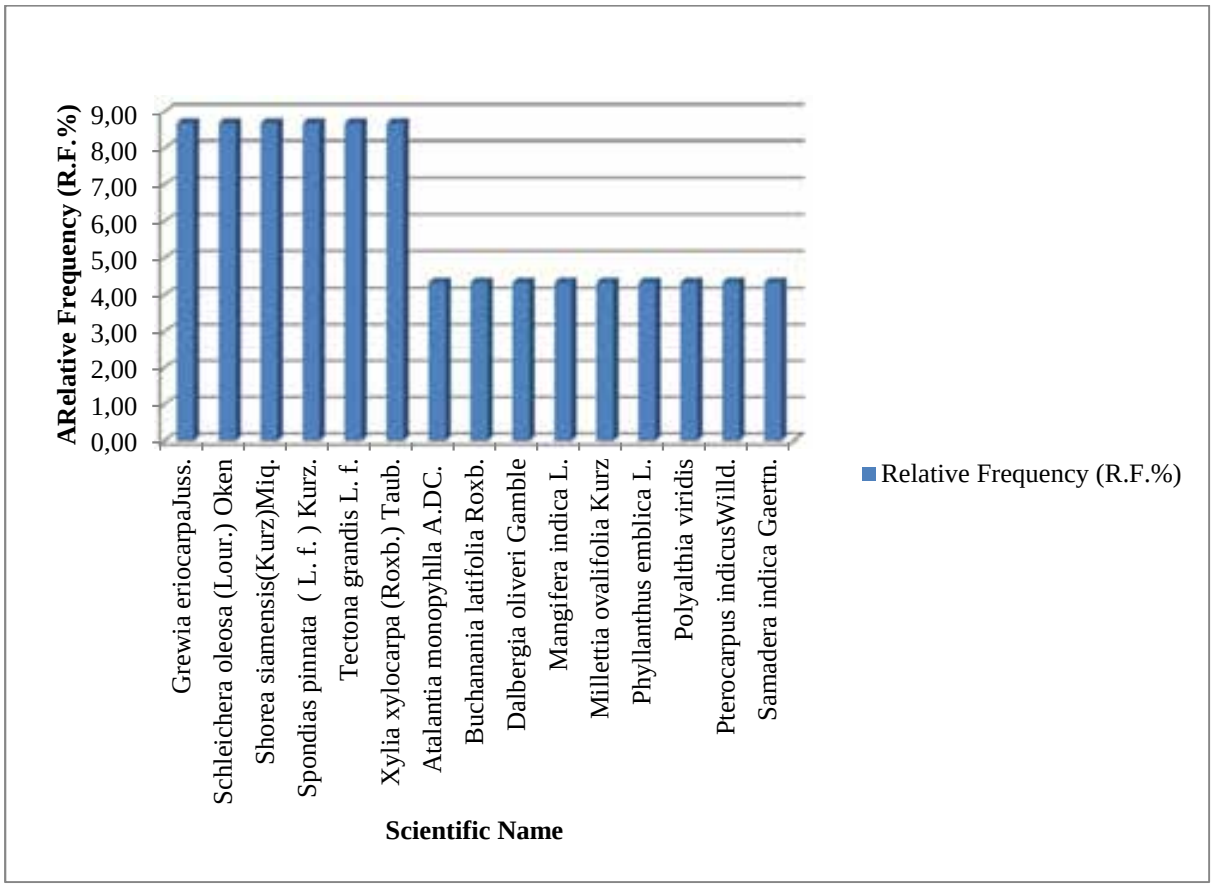


3.1.4.4. Relative frequency of Tree species

Relative frequency is the frequency of one species compared to the total frequency of all the species. According to the results, *Grewia eriocarpa*Juss., and other five species are high relative frequency value (9%) equally and respectively. Therefore these species occur everywhere in the study area. The lower frequency of some species is *Atalantia monopyhlla* A.DC. and other ten species in lower position in table are demarcated as rare species in the area.

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Grewia eriocarpa*Juss.	0.67	8.70
2	*Schleichera oleosa* (Lour.) Oken	0.67	8.70
3	*Shorea siamensis*(Kurz)Miq.	0.67	8.70
4	*Spondias pinnata* (L. f.) Kurz.	0.67	8.70
5	*Tectona grandis* L. f.	0.67	8.70
6	*Xylia xylocarpa* (Roxb.) Taub.	0.67	8.70
7	*Atalantia monopyhlla* A.DC.	0.33	4.35
8	*Buchanania latifolia* Roxb.	0.33	4.35
9	*Dalbergia oliveri* Gamble	0.33	4.35
10	*Mangifera indica* L.	0.33	4.35

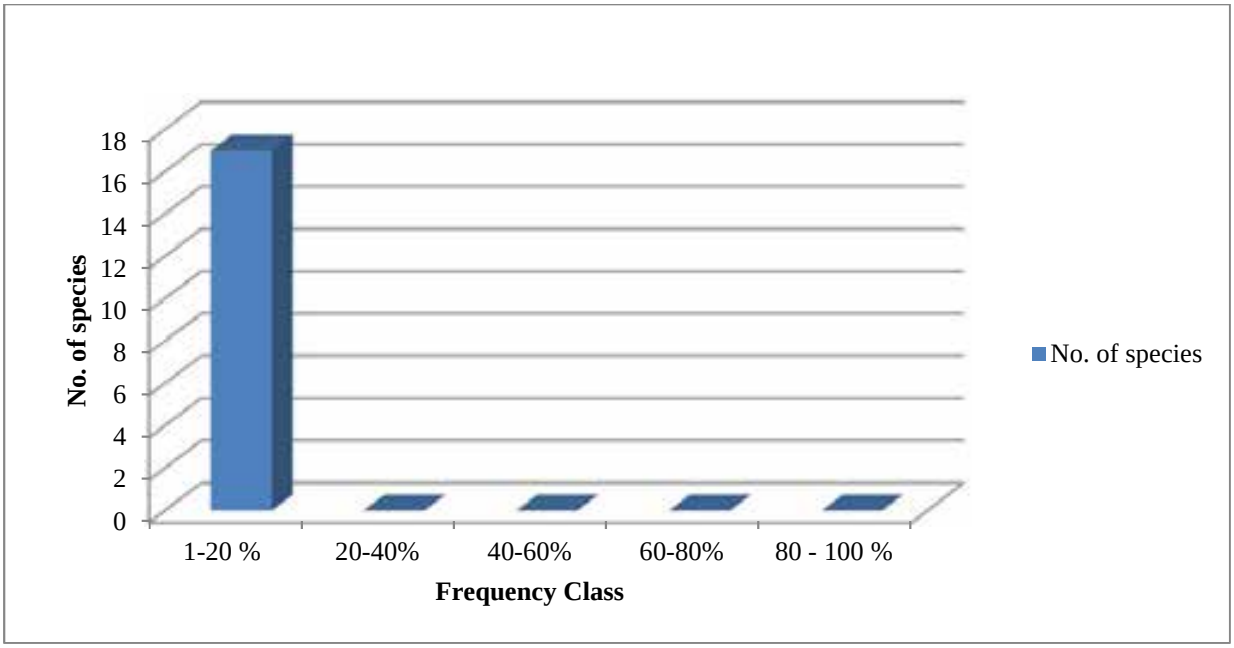
11	*Millettia ovalifolia* Kurz	0.33	4.35
12	*Phyllanthus emblica* L.	0.33	4.35
13	*Polyalthia viridis*	0.33	4.35
14	*Pterocarpus indicus*Willd.	0.33	4.35
15	*Samadera indica* Gaertn.	0.33	4.35
16	*Tetrameles nudiflora* R. Br.	0.33	4.35
17	*Wrightia arborea* (Dennst.) Mabb.	0.33	4.35



3.1.4.5. Species distribution by frequency class

In order to clarify the homogeneity and heterogeneity of the floristic distribution in the area, the species distribution by frequency class was examined. According to the outcome of the frequency classes, zero species is in high frequency class and 17 species are in low frequency class. This shows that this area is floristically high degree of homogeneity.

Frequency class	No. of species
1-20 %	17
20-40%	0
40-60%	0
60-80%	0
80 - 100 %	0



3.1.4.6. Tree species in DBH class interval

The distribution of DBH interval class reveals the dominant of small stem individuals in the area. 100 % of the tree species are less than 40cm DBH. Large stem individuals with DBH 60cm and above are of 0%. Majority of the trees are less than 40cm in diameter, which indicates that the forests secondary types.

DBH Class	No. of species	Total number of individual	% of total population
<40cm	52	433.33	100.00
41-60cm	0	0.00	0.00
61-80cm	0	0.00	0.00
81-100cm	0	0.00	0.00
>101cm	0	0.00	0.00
Total	**52**	**433.33**	**100.00**

3.1.4.7. Tree species in Height class interval

The distribution of Height class interval shows that 392 individuals are less than 10 meter, comprising 90% of the total population and 42 individuals are 15meter and above, comprising the 10%. Since most canopy height classes are less than 10m, the forests in the area could be classified as secondary forests.

Height Class	No. of species	Total number of individual	% of total population
<10m	47	391.67	90.38
11-15m	5	41.67	9.62
16-20m	0	0.00	0.00
21-25m	0	0.00	0.00
>26m	0	0.00	0.00
Total	**52**	**433.33**	**100.00**

3.1.4.8. Vegetation type in the study area

No.	Sample Quadrant	Vegetation type	Longitude	Latitude	Altitude (m)	Dominant species
1	IQ XIX	Mixed Deciduous Forest and Bamboo Forest	96.917654	21.938398	321	*Tectona grandis* L. f.,*Shorea siamensis(*Kurz)Miq, *Pterocarpus indicus*Willd.,*Oxytenanthera albociliata* Munro, *Atalantia monopyhlla* A.DC.,*Buchanania latifolia* Roxb.,*Grewia eriocarpa*Juss., *Millettia ovalifolia* Kurz, *Spondias pinnata* (L. f.) Kurz
2	IQ XX	"	96.917664	21.938723	304	
3	IQ XXI	Mixed deciduous Forest	96.917543	21.938970	282	
IQ=Inundated Quadrant						

3.1.4.9. Species Inventory List of Inundated Area

No.	Scientific Name	Common Name	Family Name	Habit
1	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae	CL
2	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae	CL
3	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae	ST
4	*Bridelia glauca* Blume	Seik-chi	Euphorbiaceae	T
5	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae	T
6	*Crateva magna* (Lour.)DC.	Ye-ka-det	Capparaceae	ST
7	*Crotalaria multiflora* L.	Not known	Fabaceae	H
8	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	T
9	*Echinodorus quadricostatus*	Not known	Alismataceae	AqH
10	*Equisetum hyemale*	Not known	Equisetaceae	H
11	*Eugenia operculata* Roxb.	Ye-tha-bye	Myrtaceae	ST
12	*Ficus carica*	Not known	Moraceae	S
13	*Ficus hispida* L. f.	Kha-aung	Moraceae	ST
14	*Flemingia strobilifera*	Se-laik-pya	Fabaceae	S
15	*Flueggea leucopyrus* Willd.	Ye-chin-ya	Euphorbiaceae	S
16	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	ST
17	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	S
18	*Mangifera indica* L.	Taung-tha-yet	Anacardiaceae	T
19	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae	CL
20	*Millettia ovalifolia* Kurz	Thin-win-pho	Fabaceae	T
21	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	H
22	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae	B
23	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae	ST
24	*Polyalthia viridis*	Ka-naing-thit	Annonaceae	T
25	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	T
26	*Racomitrium aciculare*	Not known	Grimmiaceae	Br
27	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae	ST

No.	Scientific Name	Common Name	Family Name	Habit
28	*Schistostega pennata*	Not known	Schistostegaceae	Br
29	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae	T
30	*Selaginella willdenowii*	Peacock Fern	Selaginellaceae	F
31	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	T
32	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae	T
33	*Tectona grandis* L. f.	Kyun	Verbenaceae	T
34	*Tetrameles nudiflora* R. Br.	Thit-pok	Datiscaceae	T
35	*Tetrastigma planicaule*	Not known	Vitaceae	CL
36	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae	ST
37	*Xylia xylocarpa* (Roxb.) Taub.	Pyin-ka-doe	Mimosaceae	T
AqH=Aquatic Herbs,B=Bamboo,Br=Bryophyte,CL=Climber,F=Fern,G=Grass,H=Herbs,S=Shrubs,ST=Small Tree, T=Tree				

3.1.4.10. Bamboo Forest


Bamboo Forest

3.1.4.10.1. Bamboo Species Population

No.	Scientific Name	No. of individual	Total no. of individual/ha	Total no. of population/ha(%)
1	*Oxytenanthera albociliata* Munro	7	8.75	100

3.1.4.10.2. Relative density

No.	Scientific Name	Density (D)	Relative Density (R.D.%)
1	*Oxytenanthera albociliata* Munro	3.5	100

3.1.4.10.3. Species distribution

No.	Scientific Name	Frequency (F)	Relative Frequency (R.F.%)
1	*Oxytenanthera albociliata* Munro	1	100

3.1.4.11. Species List of Aquatic Plants

Crateva magna (Lour.)DC.

Equisetum hyemale

No.	Scientific Name	Common Name	Family Name
1	*Crateva magna* (Lour.)DC.	Ye-ka-det	Capparaceae
2	*Echinodorus quadricostatus*	Not known	Alismataceae
3	*Equisetum hyemale*	Not known	Equisetaceae
4	*Flueggea leucopyrus* Willd.	Ye-chin-ya	Euphorbiaceae
	Homonoia riparia	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae

ST

3.1.4.12. Species List of Bryophytes

Racomitrium aciculare

Schistostega pennata

No.	Scientific Name	Common Name	Family Name
1	*Racomitrium aciculare*	Not known	Grimmiaceae
2	*Schistostega pennata*	Not known	Schistostegaceae

3.1.4.13. IUCN red list species, 2017-3

Homonoia riparia

*Pterocarpus indicus*Willd.

Shorea siamensis(Kurz)Miq.

Dalbergia oliveri Gamble

No.	Scientific Name	Common Name	Family Name	IUCN Criteria (2017-3)
1	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae	EN A1cd vr 2.3
2	*Equisetum hyemale*	Not known	Equisetaceae	LC ver 3.1
3	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae	LC ver 3.1
4	*Mangifera indica* L.	Taung-tha-yet	Anacardiaceae	DD ver 2.3
5	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae	LC ver 3.1
6	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	VU A1d ver 2.3
7	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae	LR/lc ver 2.3
8	*Tectona grandis* L. f.	Kyun	Verbenaceae	LR/lc ver 2.3
DD=Data Deficient, EN=Endangered, LC=Least Concern, LR/lc=Lower Risk/least concern, VU=Vulnerable				

3.1.5. Checklist in the Area

No	Scientific Name	Common Name	Family Name
1	*Acacia concinna* (Willd.) DC.	Ka-mon-chin	Mimosaceae
2	*Acacia pennata* (L.) Willd.	Su-yit	Mimosaceae
3	*Acer oblongum* Wall.	Himalayan maple	Aceraceae
4	*Adenanthera pavonina* L.	Ywe-gyi	Mimosaceae
5	*Adiantum latifolium*	Not known	Pteridaceae
6	*Adiantum peruvianum*	Adiantum	Pteridaceae
7	*Adina indivisa* Lance	Hnaw	Rubiaceae
8	*Albizia lebbekoides* (DC.) Benth.	Taung-ma-gyi	Mimosaceae
9	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe	Apocynaceae
10	*Alternanthera sessilis*	Pa-zun-sa-yaing	Amaranthaceae
11	*Anogeissus acuminata* Wall.	Yon	Combretaceae
12	*Anthocephalus morindaefolius* Korth.	Ma-u-let-tan-shae	Rubiaceae
13	*Antiaris toxicaria* (Pers.) Lesch.	Aseik-pin	Moraceae
14	*Argemone mexicana* L.	Kon-kha-ya	Papaveraceae
15	*Aristolochia tagala* Cham.	Eik-tha-ya-muli	Aristolochiaceae
16	*Artocarpus lakoocha*	Taung-pein-ne	Moraceae
17	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae
18	*Atalantia monopyhlla* A.DC.	Taw-shauk	Rutaceae
19	*Balanophora indica* Wall.	Not known	Balanophoraceae
20	*Barleria cristata*	Pyo-ma-naing	Acanthaceae
21	*Begonia semperflorens*	Kyauk-chin-pan	Begoniaceae
22	*Bidens alba*	Not known	Asteraceae
23	*Boehmeria nivea* (L.) Gaud.	Phet-ya	Urticaceae
24	*Bombax ceiba* L.	Let-pan	Bombacaceae
25	*Bombax insigne* Wall.	De-du	Bombacaceae
26	*Bridelia glauca* Blume	Seik-chi	Euphorbiaceae
27	*Buchanania latifolia* Roxb.	Lun-pho	Anacardiaceae
28	*Canscora diffusa* (Vahl) R.Br.	Kyauk-pan	Gentianaceae
29	*Cassia fistula* L.	Ngu	Caesalpiniaceae
30	*Chukrasia velutina* Roem.	Taw-yin-ma	Meliaceae
31	*Cibotium barometz* (Linn.) J. Sm.	Da-yin-kauk	Dicksoniaceae
32	*Colona floribunda* (Kurz)Craib	Phet-waing	Tiliaceae
33	*Crateva magna* (Lour.) DC.	Ye-ka-det	Capparaceae
34	*Crotalaria multiflora* L.	Not known	Fabaceae
35	*Cyperus exaltatus*	Not known	Cyperaceae
36	*Cyperus nutans*	Not known	Cyperaceae
37	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae
38	*Dalbergia oliveri* Gamble	Ta-ma-lan	Fabaceae
39	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae
40	*Desmodium gangeticum* L.	Not known	Fabaceae

No	Scientific Name	Common Name	Family Name
41	*Dichodontium pellucidum* (Hedw.) Schimp	Not known	Dicranaceae
42	*Dioscorea alata*	Myauk-u	Dioscoreaceae
43	*Dioscorea bulbifera* L.	Khat-cho/Ka-la-htaing	Dioscoreaceae
44	*Dioscorea* sp.	Kywe	Dioscoreaceae
45	*Dracaena sanderiana*	Zaw-sein	Asparagaceae
46	*Duabanga grandiflora*	Myauk-ngo	Lythraceae
47	*Dumortiera hirsuta* (Swaegr.) Nees ssp. *nepalensi*s (Tay.) Frye & Clark	Not known	Marchantiaceae
48	*Echinodorus quadricostatus*	Not known	Alismataceae
49	*Elatostema reticulatum*	Wet-sa	Urticaceae
50	*Entada scandens* Benth.	Doe-nwee	Mimosaceae
51	*Equisetum hyemale*	Not known	Equisetaceae
52	*Eriochloa procera* (Retz.) C.E. Hubb.	Myet-kha	Poaceae
53	*Eugenia operculata* Roxb.	Ye-tha-bye	Myrtaceae
54	*Euphorbia bifida*	Say-pa-le	Euphorbiaceae
55	*Euphorbia hypericifolia* L.	Seik-noe-ma-htwet	Euphorbiaceae
56	*Ficus benguetensis*	Not known	Moraceae
57	*Ficus carica*	Not known	Moraceae
58	*Ficus glomerata* Roxb.	Ye-tha-phan	Moraceae
59	*Ficus hispida* L. f.	Kha-aung	Moraceae
60	*Ficus pumila* L.	Kyauk-kat-nyaung	Moraceae
61	*Ficus variegate*	Kon-tha-phan	Moraceae
62	*Flacourtia indica* (Burm. f.) Merr.	Na-ywe	Flacourtiaceae
63	*Flemingia strobilifera*	Se-laik-pya	Fabaceae
64	*Flueggea leucopyrus* Willd.	Ye-chin-ya	Euphorbiaceae
65	*Fraxinus floribunda* Wall.	Say-kha-gyi	Oleaceae
66	*Garcinia cowa* Roxb.	Tha-le	Hypericaceae
67	*Gmelina arborea* Roxb.	Ye-ma-nae	Verbenaceae
68	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae
69	*Grimmia* sp.	Not known	Grimmiaceae
70	*Grimmia trichophylla*	Not known	Grimmiaceae
71	*Harrisonia perforata* Merr.	Su-gyin	Simaroubaceae
72	*Homonoia riparia*	Ye-mo-ma-kha/Gyin-ye	Euphorbiaceae
73	*Hymenodictyon orixense* (Roxb.) Mabb.	Khu-san	Rubiaceae
74	*Indigofera pulchella* Roxb.	Taw-me	Fabaceae
75	*Lagerstroemia macrocarpa* Kurz	Pyin-ma-ywet-gyi	Lythraceae
76	*Leea hirta* Banks	Naga-mauk-phyu	Leeaceae
77	*Leea rubra* Blume.	Na-ga-mauk-ni	Leeaceae
78	*Lygodium circinnatum*	Not known	Lygodiaceae
79	*Mangifera indica* L.	Taw-tha-yet	Anacardiaceae
80	*Marchantia berteroana*	Not known	Marchantiaceae
81	*Mesua nervosa* Planch. & Triana	Taw-gan-gaw	Hypericaceae

No	Scientific Name	Common Name	Family Name
82	*Mikania micrantha* H.B.K.	Bi-zet-nwee	Asteraceae
83	*Millettia ovalifolia* Kurz	Thin-win-pho	Fabaceae
84	*Mimosa pudica* L.	Hti-ka-yone	Mimosaceae
85	*Morinda persicaefolia* Buch.-Ham.	Ni-ba-sae	Rubiaceae
86	*Najas minor*	Brittleleaf	Najadaceae
87	*Neyraudia reynaudiana* (Kunth) Keng ex Hitchc.	Kyu	Poaceae
88	*Oxyspora paniculata* (D. Don) DC.	Not known	Melastomataceae
89	*Oxytenanthera albociliata* Munro	Wa-phyu	Poaceae
90	*Pandanus odoratissimus* L.f.	Set-thwa-phu	Pandanaceae
91	*Passiflora foetida* L.	Taw-su-ka	Passifloraceae
92	*Pentasachme caudatum* Wall. Ex Wight	Not known	Asclepiadaceae
93	*Phyllanthus amarus*	Myay-zi-phyu	Euphorbiaceae
94	*Phyllanthus emblica* L.	Zi-phyu	Euphorbiaceae
95	*Phyllanthus urinaria* L.	Myay-zi-phyu	Euphorbiaceae
96	*Piper cubebe* L. f.	Peik-chin	Piperaceae
97	*Plagiochila obscura*	Not known	Plagiothecieae
98	*Pogonatherum crinitum* (Thunb.) Kunth	Not known	Poaceae
99	*Polyalthia viridis*	Ka-naing-thit	Annonaceae
100	*Potamogeton crispus* L.	Pondweed	Potamogetonaceae
101	*Pteris esquirolii* Christ	Not known	Pteridaceae
102	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae
103	*Racomitrium aciculare*	Not known	Grimmiaceae
104	*Saccharum spontaneum* L.	Thet-kel-gyi	Poaceae
105	*Samadera indica* Gaertn.	Ka-di	Simaroubaceae
106	*Schistostega pennata*	Not known	Schistostegaceae
107	*Schleichera oleosa* (Lour.) Oken	Gyo	Sapindaceae
108	*Schrebera swietenioides* Roxb.	Thit-swe-le	Oleaceae
109	*Selaginella willdenowii*	Peacock Fern	Selaginellaceae
110	*Shorea siamensis*(Kurz)Miq.	In-gyin	Dipterocarpaceae
111	*Solanum indicum*L.	Ka-zaw-kha	Solanaceae
112	*Sphagnum* sp.	Not known	Sphagnaceae
113	*Spirogyra* sp.	Algae	Zygnemataceae
114	*Spondias pinnata* (L. f.) Kurz.	Taw-gwe	Anacardiaceae
115	*Stephania venosa* (Blume) Spreng.	Taung-kya	Menispermaceae
116	*Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.	Than-de	Bignoniaceae
117	*Strobilanthes* sp.	Pan-thin	Acanthaceae
118	*Tadehagi triquetrum* (L.)H. Ohashi	Lauk-thay	Fabaceae
119	*Tamarindus indica* L.	Ma-gyi	Caesalpiniaceae
120	*Tectona grandis* L. f.	Kyun	Verbenaceae
121	*Tetrameles nudiflora* R. Br.	Thit-pok	Datiscaceae
122	*Tetrastigma planicaule*	Not known	Vitaceae

No	Scientific Name	Common Name	Family Name
123	*Trevesia palmata* (Roxb. ex Lindl.) Vis.	Phaw-bu	Araliaceae
124	*Triumfetta rotundifolia* Lam.	Kat-se-ne-thay	Tiliaceae
125	*Utricularia* sp.	Ye-bu-baung	Lentibulariaceae
126	*Vitex peduncularis* Wall.	Phet-le-zin	Verbenaceae
127	*Vitex pubescens* Vahl	Kyet-yo	Verbenaceae
128	*Vitis trifolia*	Not known	Vitaceae
129	*Wendlandia tinctoria* DC.	Thit-ni	Rubiaceae
130	*Wrightia arborea* (Dennst.) Mabb.	Let-htok-thein	Apocynaceae
131	*Xylia xylocarpa* (Roxb.) Taub.	Pyin-ka-doe	Mimosaceae

3.2 Fauna

In total, 138 fauna species of 81 genera belonging to 74 families under 22 orders were recorded in four survey sites (Site I, II, III and IV) during the survey period from 10th to 19th December, 2017. All of them 62 bird species, 23 mammal species, 6 amphibians and 11 reptiles and 36 insect and other invertebrates were respectively collected by fauna survey team. According to the IUCN conservation status, one Critically Endangered (CR), three Endangered (EN), six Vulnerable (VU), 3 Near Threatened (NT) and 78 Least Concern (LC) were conducted in four survey sites.

3.2.1 Birds: species composition and status

A total of 62 bird species of 50 genera belonging to 32 families under 11 orders were recorded in four survey sites. In Site I, 38 bird species were observed, 30 bird species were recorded in Site II, 25 bird species were carried out in Site III and 20 bird species were collected in Site IV. According to the globally threatened status of recorded species, two were classified as Near Threatened (NT) (*Vanellus duvaucelii* River Lapwing and *Psittacula longicauda* Long-tailed Parakeet).

3.2.2. Mammals: species composition and status

A total of 23 mammal species of 22 genera belonging to 15 families under six orders were recorded in four survey sites during the survey. Within the survey area, 20 mammal species were observed in Site I, 12 mammal species were recorded in Site II, 14 mammal species were carried out in Site III and 13 mammal species were recorded in IV. Base on globally threatened status of the recorded species, one is classified as Critically Endangered (CR) (*Manis pentadactyla* Chinese Pangolin), two were observed as Endangered (EN) (*Trachypithecus phayrei* Phayre's Langur and *Cuon alpinus* Dhole), six were conducted as Vulnerable (VU) (*Nycticebus bengalensis* Asian Slow Loris, *Macaca arctoides* Stump-tailed Macacaque, *Ursus thibetanus* Asian Black Bear, *Helartos malayanus* Sun Bear, *Arctictis binturong* Binturong and *Neofelis nebulosa* Clouded Leopard), one was observed as Near Threatened (NT) (*Capricornis milneedwardsii* Chinese Serow) and 13 species were carried out as Least Concern (LC).

3.2.3. Amphibians and Reptile: species composition and status

A total six amphibians and 11 reptile species of 14 genera belonging to 11 families under two orders were recorded in four survey sites during the survey. In Site I, 12 species (six reptiles and six amphibians) were observed, seven species (five amphibians and tow reptiles) were recorded in Site II, eight species (one amphibian and seven reptiles) were carried out in Site III and seven species (two amphibians and four reptiles) were recorded in Site IV. Among then, one Endangered EN (*Indotestudo elongate* Elongated Tortoise) and five species Least Concern (LC) (four amphibians and one reptile) were conducted in four survey sites.

3.2.4. Insect and other invertebrates: species composition and status

A total 36 insect and other invertebrate species of 31 genera belonging to 16 families under three orders were recorded in four survey sites during the survey. Totally, 21 butterflies, 10 beetles and five dragonflies were conducted in four survey sites. In Site I, 23 species (14 butterflies, five beetles and four dragonflies) were collected, 20 species (12 butterflies, four beetles and four dragonfly species) were observed in Site II, 19 species (14 butterflies, three beetles and two dragonflies) were carried out in Site III and 16 species (14 butterflies and two dragonflies) were collected in Site IV.

PLATE 1: RECORDED SOME BIRD PHOTOS

A. *Psittacula finschii*

B. *Streptopelia orientalis*

C. *Coracias benghalensis*

D. *Cinnyris jugularis*

E. *Pycnonotus flaviventris*

F. *Pellorneum ruficeps*

G. *Psittacula alexandri*

H. *Saxicola caprata*

PLATE 2: RECORDED SOME MAMMALS PHOTOS

A. *Trachypithecus phayrei*

B. *Capricornis milneedwardsi*

C. *Hystrix brachyura*

D. *Muntiacus muntjak*

E. *Neofelis nebulosa*

F. *Cuon alpinus*

G. *Sus scrofa*

H. *Ursus thibetanus*

PLATE 3: RECORDED SOME AMPHIBIANS AND REPTILES PHOTOS

A. *Kaloula pulchra*

B. *Microhyla ornata*

C. *Bufo melanostictus*

D. *Kaloula pulchra*

E. *Calotes versicolor*

F. *Indotestudo elongata*

G. *Calotes mystaceus*

H. *Cryptelytrops albolabris*

PLATE 4: RECORDED SOME INSECTS AND OTHER INVERTEBRATES PHOTOS

A. *Mycalesis visala*

B. *Catopsilia pyranthe*

C. *Parantica aglea*

D. *Pieris canidia*

E. *Phalanta phalanta*

F. *Orsotriaena medus*

G. *Cycloneda munda*

H. *Scarabaeus viettei*

APPENDIX

APPENDIX 1: RECORDED BIRD SPECIES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

ORDER	FAMILY	NO	SCIENTIFIC NAME	COMMON NAME	SITE I	SITE II	SITE III	SITE IV	IUCN STATUS
GALLIFOMES	**PHASIANIDAE**	**1**	*Gallus gallus*	Red Junglefowl			4	2	LC
GALLIFOMES	**PHASIANIDAE**	**2**	*Lophura leucomelanos*	Kalij Pheasant			1		LC
FALCONIFORMES	**FALCONIDAE**	**3**	*Microhierax caerulescens*	Collared Falconet		1	1	2	LC
FALCONIFORMES	**FALCONIDAE**	**4**	*Falco tinnunculus*	Common Kestrel		2		1	LC
FALCONIFORMES	**FALCONIDAE**	**5**	*Pernis ptilorhynchus*	Oriental Honey-Buzzard		1	1		LC
FALCONIFORMES	**FALCONIDAE**	**6**	*Elanus caeruleus*	Black-shouldered Kite	2	1	1		LC
FALCONIFORMES	**FALCONIDAE**	**7**	*Butastur teesa*	White-eyesd Buzzard		1			LC
CHARADRIFORMES	**VANELLIDAE**	**8**	*Vanellus duvaucelii*	River Lapwing				2	NT
COLUMBIFORMES	**COLUMBIDAE**	**9**	*Streptopelia orientalis*	Oriental Turtle-Dove	2	2	1	1	LC
COLUMBIFORMES	**COLUMBIDAE**	**10**	*Streptopelia chinensis*	Spotted Dove	3	1	1	2	LC
PSITTACIFORMES	**PSITTACIDAE**	**11**	*Psittacula finschii*	Grey-headed Parakeet	5	4	2	4	LC
PSITTACIFORMES	**PSITTACIDAE**	**12**	*Psittacula alexandri*	Red-breasted Parakeet	2				LC
PSITTACIFORMES	**PSITTACIDAE**	**13**	*Psittacula longicauda*	Long-tailed Parakeet				2	NT
CUCULIFORMES	**CUCULIDAE**	**14**	*Rhopodytes tristis*	Green-billed Malkoha	1	1			LC
CUCULIFORMES	**CUCULIDAE**	**15**	*Centropus sinensis*	Greater Coucal	1				LC
STRIGIFORMES	**STRIGIDAE**	**16**	*Otus lettia*	Collared Scops-Owl	1				LC
STRIGIFORMES	**STRIGIDAE**	**17**	*Ketupa zeylonesis*	Brown Fish-Owl			1		LC
STRIGIFORMES	**STRIGIDAE**	**18**	*Glaucidium cuculoides*	Asian Barred Owlet	1				LC
APODIFORMES	**APODIDAE**	**19**	*Apus affinis*	House Swft		23			LC
APODIFORMES	**APODIDAE**	**20**	*Hemiprocne coronate*	Crested Treeswift	4				LC
CORACIIFORMES	**CORACIIDAE**	**21**	*Coracias benghalensis*	Indian Roller	2	2			LC
CORACIIFORMES	**ALCEDINIDAE**	**22**	*Halcyon smyrnensis*	White-throated Kingfisher				1	LC
CORACIIFORMES	**MEROPIDAE**	**23**	*Merops orientalis*	Little Green Bee-eater		6			LC
PICIFORMES	**RAMPHASTIDAE**	**24**	*Megalaima virens*	Great Barbet			1		LC

APPENDIX 1: CONTINUED

ORDER	FAMILY	NO	SCIENTIFIC NAME	COMMON NAME	SITE I	SITE II	SITE III	SITE IV	IUCN STATUS
PICIFORMES	**RAMPHASTIDAE**	**25**	*Megalaima lineata*	Lineated Barbet			2		LC
PICIFORMES	**RAMPHASTIDAE**	**26**	*Megalaima haemaccephala*	Coppersmith Barbet			1		LC
PICIFORMES	**PICIDAE**	**27**	*Dendrocopos canicapillus*	Gery-capped Pygmy Woodpecker		1			LC
PICIFORMES	**PICIDAE**	**28**	*Chrysocolaptes lucidus*	Greater Flameback		2	2		LC
PASSERIFORMES	**CAMPEPHAGIDAE**	**29**	*Coracina macei*	Large Cuckooshrike	2				LC
PASSERIFORMES	**CAMPEPHAGIDAE**	**30**	*Pericrocotus cinnamomeus*	Small Minivet	6				LC
PASSERIFORMES	**ORIOLIDAE**	**31**	*Oriolus chinensis*	Black-naped Oriole		2			LC
PASSERIFORMES	**PRIONPIDAE**	**32**	*Tephrodornis gularis*	Large Woodshrike	3				LC
PASSERIFORMES	**RHIPIDURIDAE**	**33**	*Rhipidura albicollis*	White-throated Fantail	1				LC
PASSERIFORMES	**DICRURIDAE**	**34**	*Dicrurus macrocercus*	Black Drongo	2	2	1	3	LC
PASSERIFORMES	**DICRURIDAE**	**35**	*Dicrurus leucophaeus*	Ashy Drongo	3	1	1	2	LC
PASSERIFORMES	**DICRURIDAE**	**36**	*Dicrurus paradiseus*	Greater Racket-tailed Drongo				1	LC
PASSERIFORMES	**CORVIDAE**	**37**	*Corvus japonensis*	Large-billed Crow		4			LC
PASSERIFORMES	**CORVIDAE**	**38**	*Dendrocitta vagabunda*	Rufous Treepie	3				LC
PASSERIFORMES	**LANIIDAE**	**39**	*Lanius cristatus*	Brown Shrike	2	1	1	1	LC
PASSERIFORMES	**LANIIDAE**	**40**	*Lanius tephronotus*	Grey-backed Shrike	1				LC
PASSERIFORMES	**NECTARINIIDAE**	**41**	*Cinnyris jugularis*	Olive-backed Sunbird	2			1	LC
PASSERIFORMES	**DICAEIDAE**	**42**	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	2				LC
PASSERIFORMES	**CHLOROPSEIDAE**	**43**	*Chloropsis aurifroms*	Goldren-fronted Leafbird	3				LC
PASSERIFORMES	**MOTACILLIDAE**	**44**	*Anthus hodgsoni*	Olive-backed Pipit	2				LC
PASSERIFORMES	**MOTACILLIDAE**	**45**	*Motacilla alba*	White Wagtail	2	1	1	2	LC
PASSERIFORMES	**FRINGILLIDAE**	**46**	*Carpodacus erythrinus*	Common Rosefinch	2				LC
PASSERIFORMES	**SITTIDAE**	**47**	*Sitta frontalis*	Velvet-fornted Nuthatch	4				LC
PASSERIFORMES	**STURNIDAE**	**48**	*Acridotheres burmannicus*	Vinous-breasted Myna	8	2	5		LC
PASSERIFORMES	**STURNIDAE**	**49**	*Gracula religiosa*	Common Hill-Myna			7		LC
PASSERIFORMES	**MUSCICAPIDAE**	**50**	*Chaimarrornis leucocephalus*	White-capped Water-Redstart	1				LC

APPENDIX 1: CONTINUED

ORDER	FAMILY	NO	SCIENTIFIC NAME	COMMON NAME	SITE I	SITE II	SITE III	SITE IV	IUCN STATUS
PASSERIFORMES	**MUSCICAPIDAE**	**51**	*Phoenicurus auroreus*	Daurian Redstart		2			LC
PASSERIFORMES	**MUSCICAPIDAE**	**52**	*Monticola solitaries*	Blue Rock-Thrush	2				LC
PASSERIFORMES	**MUSCICAPIDAE**	**53**	*Saxicola maurus*	Eastern Stonechat	3	2	2	1	LC
PASSERIFORMES	**MUSCICAPIDAE**	**54**	*Saxicola caprata*	Pied Bushchat	1		1	1	LC
PASSERIFORMES	**MUSCICAPIDAE**	**55**	*Ficedula albicilla*	Taiga Flycatcher	2				LC
PASSERIFORMES	**MUSCICAPIDAE**	**56**	*Copsychus saularis*	Oriental Magpie-Robin	2	1	2	1	LC
PASSERIFORMES	**STENOSTIRIDAE**	**57**	*Culicicapa ceylonensis*	Grey-headed Canary-Flycatcher		2			LC
PASSERIFORMES	**PYCNONOTIDAE**	**58**	*Pycnonotus flaviventris*	Black-crested Bulbul	6	4	2	2	LC
PASSERIFORMES	**PYCNONOTIDAE**	**59**	*Pycnonotus jocosus*	Red-whiskered Bulbul	4	4			LC
PASSERIFORMES	**PYCNONOTIDAE**	**60**	*Pycnonotus cafer*	Red-vented Bulbul	8	5	4	5	LC
PASSERIFORMES	**TAMALIIDAE**	**61**	*Pellorneum ruficeps*	Puff-throated Babbler		2			LC
PASSERIFORMES	**CISTICOLIDAE**	**62**	*Orthotomus sutorius*	Common Tailordbird	2	1			LC

KEY

NT Near Threatened

LC Least Concern

APPENDIX 2: HABITAT TYPE OF BIRD SPECIES IN FOUR SURVEY SITES

NO	SCIENTIFIC NAME	COMMON NAME	HABITATS
1	*Gallus gallus*	Red Junglefowl	Bamboo forest
2	*Lophura leucomelanos*	Kalij Pheasant	Bamboo forest
3	*Microhierax caerulescens*	Collared Falconet	Forest
4	*Falco tinnunculus*	Common Kestrel	Soaring
5	*Pernis ptilorhynchus*	Oriental Honey-Buzzard	Soaring
6	*Elanus caeruleus*	Black-shouldered Kite	Forest
7	*Butastur teesa*	White-eyesd Buzzard	Soaring
8	*Vanellus duvaucelii*	River Lapwing	River side
9	*Streptopelia orientalis*	Oriental Turtle-Dove	Forest
10	*Streptopelia chinensis*	Spotted Dove	Forest
11	*Psittacula finschii*	Grey-headed Parakeet	Forest
12	*Psittacula alexandri*	Red-breasted Parakeet	Forest
13	*Psittacula longicauda*	Long-tailed Parakeet	Forest
14	*Rhopodytes tristis*	Green-billed Malkoha	Forest
15	*Centropus sinensis*	Greater Coucal	Reed bed
16	*Otus lettia*	Collared Scops-Owl	Forest
17	*Ketupa zeylonesis*	Brown Fish-Owl	Forest
18	*Glaucidium cuculoides*	Asian Barred Owlet	Forest
19	*Apus affinis*	House Swft	Soaring
20	*Hemiprocne coronate*	Crested Treeswift	Soaring
21	*Coracias benghalensis*	Indian Roller	Forest
22	*Halcyon smyrnensis*	White-throated Kingfisher	River side
23	*Merops orientalis*	Little Green Bee-eater	Forest
24	*Megalaima virens*	Great Barbet	Forest
25	*Megalaima lineata*	Lineated Barbet	Forest
26	*Megalaima haemaccephala*	Coppersmith Barbet	Forest
27	*Dendrocopos canicapillus*	Gery-capped Pygmy Woodpecker	Forest
28	*Chrysocolaptes lucidus*	Greater Flameback	Forest
29	*Coracina macei*	Large Cuckooshrike	Forest
30	*Pericrocotus cinnamomeus*	Small Minivet	Forest
31	*Oriolus chinensis*	Black-naped Oriole	Forest
32	*Tephrodornis gularis*	Large Woodshrike	Forest
33	*Rhipidura albicollis*	White-throated Fantail	Forest
34	*Dicrurus macrocercus*	Black Drongo	Forest
35	*Dicrurus leucophaeus*	Ashy Drongo	Forest
36	*Dicrurus paradiseus*	Greater Racket-tailed Drongo	Forest
37	*Corvus japonensis*	Large-billed Crow	River side
38	*Dendrocitta vagabunda*	Rufous Treepie	Forest
39	*Lanius cristatus*	Brown Shrike	Forest/Forest edge
40	*Lanius tephronotus*	Grey-backed Shrike	Forest
41	*Cinnyris jugularis*	Olive-backed Sunbird	Forest
42	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	Forest
43	*Chloropsis aurifroms*	Goldren-fronted Leafbird	Forest
44	*Anthus hodgsoni*	Olive-backed Pipit	Forest

APPENDIX 2: CONTINUED

NO	SCIENTIFIC NAME	COMMON NAME	HABITATS
45	*Motacilla alba*	White Wagtail	River side
46	*Carpodacus erythrinus*	Common Rosefinch	Bamboo forest
47	*Sitta frontalis*	Velvet-fornted Nuthatch	Forest
48	*Acridotheres burmannicus*	Vinous-breasted Myna	Forest
49	*Gracula religiosa*	Common Hill-Myna	Forest
50	*Chaimarrornis leucocephalus*	White-capped Water-Redstart	Forest
51	*Phoenicurus auroreus*	Daurian Redstart	River side
52	*Monticola solitaries*	Blue Rock-Thrush	Cliff
53	*Saxicola maurus*	Eastern Stonechat	River side
54	*Saxicola caprata*	Pied Bushchat	Reed bed
55	*Ficedula albicilla*	Taiga Flycatcher	Forest
56	*Copsychus saularis*	Oriental Magpie-Robin	Forest/Forest edge
57	*Culicicapa ceylonensis*	Grey-headed Canary-Flycatcher	Forest
58	*Pycnonotus flaviventris*	Black-crested Bulbul	Forest/Forest edge
59	*Pycnonotus jocosus*	Red-whiskered Bulbul	Forest/Forest edge
60	*Pycnonotus cafer*	Red-vented Bulbul	Forest/Forest edge
61	*Pellorneum ruficeps*	Puff-throated Babbler	Bamboo forest
62	*Orthotomus sutorius*	Common Tailordbird	Bush

APPENDIX 3: RECORDED MAMMAL SPECIES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

ORDER	FAMILY	NO	SCIENTIFIC NAME	COMMON NAME	SITE I	SITE II	SITE III	SITE IV	IUCN STATUS
SCANDENTIA	**TUPAIIDAE**	**1**	*Tupaia belangeri*	Nothern Treeshrew	✓	✓			LC
PHOLIDOTA	**MANIDAE**	**2**	*Manis pentadactyla*	Chinese Pangolin	✓		✓	✓	CR
DERMOPTERA	**LORISIDAE**	**3**	*Nycticebus bengalensis*	Asian Slow Loris				✓	VU
DERMOPTERA	**CERCOPITHECIDAE**	**4**	*Trachypithecus phayrei*	Phayre's Langur	✓		✓		EN
DERMOPTERA	**CERCOPITHECIDAE**	**5**	*Macaca mulatta*	Rhesus Macaque	✓		✓	✓	LC
DERMOPTERA	**CERCOPITHECIDAE**	**6**	*Macaca arctoides*	Stump-tailed Macaque	✓		✓	✓	VU
CARNIVORA	**CANIDAE**	**7**	*Cuon alpinus*	Dhole	✓		✓	✓	EN
CARNIVORA	**URSIDAE**	**8**	*Ursus thibetanus*	Asian Black Bear	✓		✓	✓	VU
CARNIVORA	**URSIDAE**	**9**	*Helartos malayanus*	Sun Bear	✓		✓	✓	VU
CARNIVORA	**MUSTELIDAE**	**10**	*Martes flavigula*	Yellow-throated Marten			✓		LC
CARNIVORA	**VIVERRIDAE**	**11**	*Viverra zibetha*	Large Indian Civet	✓	✓			LC
CARNIVORA	**VIVERRIDAE**	**12**	*Paradoxurus hermaphroditus*	Common Palm Civet	✓	✓			LC
CARNIVORA	**VIVERRIDAE**	**13**	*Arctictis binturong*	Binturong	✓				VU
CARNIVORA	**HERPESTIDAE**	**14**	*Herpestes javanicus*	Small Asian Mongoose	✓				LC
CARNIVORA	**FELIDAE**	**15**	*Neofelis nebulosa*	Clouded Leopard	✓	✓	✓	✓	VU
CARNIVORA	**FELIDAE**	**16**	*Felis chaus*	Jungle Cat		✓			LC
ARTIODACTYLA	**SUIAE**	**17**	*Sus scrofa*	Eurasian Wild Pig	✓	✓	✓	✓	LC
ARTIODACTYLA	**TRAGULIDAE**	**18**	*Muntiacus muntjak*	Red Muntjac	✓	✓	✓	✓	LC
ARTIODACTYLA	**BOVIDAE**	**19**	*Capricornis milneedwardsi*	Chinese Serow	✓	✓	✓	✓	NT
RODENTIA	**SCIURIDAE**	**20**	*Callosciurus finlaysonii*	Variable Squirrel	✓	✓			LC
RODENTIA	**SCIURIDAE**	**21**	*Menetes berdmorei*	Indochinese Ground Squirrel	✓	✓			LC
RODENTIA	**HYSTRUIDAE**	**22**	*Hystrix brachyuran*	Malayan Porcupine	✓	✓	✓	✓	LC
RODENTIA	**HYSTRUIDAE**	**23**	*Atherurus macrourus*	Brush-tailed Porcupine	✓	✓	✓	✓	LC

KEY

CR-Critically Endangered, **EN**-Endangered, **VU**-Vulnerable, **NT**-Near Threatened, **LC**-Least Concern

APPENDIX 4: EVIDENCE MAMMAL SPECIES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

NO	SCIENTIFIC NAME	COMMON NAME	Evidence					
			Visual	Aural	Faeces	Track/Sign	Trophy	Interview
1	*Tupaia belangeri*	Nothern Treeshrew	✓					
2	*Manis pentadactyla*	Chinese Pangolin						✓
3	*Nycticebus bengalensis*	Asian Slow Loris						✓
4	*Trachypithecus phayrei*	Phayre's Langur	✓					
5	*Macaca mulatta*	Rhesus Macaque	✓					✓
6	*Macaca arctoides*	Stump-tailed Macaque						✓
7	*Cuon alpinus*	Dhole	✓					
8	*Ursus thibetanus*	Asian Black Bear				✓		✓
9	*Helartos malayanus*	Sun Bear						✓
10	*Martes flavigula*	Yellow-throated Marten				✓		✓
11	*Viverra zibetha*	Large Indian Civet						✓
12	*Paradoxurus hermaphrodites*	Common Palm Civet						✓
13	*Arctictis binturong*	Binturong						✓
14	*Herpestes javanicus*	Small Asian Mongoose						✓
15	*Neofelis nebulosa*	Clouded Leopard				✓		✓
16	*Felis chaus*	Jungle Cat						✓
17	*Sus scrofa*	Eurasian Wild Pig				✓		✓
18	*Muntiacus muntjak*	Red Muntjac				✓	✓	✓
19	*Capricornis milneedwardsi*	Chinese Serow				✓	✓	✓
20	*Callosciurus finlaysonii*	Variable Squirrel	✓					
21	*Menetes berdmorei*	Indochinese Ground Squirrel	✓					
22	*Hystrix brachyuran*	Malayan Porcupine				✓		✓
23	*Atherurus macrourus*	Brush-tailed Porcupine						✓

APPENDIX 5: EVIDENCE MAMMAL SPECIES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

NO	SCIENTIFIC NAME	COMMON NAME	HABITATS
1	*Tupaia belangeri*	Nothern Treeshrew	Bush
2	*Manis pentadactyla*	Chinese Pangolin	Forest
3	*Nycticebus bengalensis*	Asian Slow Loris	Forest
4	*Trachypithecus phayrei*	Phayre's Langur	Cliff
5	*Macaca mulatta*	Rhesus Macaque	Cliff
6	*Macaca arctoides*	Stump-tailed Macaque	Forest
7	*Cuon alpinus*	Dhole	River side
8	*Ursus thibetanus*	Asian Black Bear	Forest
9	*Helartos malayanus*	Sun Bear	Forest
10	*Martes flavigula*	Yellow-throated Marten	River side
11	*Viverra zibetha*	Large Indian Civet	Forest
12	*Paradoxurus hermaphrodites*	Common Palm Civet	Forest
13	*Arctictis binturong*	Binturong	Forest
14	*Herpestes javanicus*	Small Asian Mongoose	Forest
15	*Neofelis nebulosa*	Clouded Leopard	River side
16	*Felis chaus*	Jungle Cat	Forest
17	*Sus scrofa*	Eurasian Wild Pig	Forest
18	*Muntiacus muntjak*	Red Muntjac	Forest
19	*Capricornis milneedwardsi*	Chinese Serow	Forest
20	*Callosciurus finlaysonii*	Variable Squirrel	Forest
21	*Menetes berdmorei*	Indochinese Ground Squirrel	Bush
22	*Hystrix brachyuran*	Malayan Porcupine	Forest
23	*Atherurus macrourus*	Brush-tailed Porcupine	Forest

APPENDIX 6: RECPRDED AMPHIBIANS AND REPTILES SPECIES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

ORDER	FAMILY	NO	SCIENTIFIC NAME	COMMON NAME	SITE I	SITE II	SITE III	SITE IV	IUCN STATUS
ANURA	**BUFONIDAE**	1	*Duttaphrynus melanostictus*	Common Toad	1		2	1	-
ANURA	**DICROGLOSSIDAE**	2	*Fejervarya limnocharis*	Paddy Frog	3	2			LC
ANURA	**MICROHYLIDAE**	3	*Kaloula pulchra*	Asian Painted Frog	1	2		1	LC
ANURA	**MICROHYLIDAE**	4	*Microhyla ornate*	Ornate Narrow-mouthed Frog	2	1			-
ANURA	**MICROHYLIDAE**	5	*Microhyla fissipes*	Marbled Narrow-mouthed Frog	1	2		1	LC
ANURA	**RANIDAE**	6	*Sylvirana nigrovittata*	Dark-sided Frog	1	1			LC
SQUAMATA	**AGAMIDAE**	7	*Calotes veriscolor*	Garden Fence Lizard	1		2	1	-
SQUAMATA	**AGAMIDAE**	8	*Calotes mystaceus*	Blue Forest Lizard			2	2	-
SQUAMATA	**GEKKONIDAE**	9	*Cyrtodacctylus brevidactylus*	Short-toed Bent-toed Gecko	1	1			-
SQUAMATA	**GEKKONIDAE**	10	*Gekko gecko*	Tokay Gecko	1		1		-
SQUAMATA	**GEKKONIDAE**	11	*Hemidactylus frenatus*	Spiney-tailed House Gecko			1	1	-
SQUAMATA	**GEKKONIDAE**	12	*Hemidactylus garnotii*	Garnot's House Gecko	1		1		-
SQUAMATA	**SCINCIDAE**	13	*Eutropis macularia*	Little Ground Skink		1		1	-
SQUAMATA	**VIPERIDAE**	14	*Cryptelytrops albolabris*	White-lipped Pit Viper			1		LC
SQUAMATA	**PYTHONIDAE**	15	*Python reticulatus*	Reticulated Python			1		-
SQUAMATA	**COLUBRIDAE**	16	*Ptyas korros*	Indo-Chinese Rat Snake	1				-
SQUAMATA	**TESTUDINIDAE**	17	*Indotestudo elongate*	Elongated Tortoise	1				EN

KEY

EN Endangered

LC Least Concern

APPENDIX 7: HABITAT TYPES OF AMPHIANS AND REPTILES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

NO.	SCIENTIFIC NAME	COMMON NAME	HABITATS
1	*Duttaphrynus melanostictus*	Common Toad	Path
2	*Fejervarya limnocharis*	Paddy Frog	Pond
3	*Kaloula pulchra*	Asian Painted Frog	Leaf litter
4	*Microhyla ornate*	Ornate Narrow-mouthed Frog	Leaf litter
5	*Microhyla fissipes*	Marbled Narrow-mouthed Frog	Leaf litter
6	*Sylvirana nigrovittata*	Dark-sided Frog	Under the stone
7	*Calotes veriscolor*	Garden Fence Lizard	Bush
8	*Calotes mystaceus*	Blue Forest Lizard	Forest
9	*Cyrtodacctylus brevidactylus*	Short-toed Bent-toed Gecko	Hut
10	*Gekko gecko*	Tokay Gecko	Hut
11	*Hemidactylus frenatus*	Spiney-tailed House Gecko	Hut
12	*Hemidactylus garnotii*	Garnot's House Gecko	Hut
13	*Eutropis macularia*	Little Ground Skink	Beside the stream
14	*Cryptelytrops albolabris*	White-lipped Pit Viper	Bush
15	*Python reticulatus*	Reticulated Python	Cave
16	*Ptyas korros*	Indo-Chinese Rat Snake	Path
17	*Indotestudo elongate*	Elongated Tortoise	Forest

APPENDIX 8: RECORDED INSECTS AND OTHER INVERTEBRATES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

ORDER	FAMILY	NO	SCIENTIFIC NAME	COMMON NAME	SITE I	SITE II	SITE III	SITE IV
LEPIDOPTERA	**PAPILIONIDAE**	1	*Pachliopta aristolochiae*	Common Rose	4	3	3	1
LEPIDOPTERA	**PIERIDAE**	2	*Catopsilia pyranthe*	Mottled Emigrant	3		4	
LEPIDOPTERA	**PIERIDAE**	3	*Delias descombi*	Common Jezebel	1	2	2	2
LEPIDOPTERA	**PIERIDAE**	4	*Pieris canidia*	Indian cabbage white	1			2
LEPIDOPTERA	**PIERIDAE**	5	*Eurema ada*	Talbot's Grass Yellow		2		
LEPIDOPTERA	**PIERIDAE**	6	*Eurema sari*	Chocolate grass Yellow		1		5
LEPIDOPTERA	**NYMPHALIDAE**	7	*Parantica aglea*	Glassy Tiger	3		2	2
LEPIDOPTERA	**NYMPHALIDAE**	8	*Phalanta phalanta*	Common Leopard	3	4		1
LEPIDOPTERA	**NYMPHALIDAE**	9	*Mycalesis visala*	Long-brand bushbrown		1	1	
LEPIDOPTERA	**NYMPHALIDAE**	10	*Melanitis phedima*	Dark evening brown	5		2	1
LEPIDOPTERA	**NYMPHALIDAE**	11	*Melanitis zitenius*	Great evening brown	4	1		1
LEPIDOPTERA	**NYMPHALIDAE**	12	*Orsotriaena medus*	Nigger		1	5	
LEPIDOPTERA	**NYMPHALIDAE**	13	*Ariadne Ariadne*	Angled Caster	1		5	
LEPIDOPTERA	**NYMPHALIDAE**	14	*Moduza procis*	Commander		2		3
LEPIDOPTERA	**NYMPHALIDAE**	15	*Neptis hylas*	Common Sailer	1		4	
LEPIDOPTERA	**NYMPHALIDAE**	16	*Junonia hierta*	Yellow Pansy	2	5	2	
LEPIDOPTERA	**NYMPHALIDAE**	17	*Junonia lemonias*	Lemon Pansy		1	2	3
LEPIDOPTERA	**NYMPHALIDAE**	18	*Junonia atlites*	Gray Pansy	4		1	1
LEPIDOPTERA	**LYCAENIDAE**	19	*Jamides celeno*	The common cerulean	1		1	1
LEPIDOPTERA	**LYCAENIDAE**	20	*Euchrysops cnejus*	Gram Blue			1	2
LEPIDOPTERA	**HESPERIIDAE**	21	*Celaenorrhinus asmara*	White-banded Flat	1	1		
COLEOPTERA	**COCINELLIDAE**	22	*Cycloneda munda*	Lady bug beetle	3			
COLEOPTERA	**CRIOCERINAE**	23	*Neolema sexpunctata*	Shining Leaf Beetle	1		4	
COLEOPTERA	**MELYRIDAE**	24	*Hypebaeus spp*	Soft-wing flower Beetle		1		
COLEOPTERA	**GALERUCIDAE**	25	*Parchicola spp*	Flea Beetle	2			

APPENDIX 8: CONTINUED

ORDER	FAMILY	NO	SCIENTIFIC NAME	COMMON NAME	SITE I	SITE II	SITE III	SITE IV
COLEOPTERA	**CERAMBYCIDAE**	26	*Anoplophora glabripennis*	Asian Long horn Bettle			2	
COLEOPTERA	**ELATERIDAE**	27	*Ctenicera divaricate*	Click Beetle		2		
COLEOPTERA	**CARABIDAE**	28	*Carabus violaecus*	Violet Ground Beetle		1		
COLEOPTERA	**CARABIDAE**	29	*Amora oulica*	Ground Beetle		1	1	
COLEOPTERA	**SCARABAEIDAE**	30	*Scarabaeus viettei*	Dung Beetle	2			
COLEOPTERA	**LUCANIDAE**	31	*Lucanus cervus*	Stag Beetle(caterpillar)	1			1
ODONATA	**LIBELLULIDAE**	32	*Diplacodes nebulosa*	Black-tipped Percher	2	1	3	3
ODONATA	**LIBELLULIDAE**	33	*Neurothemis tulipa*		1			
ODONATA	**LIBELLULIDAE**	34	*Orthetrum triangulare*	Blue-tailed Forest Hawk	2	4		
ODONATA	**LIBELLULIDAE**	35	*Tholymis tillarga*	Coral-tailed Cloudwing		1		
ODONATA	**PETALURIDAE**	36	*Calicnemia imitans*		1	4	1	2

APPENDIX 9: HABITAT TYPES OF INSECTS AND OTHER INVERTEBRATES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

NO.	SCIENTIFIC NAME	COMMON NAME	HABITAT TYPE
1	*Pachliopta aristolochiae*	Common Rose	Shrub
2	*Catopsilia pyranthe*	Mottled Emigrant	Shrub
3	*Delias descombi*	Common Jezebel	Shrub
4	*Pieris canidia*	Indian cabbage white	Bush
5	*Eurema ada*	Talbot's Grass Yellow	Shrub
6	*Eurema sari*	Chocolate grass Yellow	Shrub
7	*Parantica aglea*	Glassy Tiger	Shrub
8	*Phalanta phalanta*	Common Leopard	Shrub
9	*Mycalesis visala*	Long-brand bushbrown	Bush
10	*Melanitis phedima*	Dark evening brown	Bush
11	*Melanitis zitenius*	Great evening brown	Bush
12	*Orsotriaena medus*	Nigger	Bush
13	*Ariadne Ariadne*	Angled Caster	Trail
14	*Moduza procis*	Commander	Stream side
15	*Neptis hylas*	Common Sailer	Bush
16	*Junonia hierta*	Yellow Pansy	Trail
17	*Junonia lemonias*	Lemon Pansy	Trail
18	*Junonia atlites*	Gray Pansy	Bush
19	*Jamides celeno*	The common cerulean	Feaces
20	*Euchrysops cnejus*	Gram Blue	Feaces
21	*Celaenorrhinus asmara*	White-banded Flat	Bush
22	*Cycloneda munda*	Lady bug beetle	Bush
23	*Neolema sexpunctata*	Shining Leaf Beetle	Bush
24	*Hypebaeus spp*	Soft-wing flower Beetle	Trail
25	*Parchicola spp*	Flea beetle	Stream side
26	*Anoplophora glabripennis*	Asian Long horn Bettle	Bush
27	*Ctenicera divaricate*	Click Beetle	Trail
28	*Carabus violaecus*	Violet Ground Beetle	Trail
29	*Amora oulica*	Ground Beetle	Bush
30	*Scarabaeus viettei*	Dung Beetle	Bush
31	*Lucanus cervus*	Stag Beetle(caterpillar)	Trail
32	*Diplacodes nebulosa*		Stream side
33	*Neurothemis tulia*		Bush
34	*Orthetrum triangulare*		Trail
35	*Tholymis tillarga*		Trail
36	*Calicnemia imitans*		Trail

APPENDIX 10: SUMMARY OF GLOBAL THREATENED FAUNA SPECIES IN FOUR SURVEY SITES, MIDDLE YEYWA HYDRPOWER PROJECT

NO.	FAUNA	IUCN REDLIST CATEGORIES					TOTAL
		CR	EN	VU	NT	LC	
1	Birds	-	-	-	2	60	62
2	Mammals	1	2	6	1	13	23
3	Amphibians and Reptiles	-	1	-	-	5	6
4	Insects and other Invertebrates	-	-	-	-	-	-
	TOTAL	1	3	6	3	78	91

APPENDIX 11: SUMMARY OF GLOBAL THREATENED FAUNA SPECIES IN FOUR SURVEY SITES, MIDDLE YEYWSA HYDRPOWER PROJECT

NO.	FAUNA	ORDER	FAMILY	GENERA	SPECIES
1	Birds	11	32	14	62
2	Mammals	6	15	22	23
3	Amphibians and Reptiles	2	11	14	17
4	Insects and other Invertebrates	3	16	31	36
	TOTAL	22	74	81	138

IV.THREATS

The present survey focuses on the inundated areas due to dam. The previous surveys mostly focus on the catchment forests and the riverine area above the 320m asl. So the total plant species recorded in the previous surveys is 462 species that were identified areas the entire project area on both banks. Of these, 289 species can be found on the right bank and 383 species can be found on the left bank. But this does not mean that the left bank has more diversity than the right bank. The survey time on left bank consists of two times that is first time in dry season and the second time in wet season and also the survey area is rather. The wide survey time on the right bank consist of only one time that is in the period of at the end of raining season.

The present survey was the assessment in the direct impact zone that is the inundated area below 320m asl. The data was collected using the same methodology. So the previous finding and present findings should be used in environmental impact assessment (EIA) and environmental mangement plan of Middle Yeywa Hydropower project report to be a complete and sufficient report.

The forest ecosystem and species diversity of both flora and fauna in the area may be complete only if the datas of previous findings and present findings are analized together.

There are total of 131 plant species and 138 animal species are recorded in present survey. In the 11 aquatic plant species are recorded. Since the river is flowing in the V-shape Vally and at high flowing rate, the floating aquatic plants cannot survive. Only the submerged floating aquatic algae *Spirogyra* sp. can survive in the ponds between the stones on ths bank and *Potamogeton crispus* in the elbow bend of the river. In the spray zone closed to the waterfall some amphibions aquatic plants like *Dumortiera* sp. and mosses are found on the rocks and lichens are also found on the rocks and cliffs.

In the second research area around the confluence of the Dokhtawaddy River and Gohteik Stream, the elevation is above 320m asl. So the area is not included in the impact zone. But some aquatic bryophytes are collected and recorded and riverine plants are also recorded.

A total of 138 fauna species were conducted in four representative areas (inundated area closed to dam site (Site I), the downstream confluence Dokhtawaddy River and Gohteik Stream (Site II), the Namkam waterfall area and the inundated area of the confluence of Namkam stream and Dokhtawaddy River (Site III) and the previously used as boat jetty on the left bank of the river near Kyauk Sone village (Site IV)). All of them, 62 bird species, 23 mammal species, 17 species (6 amphibians and 11 reptiles) and 36 species (21 butterflies, 10 beetle and 5 dragonflies species) were respectively collected in four survey sites by fauna survey team. Among them, 13 species were observed as globally threatened and near threatened using with The IUCN Red List of Threatened Species. Version 3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**. Base on IUCN Red List of Threatened Species status, one Critically Endangered (CR), three Endangered (EN), six Vulnerable (VU), three Near Threatened (NT) were conducted in four survey sites during the survey period.

Base on current field survey result, the major threats to biodiversity of this survey area are: illegal logging, fuel wood harvesting and the timber trade and poaching. These threats lead to habitat degradation, decline of species population and disruption of ecological processes—all contributing to the overall loss of biodiversity.

4.1 Habitat degradation and destruction of fauna species

Villages near the survey areas rely on forests beside of the river for their livelihood. Although illegal logging, fuel wood harvesting and the timber trade, the forests are still decent in survey area.

4.2 Poaching

Hunting pressure is also serious threats on fauna species and local people were hunting after harvesting season (November-December). In the present time Eurasian Wildboar, Civet, Chinese Serow and Red Muntjac were main target species for the local hunters. The local hunters trap or shoot them for their meat, skin, bones and canines, which are in high demand as bush meat, status symbols and for use in traditional medicine.

The threats to biodiversity in the area are

1. Expansion of farmland in the forest.
2. Loss of fresh water supply due to loss of spring.
3. Habitat loss of fauna species due to deforestration.
4. Food scarcity for fauna species due to forest degradation and deforestration.

The wild game hunting is still in practic in the area. So fauna species are facing extinction.

V.DISCUSSION AND CONCLUSION

As mention in threat, the analysis of impacts of the middle Yeywa Hydropower Dam should base on the finding of both previous findings and present findings to get a complete picture.

5.1. Potential impacts matrix and mitigation measure

Source	Potential Impact to Biodiversity	Extinct			Duration			Probility			Magnitude			Significane			Recommended Measure
		L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
FLORA	**1.1** Existing Indaing Forest on riverine will be clean up.			√			√			√			√			√	The remaining Indaing forest above the 320 meter should be protected from ilegal logging.
	1.2. Existing Teak forest on riverine will be cleaned up and if not conserve the Teak in the cathment area, it will be degarated soon.			√			√			√			√			√	Reforestaion of teak plantaion should be done.
	1.3 Loss of nutrient regime eroded from catchment forest and transported from upstream to downstream			√		√			√		√				√		Reforestration of catchment forest must be carried out. The reforestration and conservation fund should be esterblished and implemented.
	1.4 Effect of decrease oxygen concentration in water due to the change of runing water to stagnant water in storaged dam.	√				√			√			√			√		To restore the DOC in the reservour man-made falls and rapid should be constructed to get stable oxygen concentration in the inundated area along the river
FAUNA	**1.1** Habitat loss due to clean up of the riverine forest	√				√			√			√			√		Restoration of remaining riverine forests and catchment forests to restore the lost habitat.
	1.2 Food scarcity due to decrease nutrient transport for aquatic fauna and decrease tree species population		√			√			√			√			√		Reforestration of catchment forest so that the nutrition regime can be maintained
	1.3 The storage dam may block the fish migration up and down the river		√				√		√				√			√	To built fish ladder so that fish can migrate to and from the up and down stream
	1.4 Effect on fish, habitat and food chain and food web			√			√			√			√			√	Construction should be included fish ladder, for migration for fish; there is no special habitat for specific species in Dodtawaddy River

The priority measure should be carried out in addition or as a focal of environmental management plan (EMP). The main measures that should be considered are mention below.

1. Change to land cover
   (a) Preserve the existing riverine Indaing forest, which had been above the 320 meter of inundated water level.
   (b) Esterblish the plan to reforest the forests in the catchment of the river

2. Change to aquatic biota
   (a) To restore the nutrient transport for fauna species and fertility of river bank agriculture, the reforestration of catchment forests must be carried out by any mean.
   (b) To restore the DOC in the inundaled area along the river, man-made water falls and rapid should be constructed.

It is also important to make provision from an early stage of project planning for the conduct of and environmental audit shortly after completion of project. The environmental auditors must identify the environmental changes and cumulative impacts caused by series of dam on the river and assess the effectiveness of mitigation measure adopled and suggest additional measure where appropriate.

For restoration of catchment forests, the "conservation fund" must be esterblished. This fund will come from CSR fund paid by the investor of the "Middle Ye Ywar Hydropower".

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ANNEX 2D

Report on Camera Trapping Result in the Middle Yeywa Hydropower Project Area

REPORT ON CAMERA TRAPPING RESULT
IN
MIDDLE YEYWA HYDROPOWER PROJECT AREA

TIN AUNG TUN (KO LAY), KYAW NAING OO AND MIN THEIN HTET
YANGON
JANUARY, 2018

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1. INTRODUCTION

A river with three names, Nam Tu River, Dodtawaddy River and Mytinge River, originating from the northern Shan State mountain ranges, flows from east to west in Kyaukme Township (Nam Tu River), continues to flow from north to south and then turns from east to west in Naung-cho Township where it becomes Dodtawaddy River. Before flowing into the Ayerawaddy River in Amayapura Township, the river (Mytinge River) flows from north east to south west in the low land area of Mandalay Division. The study area is located about 55 km east of Pyin Oo Lwin town and situated along the central part of Nam Tu River.

At the upstream end of the 70 km length of river, below the Upper Yeywa HPP, the Nam Tu River generally flows through deep gorges with an average valley width at river level of around 70 m. The minimum width of the valley at river level is approximately 25 m and the maximum width approaches 160 m. The topography in the river valley is generally characterized by deeply incised V-shape gorges with steep slopes in the range of 30_o to 60_o and no significant widening, which will result in a narrow reservoir with only a limited storage capacity when compared to the mean yearly inflow.

2. SURVEY PARTICIPANTS

Survey team was comprised by the following members:

Biodiversity experts: Tin Aung Tun (Ko Lay) (Researcher and Team Leader), Kyaw Naing Oo and Min Thein Htet

Local Guide: Sein Win, Soe Lwin, Tun Shwe and Phoe Zaw from Kyauk Sone village, Zaw Min Htwe, Zaw Min Oo, Zaw Phyo and Thar Gyi from Ye Twin Gyi village and Win Ngwe and Thar Gyi from Naung Hkioi Gyi village as local guide

3. ITINERARY

Survey was carried out four survey sites includes the inundated closed to the dam site, southern part of Yetwingyi village on the right bank of the river (Site I). Two camera traps were installed in the second survey area includes the downstream confluence Dodtawady River and Gohteik stream (Site II). Two camera traps were set up in the third survey area includes the Nan Kun waterfall area and the inundated area of the confluence of Nan Kun stream and Dodtawady River (Site III). Two camera traps were installed in the fourth survey area include the previously used as boat jetty on the left bank of the river near Kyauk Sone village (Site IV). The following table provides a daily detail description of itinerary and activities performed during the survey.

Table 1. Date activities description

DATE	ACTIVITIES DESCRIPTION
14/01/2018	Yangon-Yawk Sawk
15/01/2018	Yawk Sawk-Kyauk Sone (Preparation)
16/01/2018	Survey (Site III and Site IV)
17/01/2018	Kyauk Sone-Naung Hkio (Preparation)
18/01/2018	Survey (Site I)
19/01/2018	Survey (Site II)
20/01/2018	Naung Hkio-Mandalay
21/01/2018	Mandalay-Yangon

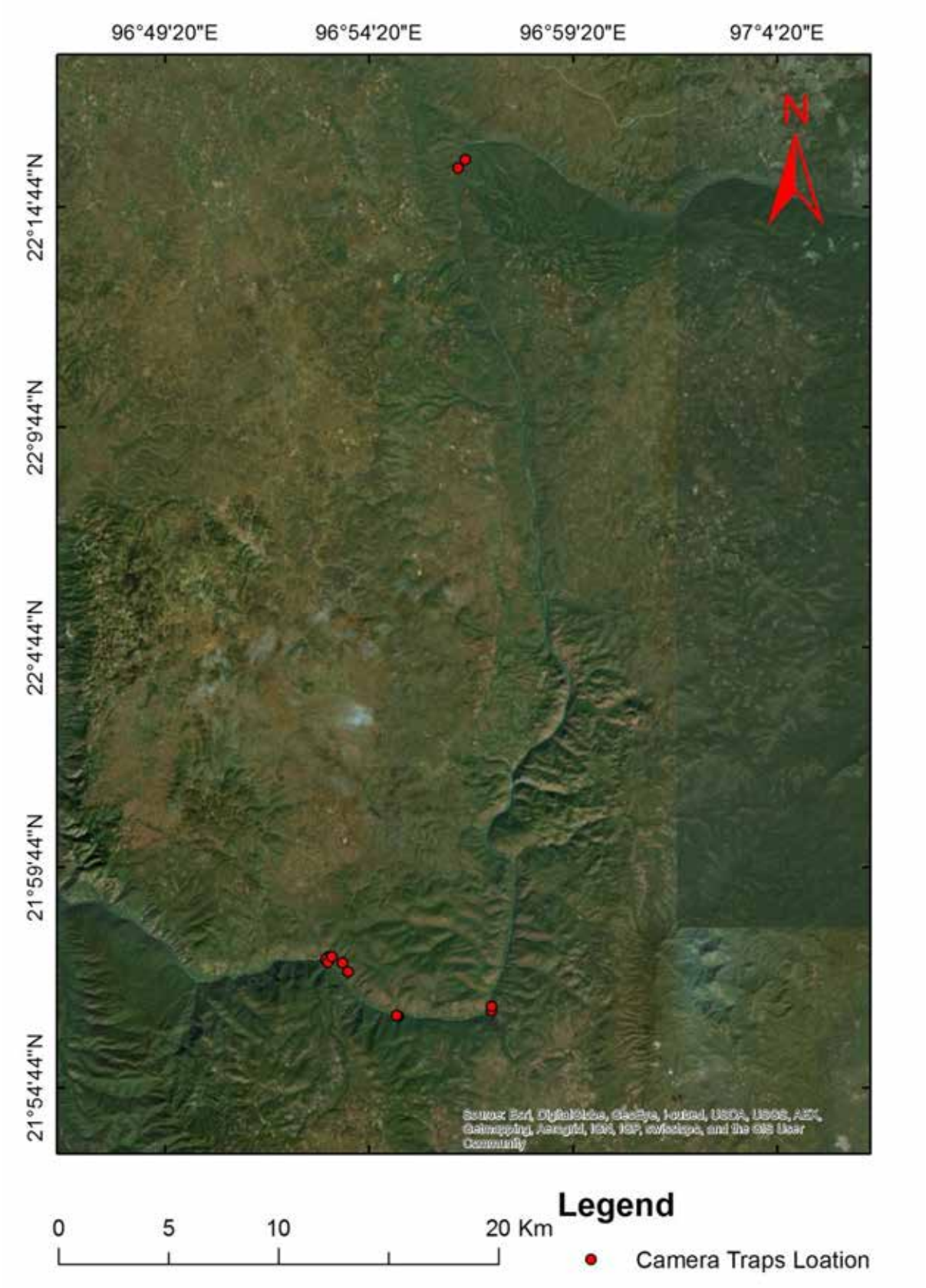

Figure 1. Camera Traps Location Map in Middle Yeywa Hydropower Project

4. MATERIALS AND METHODS

The survey was conducted from 14th to 21th of January, 2018. Globally threatened status of Fauna species were categorized using The IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.)., i.e Critically Endangered (CR), Endangerd (EN), Vulnerable (VU), Near threatened (NT) and Least Concern (LC). Geographic coordinates for each cameras location were recorded using GPS devices (Garmin etrex 10 receiver). Coordinates were recorded as latitude and longitude in decimal degrees, and referenced to the WGS84 (World Geodetic System of 1984) datum. Camera trap locations were selected based on where wild animal tracks were detected during the survey. A total of 12 cameras were operated in 12 locations in four study sites. Six camera traps were set up in the first survey area includes the inundated closed to the dam site, southern part of Yetwingyi village on the right bank of the river (Site I). Two camera traps were installed in the second survey area includes the downstream confluence Dodtawady River and Gohteik stream (Site II). Two camera traps were set up in the third survey area includes the Nan Kun waterfall area and the inundated area of the confluence of Nan Kun stream and Dodtawady River (Site III). Two camera traps were installed in the fourth survey area include the previously used as boat jetty on the left bank of the river near Kyauk Sone village (Site IV) for a minimum of 30 days. Cameras were placed beside of the animal trail and active 24.00 hrs with camera delay time of 10 second.

Table 2. The location of Cameras and target species

Camera Name	POINT_X	POINT_Y	Elev	Set up date	Take out date	Study site	Description
C1	96.916728	21.939457	237	2017-12-18	2018-01-16	Old boat jetty (Site IV)	Left bank
C2	96.917346	21.939329	232	2017-12-18	2018-01-16	Old boat jetty (Site IV)	Left bank
C3	96.955408	21.942878	275	2017-12-17	2018-01-16	Namkan water fall area (Site III)	Left bank
C4	96.955569	21.941311	266	2017-12-17	2018-01-16	Namkan water fall area (Site III)	Left bank
C5	96.941861	22.260119	323	2017-12-15	2018-01-19	Near Nawng Hkio Gyi area (Site II)	Left bank
C6	96.944720	22.263380	356	2017-12-15	2018-01-19	Near Nawng Hkio Gyi area (Site II)	Left bank
C7	96.894622	21.959463	526	2017-12-13	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank
C8	96.890132	21.961792	437	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank
C9	96.888835	21.961750	382	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank
C10	96.896853	21.956126	497	2017-12-13	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank
C11	96.888524	21.959651	246	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank
C12	96.887728	21.960751	263	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank

5. RESULTS

A total of 11 mammals and five bird species were recorded from 11 camera traps from 19 Dec 2017 to 18 Jan 2018. Base on camera trapping result, Camera 1 (C1) recorded the highest number of species and Camera 5 (C5) didn't record any species.

Camera 1 (C1)

A total of five mammal and five bird species were recorded in C1. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Green Peafol was recorded as Endangered (EN), Leopard was captured as Vulnerable (VU), River Lapwing was carried out as Near threatened (NT) and Rhesus Macaque, Leopard Cat, Red Juntjac, Blue-whisteling Thrush, Red Junglefowl and Ashy Woodpigeon were conducted as Least concern (LC).

Camera 2 (C2)

A total of four mammal and two bird species were recorded in C2. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Green Peafowl was recorded as Endangered (EN) and Rhesus Macaque, Leopard Cat, Red Muntjac and Red Junglefowl were conducted as Least concern (LC).

Camera 3 (C3)

A total of two mammal species were recorded in C3. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Red Muntjac was conducted as Least concern (LC).

Camera 4 (C4)

A total of five mammal species were recorded in C4. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Chinese Serow was carried out as Near threatened (NT) and Small Asian Mongoose and Leopard Cat as Least concern (LC).

Camera 5 (C5)

Camera 5 (C5) didn't recorded any species and the pictures colour were also uncorrected.

Camera 6 (C6)

A total of two mammal species were recorded in C6. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Small Indian Civet and Leopard Cat as Least concern (LC).

Camera 7 (C7)

A total of four mammal species were recorded in C7. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Chinese Serow was carried out as Near threatened (NT) and Rhesus Macaque, Leopard Cat and Malayan Porcupine were conducted as Least concern (LC).

Camera 8 (C8)

A total of two mammal species were recorded in C8. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Rhesus Macaque and Malayan Porcupine were conducted as Least concern (LC).

Camera 9 (C9)

A total of two mammal species were recorded in C9. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Rhesus Macaque and Red Muntjac were conducted as Least concern (LC).

Camera 10 (C10)

A total of two mammal and five bird species were recorded in C10. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Rhesus Macaque was conducted as Least concern (LC).

Camera 11 (C11)

A total of three mammal and one bird species were recorded in C11. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Rhesus Maacaque, Malayan Porcupine and Red Junglefowl were conducted as Least concern (LC).

Camera 12 (C12)

A total of four mammal species were recorded in C1. According to the IUCN Red List of Threatened Species. Version3.1. <www.iucnredlist.org>. Downloaded on **01 May 2017**.), Rhesus Macaque, Leopard Cat, Red Muntjac, and Malayan Porcupine were conducted as Least concern (LC).

Table 3. Recorded Mammal species in Camera trapping

Order	Family	No	Scientific name	Common name	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	IUCN
DERMOPTERA	**CERCOPITHECIDAE**	**1**	*Macaca mulatta*	Rhesus Macaque	✓	✓					✓	✓	✓	✓	✓	✓	LC
CARNIVORA	**VIVERRIDAE**	**2**	*Viverricula indica*	Small Indian Civet						✓							LC
CARNIVORA	**HERPESTIDAE**	**3**	*Herpestes javanicus*	Small Asian Mongoose				✓									LC
CARNIVORA	**FELIDAE**	**4**	*Panthera paradus*	Leopard	✓												VU
CARNIVORA	**FELIDAE**	**5**	*Prionailurus bengalensis*	Leopard Cat	✓	✓		✓		✓	✓						LC
ARTIODACTYLA	**TRAGULIDAE**	**6**	*Muntiacus muntjak*	Red Muntjac	✓	✓	✓						✓			✓	LC
ARTIODACTYLA	**BOVIDAE**	**7**	*Capricornis milneedwardsi*	Chinese Serow				✓			✓						NT
RODENTIA	**HYSTRUIDAE**	**8**	*Hystrix brachyuran*	Malayan Porcupine							✓	✓			✓	✓	LC
		9		Bat spp	✓	✓		✓									-
		10		Langur spp										✓			-
		11		Rodent spp			✓	✓							✓	✓	-

Table 4. Recorded Bird species in Camera trapping

Order	Family	No	Scientific name	Common name	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	IUCN
CHARADRIFORMES	**VANELLIDAE**	**1**	*Vanellus duvaucelii*	River Lapwing	✓												NT
PASSERIFORMES	**MUSCICAPIDAE**	**2**	*Myophonus caruleus*	Blue-whisteling Thrush	✓												
GALLIFOMES	**PHASIANIDAE**	**3**	*Gallus gallus*	Red Jungle Fowl	✓	✓									✓		
GALLIFOMES	**PHASIANIDAE**	**4**	*Pavo muticus*	Green Peafowl	✓	✓											EN
COLUMBIFORMES	**COLUMBIDAE**	**5**	*Columba pulchricollis*	Ashy Wood Pigeon	✓												

Some recorded photos in camera trap

Figure 2. Leopard

Figure 3. Leopard

Figure 4. Red Muntjac

Figure 5. Small Indian Civet

Figure 6. Leopard Cat

Figure 7. Chinese Serow

Figure 8. Langur spp

Figure 9. Rhesus Macaque

Figure 10. Malayan Porcupine

Figure 11. Red Muntjac

Figure 12. Green Peafowl

Figure 13. River Lapwing

Figure 14. Red Junglefowl

Camera Name	POINT_X	POINT_Y	Elevation	Set up date	Take out date	Study site	Description	Total recorded species	
								Mammal	Bird
C1	96,916728	21,939457	237	2017-12-18	2018-01-16	Old boat jetty (Site IV)	Left bank	5	5
C2	96,917346	21,939329	232	2017-12-18	2018-01-16	Old boat jetty (Site IV)	Left bank	4	2
C3	96,955408	21,942878	275	2017-12-17	2018-01-16	Namkan water fall area (Site III)	Left bank	2	-
C4	96,955569	21,941311	266	2017-12-17	2018-01-16	Namkan water fall area (Site III)	Left bank	5	-
C5	96,941861	22,260119	323	2017-12-15	2018-01-19	Near Nawng Hkio Gyi area (Site II)	Left bank	-	-
C6	96,944720	22,263380	356	2017-12-15	2018-01-19	Near Nawng Hkio Gyi area (Site II)	Left bank	2	-
C7	96,894622	21,959463	526	2017-12-13	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank	4	-
C8	96,890132	21,961792	437	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank	2	-
C9	96,888835	21,961750	382	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank	2	-
C10	96,896853	21,956126	497	2017-12-13	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank	2	-
C11	96,888524	21,959651	246	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank	3	1
C12	96,887728	21,960751	263	2017-12-12	2018-01-18	Near Ye Dwin Gyi area (Site I)	Right bank	3	-

Order	Family	No	Scientific name	Common name	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	IUCN Status
CHARADRIFORMES	VANELLIDAE	1	*Vanellus duvaucelii*	River Lapwing	✓												NT
PASSERIFORMES	MUSCICAPIDAE	2	*Myophonus caruleus*	Blue-whisteling Thrush	✓												
GALLIFOMES	PHASIANIDAE	3	*Gallus gallus*	Red Jungle Fowl	✓	✓									✓		
GALLIFOMES	PHASIANIDAE	4	*Pavo muticus*	Green Peafowl	✓	✓											EN
COLUMBIFORMES	COLUMBIDAE	5	*Columba pulchricollis*	Ashy Wood Pigeon	✓												

Itinerary of Biodiversity Group, Camera Track Survey

Name : Biodiversity Group
Destination : Middle Yeywar Hydropower Project
Period : 14.01.2018 To 21.01.2018

Date	Location	Detail
January 14, 2018	Yangon to Kyaukgu Village	Go to Kyaukgu Village, by car
January 15, 2018	Kyaukgu Village	Discussion with village head and preparing site plan
January 16, 2018	Kyaukgu Village to Kyaukson Village	Divided by two groups, Go to Nankan water fall (C3, C4) and previous boat jetty area (C1, C2) and (C1) was changed its position.
January 17, 2018	Kyaukson Village to Naungcho	Go to Yetwingyi village and preparing camera track plan
January 18, 2018	Naungcho to Yetwingyi Village	Go to Yetwingyi site Area camera track point (C7, C8, C9, C10, C11, C12) and changed position of (C9, C10)
January 19, 2018	Naungcho to Naung cho gyi village	Go to Naung cho gyi village area camera track points (C5, C6) and changed position to right bank.
January 20, 2018	Naung cho Hotel	Data entry and analysis
January 21, 2018	Naung cho to Yangon	Reach Yangon, by car

ANNEX 3

INDIGENOUS PEOPLES REPORT

Contents

0. Introduction, Indigenous Peoples and IFC PS7

The presence of three ethnic minority groups in the vicinity of the project triggers IFC Performance Standard No. 7 on Indigenous Peoples. The three groups are Danu, Shan and Palaung (Ta-ang).

The indigenous peoples of the project area are all officially classed as ethnic minorities on the government list, and they meet all of the criteria set forth in PS7:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture;
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

It will be seen that with reference to the intent of the PS as indicated in its introductory paragraph, all evidence indicates that these groups,

- are not “marginalized or vulnerable”
- their economic, social and legal status does not “limit their capacity to defend their rights to, and interest in, lands and natural and cultural resources,”
    - the groups are well-off economically, have very large tracts of land averaging, by villager estimates, a minimum of 10 acres per household. Cultural pride is evident in a wide array of popular media, and annual ethnic festivals in which all villagers participate
- and, “their ability to participate in and benefit from development,” is not restricted in any form as far as can be discerned from our investigations

Based upon information collecting visits to villages in the projects area, it is clear that they have not had their lands and resources “transformed, encroached upon, or significantly degraded.” Their languages, cultures, religions, spiritual beliefs, and institutions are intact and not under threat, and in fact appear to be growing stronger. It is highly unlikely, based upon our investigations, that they will suffer “adverse impacts associated with project development” more than non-indigenous communities (there are in fact no non-indigenous communities in the project area regardless of how it may be ultimately defined). The groups are not liable to lose their identity, culture, or the natural resource-based portion of their livelihoods, nor are they likely to be exposed to impoverishment and disease at any time in the foreseeable future.

1. Ethnic Minorities in Myanmar

The ethnic groups of Burma are usually divided into three main ethnolinguistic stocks: **Tibeto-Burman**, **Kra-Dai**, and **Austroasiatic**. In the far south among the islands of the Mergui Archipelago there are also a small number of **Austronesian** speaking Moken who traditionally live in boats, nomadic hunter-gatherers and whose livelihoods are based on the sea. The 800 or so islands of the archipelago are claimed by both Thailand and Myanmar, so their legal status and nationality in many cases remains undetermined. And in the far eastern portion of the Shan State there are several Yao (Iu Mien) villages indicating that the **Miao-Yao (Hmong-Mien)** family needs to be added to the list as well, bringing the total number of stocks to five. It has also been cited (Wikepedia – List of Ethnic Minorities of Myanmar) that Hmong Njua (Green Hmong) are present in the Keng Tung area as well, and if so then they would belong in the latter category as well.

1.1 Ethnic Groups

The official list of 135 ethnic groups is not well presented in government literature, particularly with regard to classification. Groups are lumped together based on geographical location and referred to as "national ethnic races," of which eight are recognized (Wikipedia-List of ethnic groups in Myanmar):

1. Bamar
2. Chin
3. Kachin
4. Kayin
5. Kayah
6. Mon
7. Rakhine
8. Shan

Thus the ***Shan*** category includes the Tibeto-Burman Lahu, Akha, Pa-O, and Danu; the Austroasiatic Palaung, Wa and Khmu; and the Hmong-Mien Yao. The Austronesian Moken mentioned above, also called Salone, is classed as Bama (i.e. Burmese).

For purposes of this report, and for coherence and clarity with respect to other Southeast Asian nations, the internationally accepted ethnolinguistic system of classification will be used.

The ethnolinguistic map below (Wikipedia commons, *ibid*) is a somewhat generalized but largely accurate rendering of the locations of ethnic groups in Myanmar, keeping in mind that broad categories

such as Chin, Kachin, Karen, Palaung, Shan, etc. all have many subgroups whose languages are not necessarily mutually intelligible, and whose total numbers no doubt exceed the official list of 135.

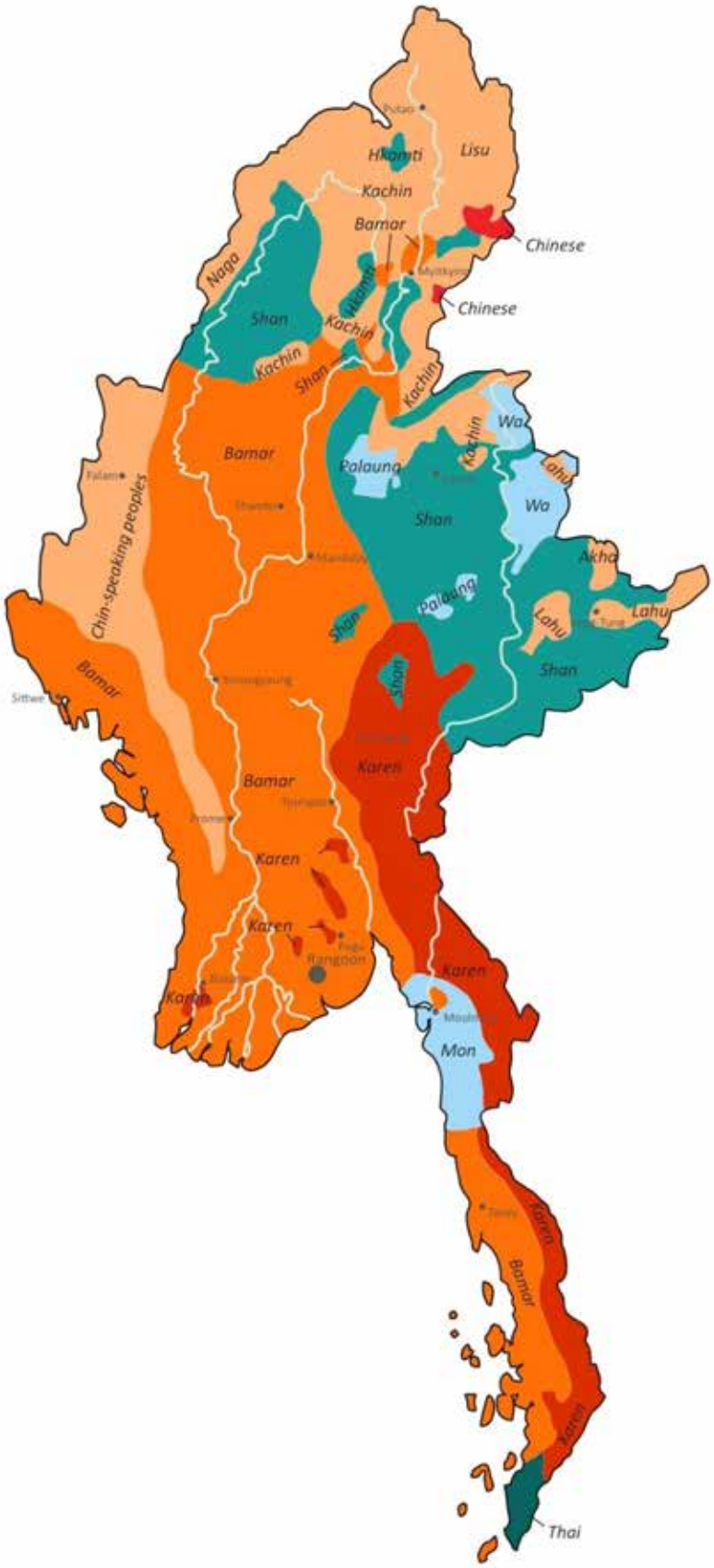

Figure 1: Map of Major Ethnic Groupings in Myanmar

1.2 Government Policy

Ethnic minorities re estimated to make up 30 - 40% of the country's total population, and so-called "ethnic states" occupy some 57% of the total land area along the international borders. Ethnic minorities are not recognized in the Constitution. Rather the term "national races" is used, though not defined by the Constitution, apparently arising from the application of the 1982 Myanmar Citizenship Law, listing 135 "national races" in its Procedures. The law includes include the Kachin, Kayah, Karen, Chin, Bamar, Mon, Rakhine and Shan ethnic groups that have settled in any of the territories included as part of the Burmese State as their permanent home from 1185 B.E or 1823 A.D. law. (Anonymous n.d.)

Political units in Myanmar are largely organised along ethnic lines. Seven states are named after the seven large ethnic groups, that is the Kachin, Kayah, Kayin, Chin, Mon, Rakhine, and Shan States. The Bamar do not have a specific state of that name, but they they remain the politically dominant ethnic group of the country, occupying especially the seven Regions (Sagaing, Magwe, Tanintharyi, Mandalay, Yangon, Ayeyarwady, and Bago). There are also six self-administered areas that are part of Regions or States, each named after the minority national race that forms the majority in the relevant area (Naga, Danu, Pa-O, Palaung, Kokang and Wa Self- Administered Areas). The rights of ethnic nationalities to representation in State parliaments is set forth in Myanmar national (*ibid*)

1.3 Self Administered Zones (SAZ)

Myanmar has a total of six Self Administered Zones (SAZs), all of which are located in the Shan State, including the disconnected portion of the State where the Khamti are dominant. One of these is allocated to the Danu, though the northern Danu who inhabit the project area are not included in the SAZ. The reasons for this are not immediately apparent other than the possibility that the northern Danu are considered to be more recent settlers and not a part of the Danu mainstream. The Danu maintain a political party but not a separatist army like the others. And although they consider themselves as separate and independent, linguistically and culturally they are closer te the ethnic Burmese than to any other ethnic group.

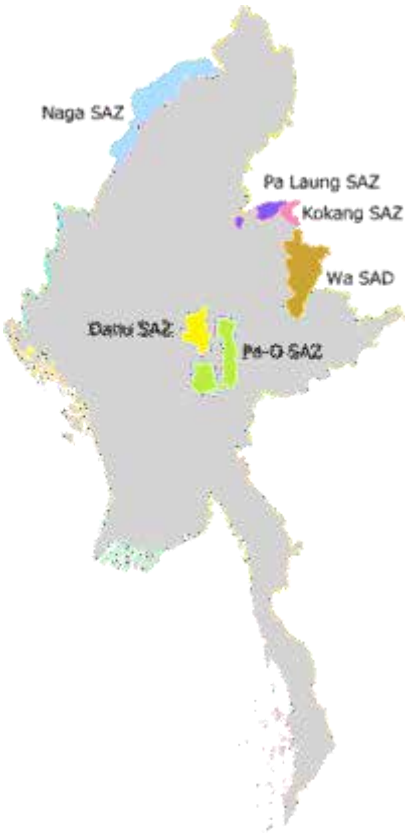

Figure 2: Map of Self Administered Zones

2. The Greater Project Area

2.1 History of the Shan State

The Shan State forms the eastern portion of the present Union of Myanmar and consists of 52 townships. The state is bounded by the Kachin State on the north, the People's Republic of China on the Northeast, Lao PDR and the Mekong River on the East, Thailand on the Southeast, Kayah State on the South, and the Mandalay Division to the west. The Salween River (Nam Khone in Shan), separates the Shan Plateau into two parts, flowing from North to South and emptying into the Gulf of Martaban, a part of the Indian Ocean. One of the notable features is Inle Lake (Nong Ang La in Shan) with its floating island gardens.

The name "Shan states" (plural) referred a group of some 46 states each with more-or less autonomous status, though some were more powerful than others. The feudal system acknowledged the rule of a "sao hpa" (Sawbwa in Burmese) in each state ("mong"), who was descended from the sky and who had the right to rule his farming subjects. The states are called "Mong" [actually /mɤŋ/ phonemically] and

were organized into villages, *baan* or *maan*, as are other Tai speaking areas throughout Southeast Asia and Southern China.

The majority were ethnic Shan, with some notable exceptions such as Kokang (a small Chinese group), Pwo Karen (Pa-O), Nagas, Wa, Kachin, and Palaung (Ta-ang). The Danu-speaking area surrounding the MYW project and extending further south was never considered one of the states, though in part it was more recently granted status as an SAZ (Self-Administered Zone) in 2010.

Other ethnic groups found within the Shan states are Lahu, Akha, Lisu, Wa and many varieties of Ta-ang. The Tai-speaking Khamti in the extreme northwest of the country and the Kheun of Keng Tung (the eastern Shan State) are usually counted as types of Shan, with the exception of the Lue of Meuang Yong in Keng Tung State who are considered a separate group.

Following independence and the establishment of the Union of Burma all of these areas were grouped together under the singular designation of "Shan State."

Historically, the most powerful Shan polities were located at Muang Mao in the north and at Ava in the south. The Ava Kingdom controlled upper Burma from 1364 until 1555 when it was conquered by the Burmese from Taungoo. It was located at the juncture where the Nam Tu (Myitnge) river flows into the Irrawaddy, just southeast of Mandalay, not far south of the proposed MYW dam site.

The Shan system of writing belongs to a class of Indic-based writing known as Lik scripts. The earliest example dates from the Tai polity of Meuang Mao in Yunnan in the 14th century. Muang Mao had been in contact with the Burmese kingdom at Pagan since the 12th century, so assuming a Mon or early Burmese prototype, the Lik script may have originated at that time (David Wharton p.c.). Note that the Burmese script has a separate origin, based upon the Old Mon system of writing.

As mentioned, Shan rulers of the states or fiefdoms were referred to as "Sao Pha" or "Chau Fa" (depending on the dialect). The literal translation is 'sky-lord', a reference to the belief that the original founders were heavenly beings who descended from the Buddhist heaven known as Tavatimsa. The elaborate clothing and regalia of the Shan princes, studded with gems and unearthly designs is a testament to that notion (Conway 2006). The idea of feudal lords being descended from heaven is not peculiar to the Shan however. Such ideas are found across a wide Tai-speaking area, beginning with the Tai Dam or Black Tai whose ruling nobility of the Lo lineage have their own separate heaven called Lian Phane to which they return after death. The "Chau Fa" title is found also among the Lue as well and in a continuum across northern Burma all the way to Assam.

In the MYW Project area, ruling Sao Phas of Lawksawk have been chronicled at least as far back as the 18th century:

Lawksawk Sabwas

- Hkun Sam Lik 1791–1811
- On Gaing 1812–1813
- Hkun Shwe Ek 1813–1850
- Vacant 1850–1854
- Sao Weng (first time) 1854–1881
- Occupied by Yawnghwe 1881–1886
- Sao Weng (second time) 1886–1887
- Bo Saing (regent) 1887
- Hkun Nu 1887–1900
- Sao Hkun Nsok 1900–1946
- Sao Hkun So 1946–1952

Chronicles of the Shan states are often fanciful and rife with mythological figures and dates that do not match with historical information that is available from other sources. For example, Mong Nai and Hsipaw claim their history begins in 519 BCE, and for Hsenwi it began in 441 BCE, and so on (Conway 2006:33). But in fact most of these feudal states can realistically date their origins to the 12th - 14th centuries, and have lists of their rulers that date from those periods. Many of the original rulers were in fact women. The genealogy of Yaungshwe, just to the south of the project area, begins in the 14th century with a prince named Si Hseng and continues without interruption until the last prince Sao Shwe Thaike whose reign ended in 1959 (Conway 2006:33).

Figure 3: Map of the Shan State

Apart from the Sao Pha who ruled a domain with absolute authority and power over life and death, there were deputies and minor princes with titles of their own. The senior consort of a prince was addressed as *chau/sao* or even *mahadewi* 'queen.' When townships began to appear under the British rule, the head of the township was given the title of *myosa* , a Burmese term translated literally as "eater of the town." (Conway 18). Shan administrators of non-Tai ethnic group areas were accorded the title of *Ngwegunhmus,* and in the Shan State Manual of 1925, eight such areas were recorded (Sao Saimong Mangrai 1965:xxv) and included such groups as Karen and Kachin.

It is generally believed that prior to the arrival of the Shan the plateau was occupied by the ancestors of Palaungic groups such as Wa and Ta-ang in the north and by various Karen peoples to the south.

In addition, the influence of the Austroasiatic Mon kingdom should not be overlooked. Having moved from what is now northern and central Thailand and establishing their first kingdom at Thaton in the 9th century, they are thought to have been the main source of culture for early Pagan, their artisans having constructed the temples and stupas there, and their orthography being the source for written Burmese. In 1752 the Mons of the briefly resurrected Hanthawaddy Kingdom captured Ava with the assistance of the French, and ended three centuries of the Burmese dynasty of Toungoo. But although there must have been considerable contact, little has been written on the relationship of the Mon and the Shan.

The Burmese king Bayinnaung conquered all of the Shan states in 1557. Although the Shan states would become a tributary to Irrawaddy valley based Burmese kingdoms from then on, the Shan Saophas retained a large degree of autonomy. Throughout the Burmese feudal era, Shan states supplied much manpower in the service of Burmese kings. Without Shan manpower, it would have been difficult, if not impossible, for the Burmans alone to achieve their much vaunted victories in Lower Burma, Siam, and elsewhere. Shans were a major part of Burmese forces in the First Anglo-Burmese War of 1824-1826, and fought valiantly—a fact even the British commanders acknowledged. (Sao Sai Mong).

After the Third Anglo-Burmese War in 1885, the British gained control of the Shan states. Under the British colonial administration, the Shan principalities were administered separately as British protectorates with limited monarchical powers invested in the Shan Saophas.

At the end of World War II, the Shan and other ethnic minority leaders negotiated with the majority Bamar leadership at the Panglong Conference, and agreed to gain independence from Britain as part of Union of Burma. The Shan states were given the option to secede after 10 years of independence. The Shan states (plural) became Shan State (singular) in 1948 as part of the newly independent Burma.

General Ne Win's coup d'état overthrew the democratically elected government in 1962, and abolished the Shan saopha system.

2.2 Population

As indicated, the Shan State itself is quite diverse including ethnic groups such as the Shan, Pa-O, Palaung, Kachin, Intha, Danu, Kokang, Wa, Lahu, Taungyo, Myoungzee, Lishaw, and Yinnet. Of these, the Shan are the largest, numbering an estimated six million (although not all live in Shan State). Estimates of the total population of Pa-O and Danu vary (due to the lack of reliable censuses), but the Danu population is usually cited as 220,000 and the Pa-O population as 600,000. There are seven SAZs in Shan

State, belonging to the Naga, Palaung, Kokang, Wa, Danu, and Pa-O. The Danu and Pa-O SAZs are located in southern Shan State and were focuses of this research. The Danu SAZ consists of two townships along the western edge of southern Shan State, with a total population of around 150,000, and the Pa-O SAZ consists of 3 non-contiguous townships with a total population of 400,000. Within both of these SAZs, the central government of Myanmar is present and performs all land management-related functions.

3. Ethnic Groups of the Project Area

3.1 Danu

3.1.1 Language and Culture

Danu belongs to Burmish branch of Lolo-Burmese, part of the greater Tibeto-Burman stock and ultimately the Sino-Tibetan superstock. It is quite close to Burmese, and is one of numerous dialects than includes Intha, Taung'yo, Tavoy (Dawei), Beik and Rakhaing (Arakan). Most of these dialects can be understood by Myanmar speakers after a few weeks exposure indicating their separation from the mainstream is not very old in linguistic terms. Danu is thought to have originated with a group of soldiers who were posted as a buffer between Pagan and the Shan States in the 18th century during the reign of King Alaungpaya, and whose territory stretches roughly from south to north between Taunggi and Mandalay. This was apparently a recognized practice. For example, when the Burmese capital was relocated from Ava to Mandalay in 1857, many troops and officials were stationed in the Shan States to monitor the goings on. And even as early as 1840 some 1,500 Burmese soldiers were posted to Mong Nai, a location just to the northeast of Inlay Lake (Conway: 37). Interestingly, this time period coincides with the dates of establishment provided by Danu villages in the project area.

In the period of 1970-72, and 1977-79, the Japanese linguist Shiro Yabu traveled to the Danu speaking areas and made some observations on their geographical distribution and language. Professor Yabu had the opportunity to work with the Danu dialect (as well as many other languages). The dialect recorded in this article is that of Pindaya, south of the MY project area.

Yabu (1981) describes Danu as a language spoken on the western edge of the Shan Plateau, in the administrative units of:

- Mogok
- Nawng Hkio [in Project Area]
- Maymyo (a hill station)
- Yassau (Lawksawk) [in Project Area]
- Ywagan

- Pintaya (Pangtara)
- Aung Ban
- Kalau

He notes that some of the areas inhabited by Danu have ruby mines, especially at Mong Long, to the north of Hsum-Hsai/Nawng Hkio.

The actual places he names as being Danu include:

- Nawng Hkio
- Hsum-Hsai (Note that this place is a district within the old Hsipaw principality, the district where Nawng Hkio is located – established in 1961)
- Mönglong (Ruby Mines)
- Lawksawk (Yassau)
- Kawng Bo
- Ye Ngan (Ywagan) (Yen Ngan)
- Ye U
- Maw (Bo)
- Pangtarn (Pintaya)
- Poila
- Aung Ban
- Maw Sön (Baw Saing)

This list is close to the Danu area defined by elders interviewed in Nawng Hkio, i.e.

- NW – Kyawk Se township
- NE – Yat Saut (Yassau) township
- W – Myot Thar township
- SW – Thar Se township
- SE – Pindaya township
- S – Aung Pan township and on to Taunggyi

Outside of the Shan State, Yabu furthermore notes areas in the Burmese lowlands where Danu people live, namely:

- Tha Ji (=Thar Se ?)
- Kyawk se

- Salaween Province (in Karen State)
- Kantarawadi (in Kayah State)
- And in the Southern Shan lowlands there are small populations at,
- He Pông
- Hsihseng
- Panglong (=Pinglong)

The Danu people themselves say there is not much variation among the dialects spoken in these areas. Most of these place names can be found on the attached Map of old Shan principalities (above). That the Danu distribution overlays the boundaries of the old principalities is good evidence of their relatively recent arrival, as historically they do not have a principality of their own as do the Shan, Wa, Palaung, Kachin, Kokang, etc.

In the well-known Gazetteer of Scott and Hardiman, it is noted that there are two kinds of Danu; Rhan Danu and Burman Danu, and speculates that the Shan Danu speak Shan as well as Danu. (Rhan = Shan). (note: This we did not find to be the case in any of the villages visited.)

He also notes two Burmese sources that claim the Danu are mentioned in Burmese "inscriptions," but no details are provided.

The two theories of origin Yabu heard, were

1. Related to Pa-O and /or Shan
2. Moved into the area from the Burmese lowlands

But whatever the case, he notes, Danu is definitely Burmese and the similarity of Danu, Taung'Yo and Intha dialects of Burmese is noted. But Although there may be some linguistic influence on Danu from Shan and Pa-O, Yabu notes that this cannot have been very big.

The findings of Yabu are consistent with those of our SIA research investigation. Caution is advised with place names, as there are often two names for the same location, at least in Romanized form. The total population of Danu at the time of Yabu's studies he estimates at between 70,000 and 100,000. In conclusion, Yabu notes that the northern and southern varieties of Danu differ slightly, but both are definitely Burmese and are closely related to Taung'yo and Intha. That is, they are not related to Shan or to Pa-o as some people used to believe. The tones are like Burmese.

In our brief interactions during the field trip, we noted that the Danu always take the one-down self-effacing position, claiming unsophistication, lack of education, honesty, hardworking, and peacefulness

as their cultural traits. Their warrior past, if such turns out to be the case, comes to the surface when discussing hunting and stories pour forth with great animation. Guns used are all homemade.

With great community spirit and solidarity, the Danu make their own roads, do their own construction, collectively help each member of the community with their house building, and so on.

Ethnic pride and identity are in evidence everywhere. They have their own flag that flies in all important locations in the village. They remain in touch with the Danu further south, the Pindaya Danu, and have adopted their dress and festivities, and have begun their own, Northern Danu, celebration, just prior to the one in Pindaya.

The Danu perhaps preserve more of the old style SEA bilateralism with matrilocal residence. This seems very much in evidence in the villages visited

Relationships with Shan are said to be friendly and symmetrical, but this needs further investigation, since many of the villages have Shan names (eg Taung Kam) as if the original Shans were displaced.

The distribution of Danu roughly along the western border of the Shan State between Taunggyi and Mandalay supports the idea that the Danu are the descendants of soldiers placed here as a buffer between the Shan States and the Burmese King. (18th c King Alaungpaya 1714-1760, founder of the Konbaung Dynasty). Since the Shans allegedly joined Alaungpaya in the retaking of Ava from the Mons this is a bit strange – although the Shans had controlled Ava at an earlier date.

It is also a possibility, hinted at by many of the Danu interviewed, that if indeed the king did order the soldiers to remain as a buffer, they would have sought wives from among local Shan women, and given the higher prestige of the Burmese language, the language gradually shifted to what was to become Danu, assisted perhaps by the bordering of that population with ethnic Burmese speakers. But this hypothesis does not fit the situation well, given the relative high status of Shan women and the fact that children tend to learn their mother's language first. Also, as Yabu notes, there seems to be little or no influence from Shan on the Danu language. The Danu group must have been isolated to some degree from the Bama mainstream in order to develop separate dialectal features.

It does seem clear that the Northern Danu of the project area split off from the southern group approximately 150 years ago (mid-19th c.), or four generations, the villagers queried provided much the same estimated age for their respective villages. Many also related that their grandparents or great grandparents were Shan, though oddly no linguistic traces of this remain.

At a meeting with Shan representatives in the Township Head of Nawng Hkio Attempts to speak with the Shan alone were thwarted, ostensibly by the Township administration, by inviting three senior level

Danu elders to the meeting which had the effect of inhibiting the Shan from speaking freely due to ethnicity and to age (*keng chay*). A Shan woman teacher who was part of the group observed wryly that the Danu version of history provided to us was an oral one without documentary evidence. Perhaps she was alluding to the lack of a written language or literature for Danu compared to the abundant wealth of Shan written historical and literary documents. But for our purposes, the Shan version of the area's history is still lacking.

The Danu at this meeting said the Danu settlement of the territory took place via migrations from the south (apparently Pindaya), and that the Danu gradually settled in Shan villages, intermarrying, until all of the Shan began speaking Danu, as evidenced by the fact that many Danu have Shan grandparents. This is apparently the myth that is being perpetuated and explains why so many villages have Shan names. But on the contrary, Danu speakers all claim, rather too gladly, that they do not speak a word of Shan, and there are indeed no traces of Shan sub-strata in the Danu language which would support their version of settlement.

For the time being this remains unresolved and more information is needed. The greater Project Area consists of the two townships of Nawng Hkio and Lawksawk – defined by nearest tracks. For Nawng Hkio we have no historical information on the Shan side, but for Lawksawk we have a list of Shan ruling princes since 1791 – see above.

Note: Danu the Burmish group, should not be confused with Danau, a Palaungic group.

The Danu Story of the Archer Prince

A prince of Yawng Shwe was out hunting in the forest nerar the entrance to Inle Lake, not far from Pindaya caves. There is another lake there called Poke Ta Loak. In this lake, seven angels from Kaw Loi (Kayah State – formerly Hwe Thar Li) liked to bathe there every day. One day they were having such a good time that it got to be too late, and they could not return home. Looking around, they discovered a large cave on the western side of the lake and decided to spend the night there.

At the time there was a giant spider that happened by, and spun a web that covered the entrance to the cave. When morning came, the angels found they were trapped in the cave by the spider's web and could not get out. They began to shout for help.

The prince heard the cries for help and went to see what was happening. Seeing the gigantic spider he shot it with an arrow and then proceeded to free the angels. In gratitude, the angels gave their youngest sister to the prince. They fell in love and he took her back to his kingdom where they lived together forever. His name was Thu Danu.

(NB: The name *Danu* is from Sanskrit ***dhanu***, the word for the long bow used in warfare and hunting and borrowed into many languages in Southeast Asia as a literary form.)

3.1.2 Status with respect to Performance Standard 7

The Danu people visited:

- Perceive themselves as honest, hardworking, farmers
- Are economically well-off and self-sufficient
- Language not the same as Bama, southern Danu is more different
- Have own traditional dress
- Have own singing, dances, music
- Have ethnic pride, belong to the Danu Political Democracy Party, but the northern Danu are not part of the Danu SAZ (established in 2010)
- Each village has its own cultural group with dancing competitions
- Have the same origin myth of the Archer Prince Thu Danu

The Danu are officially classed as an ethnic minority among the groups listed by the government, and they meet all of the criteria set forth in PS7:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture;
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

However, with reference to the intent of the PS as indicated in the introductory paragraph, all evidence indicates that the Danu,

- are not “marginalized or vulnerable”
    - the Danu are the dominant ethnic group in the project area both numerically and due to their close ethnic and linguistic affiliation with the Myanmar majority of the country
- their economic, social and legal status does not “limit their capacity to defend their rights to, and interest in, lands and natural and cultural resources,”

- the Danu are well-off economically, have very large tracts of land averaging, by villager estimates, a minimum of 10 acres per household. Cultural pride is evident in a wide array of popular media, and annual ethnic festivals in which all villagers participate

- and, "their ability to participate in and benefit from development," is not restricted in any form as far as can be discerned from our investigation

Based upon information collecting visits to a sample of seven widespread Danu villages in the projects area, it is clear that the Danu have not had their lands and resources "transformed, encroached upon, or significantly degraded." Their languages, cultures, religions, spiritual beliefs, and institutions are intact and not under threat, and in fact appear to be growing stronger. It is highly unlikely, based upon our investigations, that they will suffer "adverse impacts associated with project development" more than non-indigenous communities (there are in fact no non-indigenous communities in the project area regardless of how it may be ultimately defined). The Danu are not liable to lose their identity, culture, or natural resource-based livelihoods, nor are they likely to be exposed to impoverishment and disease at any time in the foreseeable future.

3.2 Shan

3.2.1 Language and Culture

Technically Shan belongs to the Be-Tai sub-family of Kam-Tai family under the Kra-Dai ethnolinguistic stock. Its contemporaneous sister states and statelets include the Ahom kingdom of Assam, the Lue Sip-Song Panna, the Black Tai Sip-Song Chu Tai, and more fully developed kingdoms of Laos and Siam. All of these belong to the Southwestern branch of Tai. Related languages often considered as Shan dialects include Khamti, Phakhe, Khamyang, Turung, Nora, and Aiton spoken in northwestern Burma and Assam respectively.

The Shan are an old and well-established ethnic group. Their current status as "minority" belies their historical position as a state nearly rivaling that of Burma itself. What is now called the Shan State was formerly a group of principalities ruled by Saophas (or Sawbwas) since the 13th century. Today that includes a territory covering nearly one-third of Myanmar. Shan is a written language with an old literature both religious and secular. It is worth mentioning that the Chinese invasion of 1765-9 used the Nam Tu river as their main route through the Shan States to attack Ava.

Despite being subjugated by the Burmese king Bayinnaung in 1557, the Shan saophas (or chau fa, depending on the dialect) remained largely autonomous. When, after the Third Anglo-Burmese War in 1885, the British gained control of the Shan states, Shan principalities were administered separately as British protectorates, but still with a degree of power accorded to the saophas.

After World War II, the Shan and other ethnic minority representatives negotiated with the majority Bamar and agreed to independence from Britain to become the Union of Burma in 1948. The first president of the Union, Sao Shwe Thaik, was in fact a Shan prince from Yawnghwe. The Shan states were given the option to secede after 10 years of independence which ultimately they did not exercise, and the Shan States [plural] became Shan State in 1948, a part of independent Burma. But the Shan Saopha system was not abolished until after Ne Win's coup d'état in 1962.

Thus while in microcosm Shan villages are few in relation to Danu in the greater project area, in the Shan state where the project is situated, the Shan are the overwhelming majority. In the one village visited where the Shan comprise a considerable percentage percent of the population, Nawng Hkio Gyi, the Shan appear to dominate the village administration. The village has a thriving and modern mechanized agricultural system with an advanced action program of conservation complete with protected forests and lakes where fishing and hunting are prohibited, and a reforestation program (the only village visited so far to have done this). They also have functioning schools, a health clinic, a large well-cared for temple, and a language preservation policy wherein all children learn how to read and write the Shan language in addition to Burmese. Indeed it would be hard to imagine how an outside development program could improve upon the existing system except perhaps providing a better road system.

3.2.2 Status with respect to Performance Standard 7

As with the Danu, the Shan people visited:

- Are economically well-off and self-sufficient
- Possess a distinct spoken and written Language distance from Bama
- Have their own traditional dress and material culture
- Have their own singing, dances, music and ceremonies
- Have ethnic pride, and are voice their opinions openly to the government
- Have a considerable historical and literary heritage dating from the 13th century

The Shan are officially classed as an ethnic minority among the groups listed by the government, and they meet all of the criteria set forth in PS7:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;

- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture;
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

However, with reference to the intent of the PS as indicated in the introductory paragraph, all evidence indicates that the Shan,

- are not "marginalized or vulnerable"
    - while the Shan are not the dominant ethnic group in the project area they do have considerable political and administrative authority in the villages shared with Danu
- their economic, social and legal status does not "limit their capacity to defend their rights to, and interest in, lands and natural and cultural resources,"
    - the Shan are well-off economically, have very large tracts of land averaging, by villager estimates, a minimum of 10 acres per household. Cultural pride is evident in a wide array of popular media, and ethnic festivals in which all villagers participate
- and, "their ability to participate in and benefit from development," is not restricted in any form as far as can be discerned from our investigation

Based upon information collecting visits to a sample of seven widespread Danu villages in the projects area, it is clear that the Shan have not had their lands and resources "transformed, encroached upon, or significantly degraded" within living memory. Their languages, cultures, religions, spiritual beliefs, and institutions are intact and not under threat. It is highly unlikely, based upon our investigations, that they will suffer "adverse impacts associated with project development" more than non-indigenous communities (there are in fact no non-indigenous communities in the project area regardless of how it may be ultimately defined). The Shan are not liable to lose their identity, culture, or natural resource-based livelihoods, nor are they likely to be exposed to impoverishment and disease at any time in the foreseeable future.

3.3 Palaung (Ta-ang)

3.3.1 Language and Culture

Palaung, is an exonym applied to this group by the Burmese, and the general term preferred by the groups themselves is Ta'ang. This is a recently adopted political term, as there are said to be between 13 and 17 subgroups, whose languages are not all mutually intelligible. They prefer politically to be seen as speaking with a single common voice. In fact Ta-ang is also the name of a specific subgroup of Palaung. In the northern Shan State the Ta-ang (Palaung) have their own SAZ (see map) and a liberation army.

Internal Ta'ang diversity has also caused problems in the adoption a written language that can be understood by all dialects. The Palaung are thought to have predated the Shan in much of the area of the Shan State.

Ethnolinguistically, Palaung belongs to the Palaungic Branch of Austroasiatic, considered by some to be related to the Khasian Branch of Megdalaya in northeastern India. Palaungic includes several main groups, including Danau, Palaung, Riang, Angkuic, Lamet (Ramet, Xmet), and Waic (Plang, Lawa, Wa).

A family tree showing the relationships of the various groups to each other is shown here:

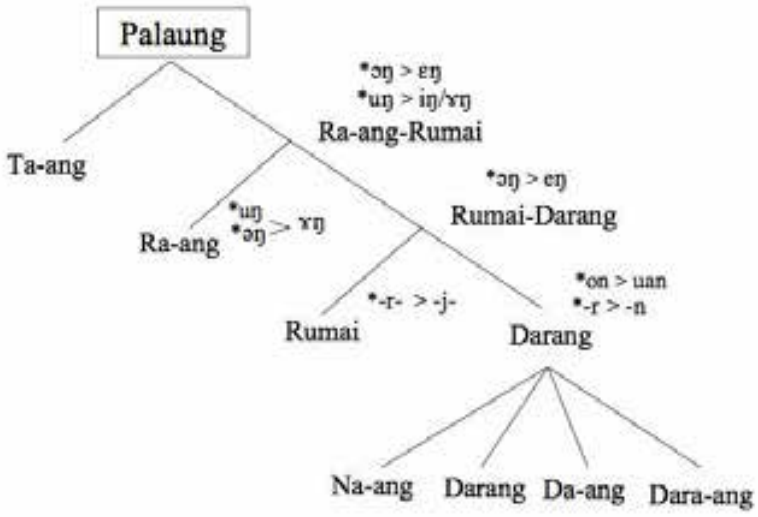

Figure 4 - Palaung Subgroups based on linguistic criteria (Ostapirat)

These groups are widely distributed around the Shan State, though their point of origin is thought to be in the north near the Chinese border. There are also Palaung languages spoken in Yunnan and Thailand. The Palaung in the vicinity of the project appear to belong to the Darang subgroup in the above phyletic tree.

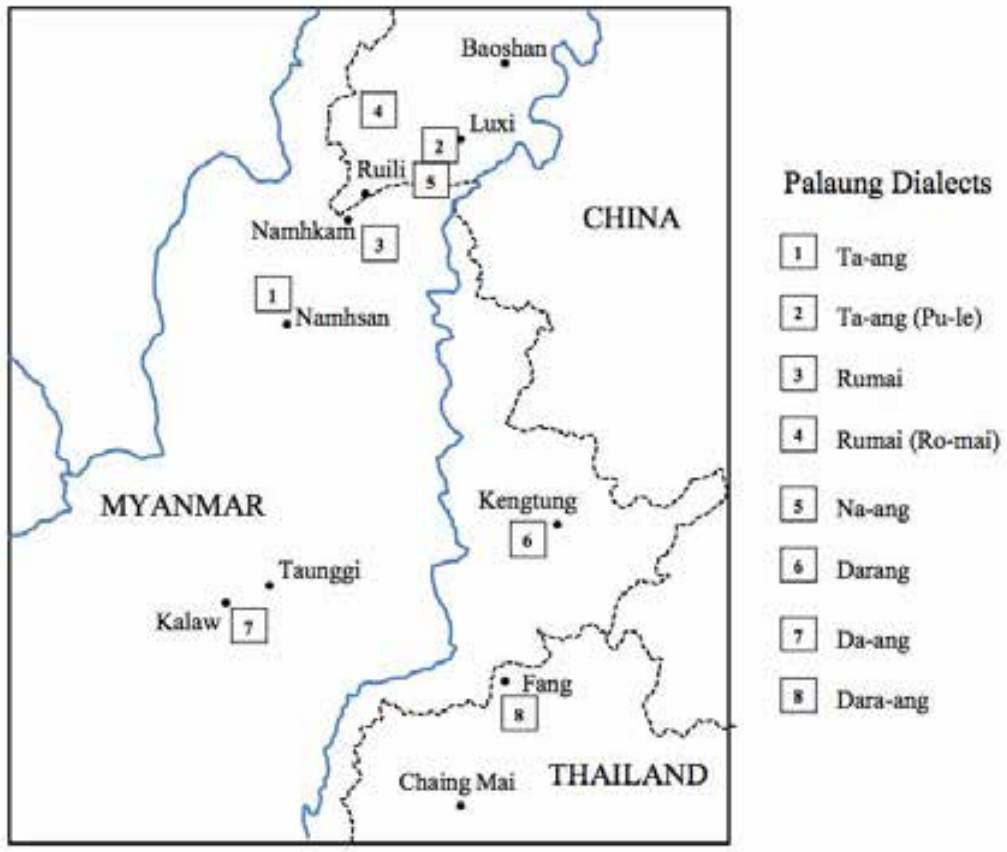

Figure 5 - Map of locations of Palaung groups (Ostapirat)

In the greater project area there are six Palaung villages in Kyawk Ku track of Lawksawk township on the left bank. These have so far not been included in the project preparation work. Another village, Nawng Yin, is located two kilometers southeast of Pin Ping and was said to have moved here from Yassau (Lawksawk) at the same time as the Danu in the mid-19th century. In addition to education in the government schools which is in Burmese, the Palaung villages visited have literacy programs in their own language, using a modified from of Shan or Lik alphabet.

There has been some involuntary relocations of this group from areas further north where armed resistance to the government was taking place until recently, but the villages in the project area were not a part of this process.

Long ago Leach (1960) noted the Palaung or Ta'ang represent an exception to long held theories regarding state development in Southeast Asia, and upland-lowland ethnic relationships. As noted in Takahiro and Badenoch (2013):

> *The lowland model is characterized as governed by hierarchical political structures, supported by high-productivity wet- rice cultivation, organized by non-unitary descent, dedicated to*

> *Buddhism, and displaying a modest level of bilingualism. The contrasting upland model has egalitarian governance, shifting cultivation, unitary descent, animism, and high levels of multilingualism as its defining characteristics.*

The Palaung break this pattern. They have been Buddhists for hundreds of years, are proficient in the use of written religious texts, and some observers have ventured they are even more devout than the Shan. Their prosperous economy is based on tea which is likened to the position of rice among the Shan, and has allowed them to interact with the Shan on more or less symmetrical terms. And according to their own legends their Buddhism came directly from India and is hence more pure than that of the lowlanders. But all indications are that in reality Buddhism was received by the Palaung in the 16th century at the same time as the Shan - not necessarily from the Shan although the two forms are very much alike.

Leach's characterizations have been shown over the years to be somewhat overly rigid, but he has been lauded for demonstrating that ethnicity is a highly flexible and ever changing type of social phenomena. However the Shan-Palaung relationship does not fit Leach's pattern of social oscillation between democratic and autocratic, but rather developed into something more stable.

This is made abundantly clear in one little known fact, that one of the principalities of the Shan States was in fact Palaung – that of Taung Peng. It was in fact a mountain kingdom, something that was not supposed to be possible. In all other respects, this state resembled the Shan model, and was ruled by a Palaung Sawbwa. At one point in history, Taung Peng paid its tribute directly to the Burmese court at Ava rather than via the Shan. In 1947, when the council was held to form the Union of Burma, alluded to above, the representative of the Shan states was indeed the Palaung prince Hkun Pan Tsing, the last Sawbwa of Taung Peng. (Takahiro and Badenoch 2013).

Although not many Palaung villages near the project area have been visited by the consultants, it is clear that the Palaung or Ta-ang do NOT fit the typical Mon-Khmer stereotype of remote upland minority dominated or enfeoffed by Tai overlords.

3.3.2 Status with respect to Performance Standard 7

No adverse impacts on land, traditional livelihoods, culture, or legal rights, were identified. The Palaung are on an equal status economically and socially with Shan and Danu.

4.0 Conclusions

In effect, no adverse impacts on Indigenous Peoples or their indigeneity have been identified. Households sampled in 7 villages have average estimated household incomes raging from 3,200,000

kyats (USD 2,005) to 7,750,000 kyats (USD 5,580), well above the national average which in 2011 was calculated by Harpers Index at $459. (Gross National Income (GNI) which is not completely comparable in 2015 was calculated by the World Bank at $1,270.)

4.1 General Requirements

The Indigenous Peoples identified in this report, as per PS7, refer to distinct social and cultural groups possessing the following characteristics:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; or
- Possess a distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

In the cases of Shan and Palaung distinct written languages are used and taught in addition to the national language. IN the case of Danu, the language, though distinct, is considered by linguists to be a dialect of Burmese and as such, they do not possess a separate written language.

Villagers consulted in the locations visited by the team are willing participants in discussions of potential environmental and social impacts, and the dialog remains open to further consultations as needed. So far, impacts on natural resources and livelihoods are very minimal as villages are not located close to the river do not cultivate areas in the river valley due to the steepness of the slopes. No relocation of villages or village lands is envisioned, and critical cultural heritage is not effected. Archaeological sites are so far absent, but see Annex II for this potential.

The need for FPIC at this time is therefore minimal.

Probably the greatest social impacts will be felt in the villages that will host the construction camp(s) and this will need to be monitored carefully when plans become finalized.

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Annexes

Annex I – Villages Visited

The following locations were visited during a brief 5-day stay in the townships of Nawng Hkio and Lawksawk.

Village No 1 – Nawng Hkio Gyi

Belongs to the Nyan Taw Village Track, a cluster of 4 villages

Half Shan – Half Danu

Village No. 2 – Nawng Lin

Belong to the Me Pok Village Track

Danu

Village No. 3 – Me Poke

Head of the village track

Danu

Village No. 4 – Pin Ping

(Is Kyauk Ku the village track??)

Danu

Village No. 5 – Thar Si

(Also Kyauk Ku Track ?)

Danu

Village No. 6 – Phet Yin Gone

Kyauk Ku Village Track

Lawksawk Township

Danu

26 (24?) villages in this track

- including 12 Danu

- 6 Shan

- 6 Palaung

Village No. 7 – Yae Twin Gyi

Head of Village Track

Danu

No. 8 – Nawng Hkio Township

Meeting with Shan and Danu leaders

No. 9 – Inn Wine Village

Palaung sample village (not in project area)

Annex II – The likelihood of archeological remains in caves along the Myitnge River (Nam Tu River)

Burmese archaeologists look upon their prehistory as being composed of seven periods based upon remains found in various parts of the country, they include:

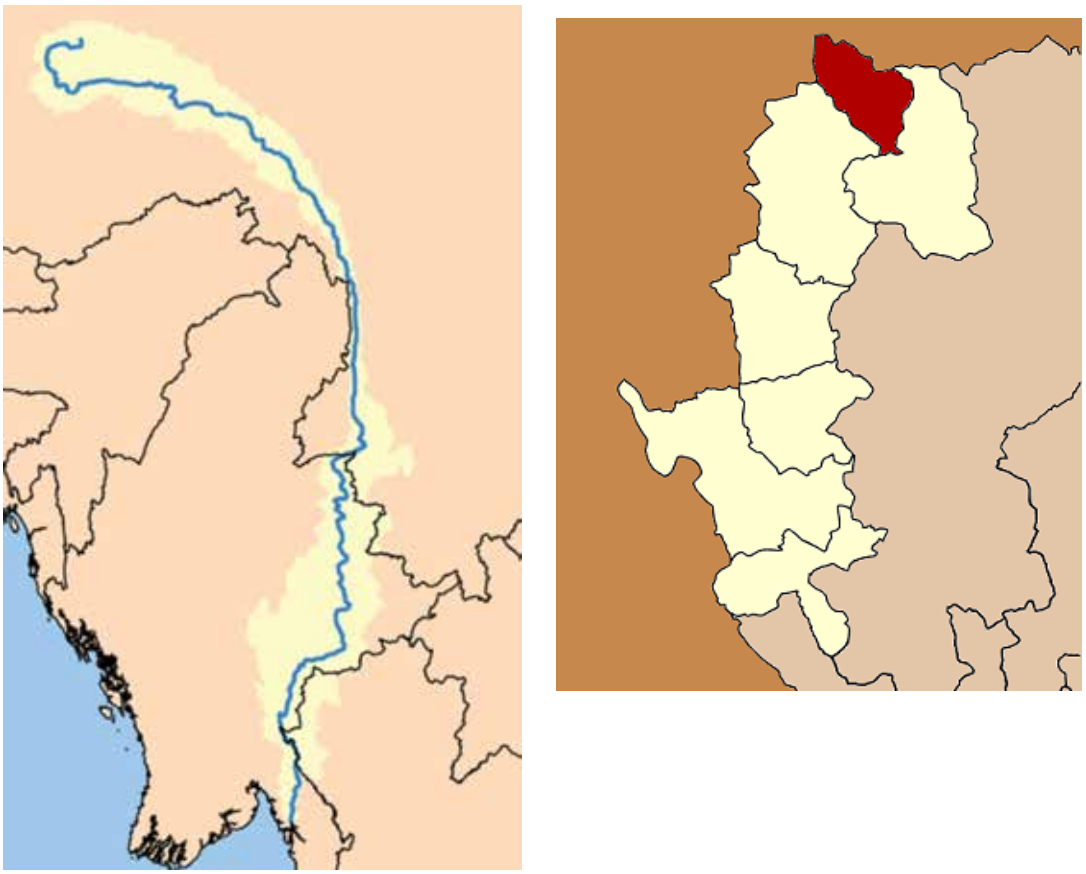
Dates	Description
750,000- 275,000 years BP	Lower Palaeolithic men of early Anyathian culture (*Homo erectus*) lived along the bank of the Ayeyawaddy river.
275,000-25,000 years BP	Lower Palaeolithic men of late Anyathian culture
11,000 BCE	Upper Palaeolithic men (*Homo Sapiens*) live in Badah-lin caves which situated in Ywagan township in southern Shan States.
7,000 - 2,000 BCE	Neolithic men live in central Burma, Kachin State, Shan States, Mon State, Taninthayi Region, and along the bank of the Chindwin and Ayeyarwaddy rivers.
1500 BCE	Earliest evidence of copper and bronze works, rice growing, domesticating chickens and pigs in Irrawaddy valley
500 BCE	Iron-working settlements south of present-day Mandalay
200 BCE	Pyu people enter the Irrawaddy valley from Yunnan

Figure 6: Prehistoric periods of Burma

(source: https://en.wikipedia.org/wiki/Prehistory_of_Myanmar#cite_note-rmc-1-1)

A number of the finds used for this classification are found in the Shan State. Note especially the third and fourth periods.

It is not known whether archaeological exploration has been carried out in the caves located inside the valley of the Nam Tu River. This is considered relevant because of the presence in adjacent areas of Laos and Thailand of extensive Hoabinhnian finds have been discovered in caves. The best known of these is the Spirit Caves located in Mae Hong Son Province, Thailand, excavated by by Chester Gorman (1970) immediately adjacent to the Shan State and falling within the watershed of the Salween. The project site on the Nam Tu is only a few miles from the watershed divide that separates the Salween from the Irrawaddy.



Figur7: Salween watershed and Spirit Cave location (Source: Wikipedia)

The Spirit Cave finds are dated at between 12,000 – 7,000 BP and may contain evidence of early domesticated agriculture although this claim is highly controversial. The distance between Mae Hong Son and the project area is approximately 150-170 miles. DNA from Hoabinhnian sites has recenly been shown to be identical to that of the nigrito Andaman islannders.

Although the link of Spirit Cave to the caves along the Nam Tu is purely speculative, substantial neolithic finds were discovered in the Padah-Lin caves near Taungyi only a short distance from the project area (Aung Thaw 1969). Furthermore, these finds share almost the same time depth as those in the Spirit Cave mentioned above, in this case 13,000 BP (compared to 12,000 BP for Spirit Cave). Both dates were based on radio-carbon methods using bone and charcoal. The assemblage includes over 1,600 stone artefacts as well as many pieces of bone and red ochre. The stone artefacts are clearly Hoabinhnian as well and include unifacial choppers, bifacial chopping tools, perforated stone rings, adzes and scrapers. That is, again, very similar or identical to the assemblage at Spirit Cave. The Padah-Lin caves are now tentatively approved as a UNESCO World Heritage site.

ANNEX 4

VILLAGE PROFILES

Table of Contents

Village Profile of Nawng Lin

Population

Based on the Household Baseline Survey, where 90 (33%) of the total of 273 households of Nawng Lin were included in survey, data shows the following:

- There are 415 Danu people with 201 (48%) female and 214 (52%) males with a lone Bama male
- 15.4% are children below the age of nine
- 18% are between 10-18 years old
- 55% are in the productive years between 19-54 years old. Of which, 89 females are in their reproductive years.
- 12% are 55 years old and above
- Average household size is five
- 72 (8%) of the surveyed population have no education and most of these are females with 10% while the males are 7%
- 293 (70%) of the surveyed population have attained primary education between Grades 1-5
- Where 33.4% are females
- Only 19 (4.6%) have reached middle school which is between Grade 6-9. Where 3.4% are females
- Only 3 (0.7%) have proceeded to high school and 3 (0.7%) have gone further to university studies.
- 25 (6%) have gone through monastic education where 22 are males.
- 310 (75%) of the surveyed population are farmers while 24.3 % are unemployed or dependent since most of them are students and children. There are 5 persons with disabilities in this village

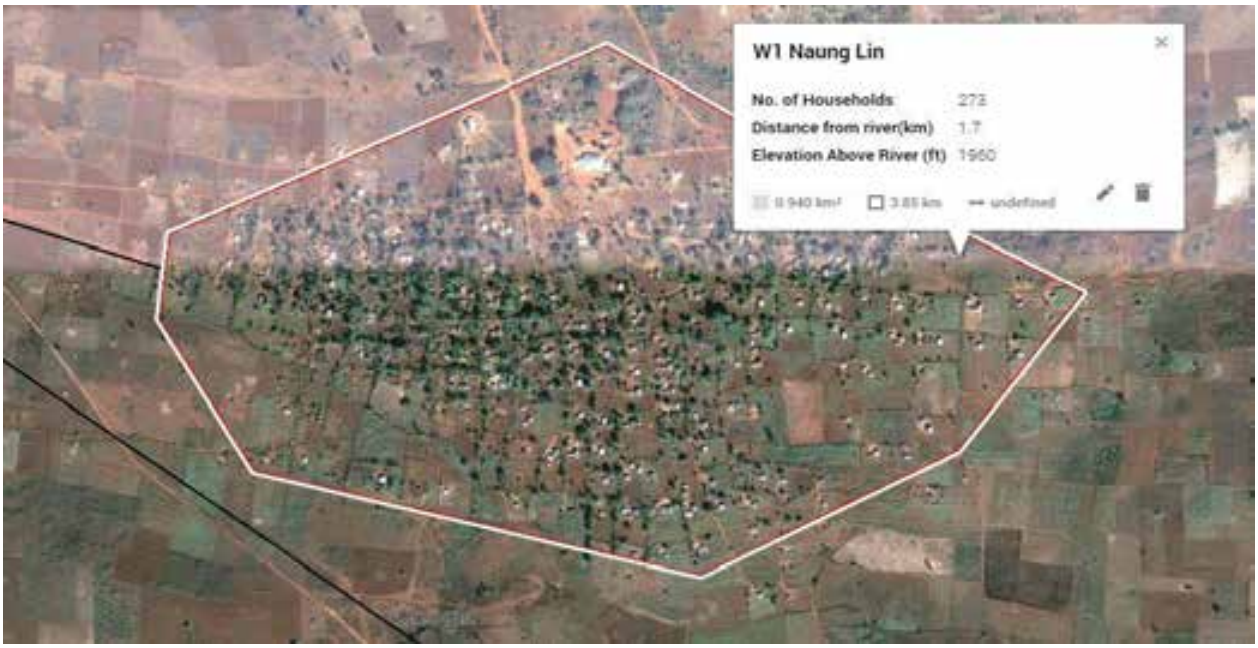


Figure 1: Satellite image of Nawng Lin Village

The population sample of Nawng Lin revealed only one person not belonging to the Danu group – he was Burmese or Bama. The population by age and household size are presented in the tables below.

Table 1: Population of Nawng Lin by age group

Age Group (years)	Female (number of persons)	Male (number of persons)
0-9	31	33
10-18	35	40
19-27	38	39
28-36	20	34
37-45	31	20
46-54	19	26
55-63	15	14
64 and above	12	9

Table 2: Population of Nawng Lin by household size

Age Range	Number of Persons
1-2	4
3-4	33
5-6	43
7-9	9
10+	1
Grand Total	**90**

Gender

Of the 90 household sample, only one household was reported to have a female household head. Other information regarding gender is presented in the tables below.

Table 3: Education levels by gender at Nawng Lin

Education Level	Female	Male	Grand Total
Child or no education	42	30	72
Primary (grade 1-5)	139	154	293
Middle School (grade 6-9)	14	5	19
High School (grade 10-11)	1	2	3
College/University	1	2	3
Monastic Education	3	22	25
Preschool	1	0	1
Grand Total	**201**	**215**	**416**

Table 4: Occupation of respondents by gender at Nawng Lin

Occupation	Female	Male	Grand Total
Child	13	13	26
Casual Labour	1	4	5
Farmer	145	165	310
Housewife	5	0	5
Student	28	22	50
Dependant	9	11	20
Grand Total	**201**	**215**	**416**

Vulnerability

The following information was recorded on vulnerability.

Table 5: Households with Disabled People at Nawng Lin

No. of Households with Disabilities	5
Type of Disability	**Total Number**
Dumb	1
Paralysis by Stroke	0
Deaf	0
Blind	0
Lame	5
Mentally Ill	0

Livelihood and Economic Activities of Households

Based on the result of the household survey, farming income shows that corn is planted by almost all (98.8%) of the sample households and the total estimated annual income is Kyats 109,158,700; the most important crop planted is upland rice wherein 63% of the sample households are planting providing them an estimated annual income of Kyats 19,030,328 and the third crop planted by 51% of the sample households is sugarcane where the estimated annual income is Kyats 243,368,500.

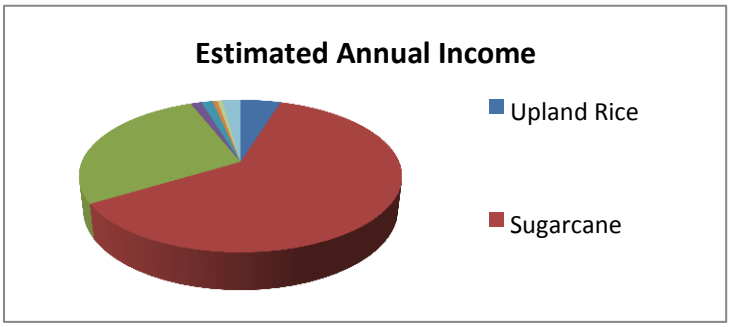


Figure 2: Annual Income for Nawng Lin

In terms of cash income, sugarcane provides the highest income however only half of the household samples plant sugarcane because it takes around 9-12 months to harvest the sugarcane. This means that the farmland cannot be used any longer for the production of other crops necessary for the households' food. Corn and rice are planted by most of the household because these provide the food and sustenance of the household. Rice and corn are planted once a year which takes an average of 4-6 months depending on the variety. The remaining 6 months is used to plant other cash and food crops such as vegetables, beans, peanuts, fruits such as watermelon and pineapple.

No household does mono-cropping. Most of the farming practice combines a number of crops that will provide the food for the household and also cash for their other needs. The average annual income from corn of a household is Kyat 1,226,502.25; average annual income from upland rice is kyats 333,865.40; and for sugarcane is Kyats 5,290,619.57. For the 46 households planting sugarcane their annual cash income is very high.

Another source of household income is timber and Non-Timber Forest Products (NTFPs) as shown in the Figure below, timber or wood is the highest cash income earner for the household. This data shows the economic significance of the forest area along the slope of the Yeywa River where these forest and non-timber forest products are taken from.

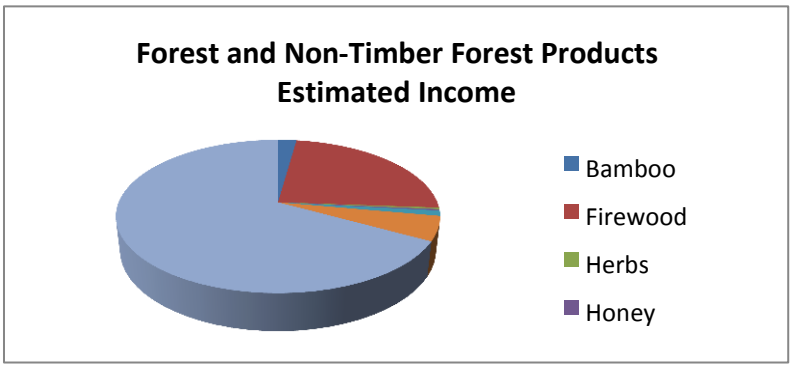


Figure 3: Timber and NTFP Income for Nawng Lin

Other sources of household income are shown in the Figure below. Labor services and livestock raising are the highest income earners other than farming. For livestock raising, where 36 households are engaged with this livelihood, a household earns an estimated annual income of Kyats 748,722 and for labor services, there are 64 households, usually the husband during off-farming season, work elsewhere usually in construction work providing an annual cash income of Kyats 568,906.25 for each of the 64 households engaged in this activity. This number of available manpower should be noted and may be tapped for the construction activities of the proposed dam project.

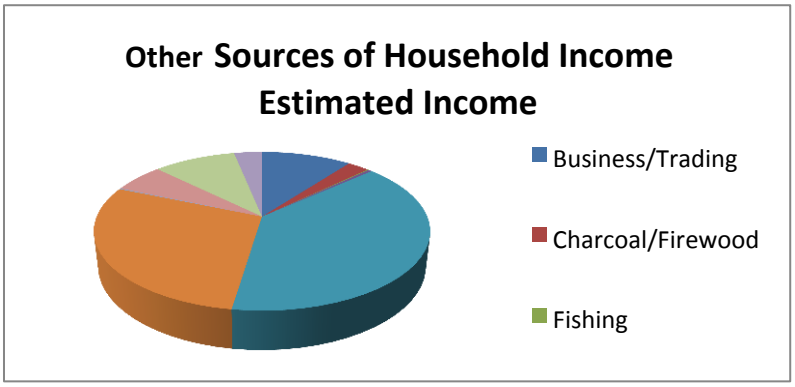


Figure 4: Other Sources of Income for Nawng Lin

Village Profile of Yae Maung Tan

Population

- Based on the Household Baseline Survey, where 26 (33%) of the total 80 households of Yae Maung Tan included in survey reveal the following:
- There are 109 Danu people in this village. Of which, 59 (55%) are females and 50 (45%) are males.
- 13.8% are children below 9 years old
- 17.4% are between 10-18 years old
- 56 (51.4%) are in the productive years between the ages 19-54 years old. Of this, 27 females are in their reproductive years.
- 18.3 % are 55 years old and above
- The average household size in this village is 4
- Only 11 (10%) of the surveyed population have no education or attended school. This may account for the children below the school age.
- 88 (80.7%) of the surveyed population have attended primary education between Grades 1-5
- 7 (6.4%) of the surveyed population have reached middle school between Grades 6-9
- Only 1 (0.9%) proceeded to study high school. This is the highest educational attainment reached among the surveyed population in this village
- Two(1.8%) males attended monastic education
- 79 (72.5%) are farmers and the rest of the surveyed population are children, students, and dependents.
- There are no disabled persons in this village

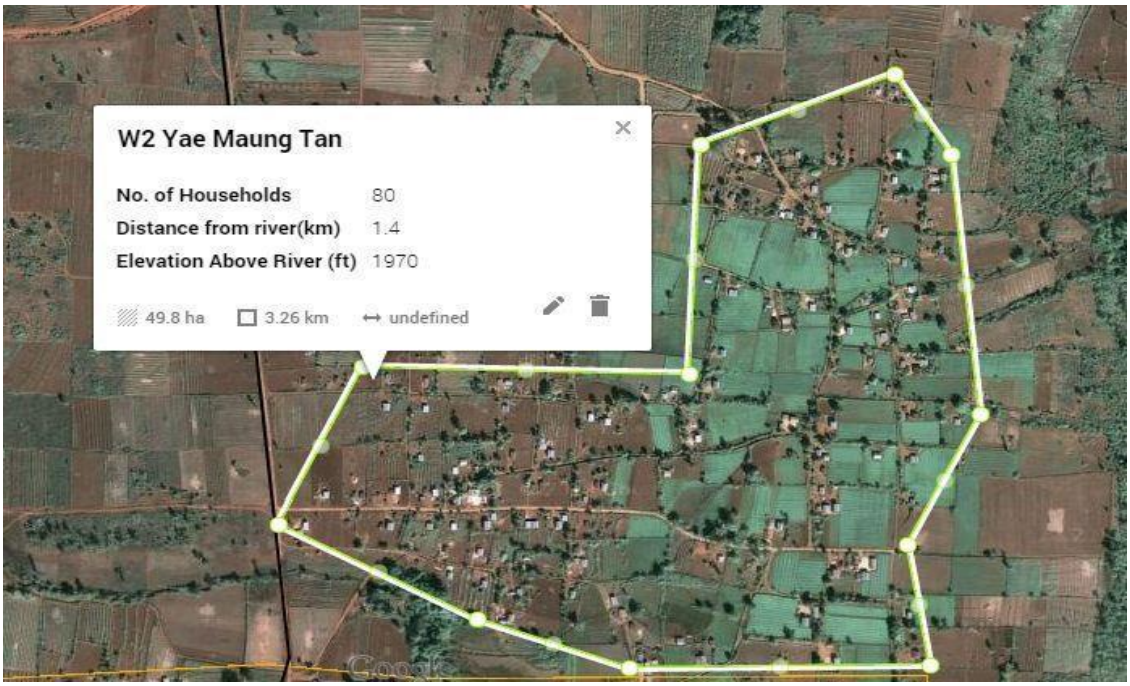


Figure 1: Image of Yae Maung Tan Village

The population sample of Yae Maung Tan revealed all sampled households belonging to the Danu group. The population by age and household size are presented in the tables below.

Table 1: Population of Yae Maung Tan by Age Group

Age Group (years)	Female (number of persons)	Male (number of persons)
0-9	5	9
10-18	12	7
19-27	11	7
28-36	5	7
37-45	11	10
46-54	4	1
55-63	7	8
64 and above	4	1

Table 2: Population of Yae Maung Tan by Household Size

Age Range	Number of Persons
1-2	1
3-4	14
5-6	11
7-9	0
10+	0
Grand Total	**26**

Gender

Of the 26 household sample only one household was reported to have a female household head. Other information regarding gender is presented in the tables below.

Table 3: Education Levels by Gender of Yae Maung Tan

Education Level	Female	Male	Grand Total
Child or no education	6	5	11
Primary (grade 1-5)	49	39	88
Middle School (grade 6-9)	4	3	7
High School (grade 10-11)	0	1	1
Monastic Education	0	2	2
Grand Total	**59**	**50**	**109**

Table 4: Occupation of Respondent by Gender of Yae Maung Tan

Occupation	Female	Male	Grand Total
Child	1	2	3
Casual Labour	0	1	1
Farmer	45	34	79
Housewife	3	0	3
Student	7	9	16
Dependent	3	4	7
Grand Total	**59**	**50**	**109**

Vulnerability

No vulnerable or disabled persons were reported for this village survey.

Livelihood and Economic Activities of Households

There are more than 10 varieties of cash crops planted by the villagers which contributes to the household source for food and cash, these are rice, corn, vegetables, beans, wheat, tomato, root crops, peanuts and fruits. Based on the result of the household survey, where 26 sample households were interviewed, corn (30%), upland rice (17.5%) and vegetables (15%) are the cash crops planted most by the households in the village. But in terms of the village total cash income per cash crop, the highest is corn (60.82%); sugarcane is second (8.43%) with only three households and upland rice is third (8.07%) with 14 households planting this crop. Corn provides an estimated annual income of Kyat 969,916.67 to a household.

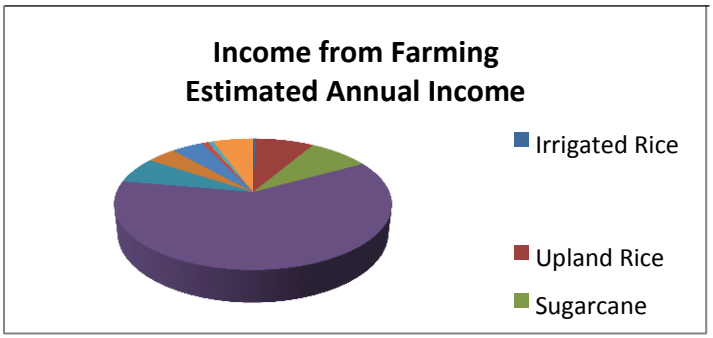


Figure 2: Annual Farming Income for Yae Maung Tan

The pie below shows the significant use of the forest to households as source for cash income, mostly from wood/timber and bamboo and firewood and some non-timber forest products such as wild vegetables, fruits and animal. The total income from Forest and NFTPs is Kyats 3,177,500. The loss of access to this natural resource because of inundation may impact the villagers in relation to their source of household firewood for cooking.

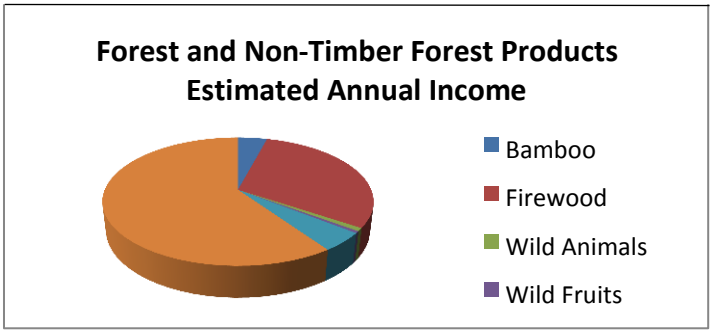


Figure 3: Annual Income from Timber and NTFPs for Yae Maung Tan

Other sources of household income are shown by the diagram below. Fifteen households (58%) are engaged in labour services.

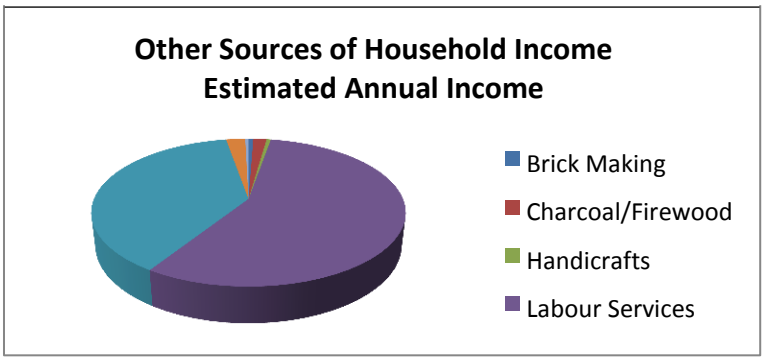


Figure 4.15: Other Sources of Income for Yae Maung Tan

Village Profile of Me Poke

Population

Based on the Household Baseline Survey, where 88 (33%) of the total 267 household of Me Poke were included in survey shows the following:

- 363 (99.7%) are Danu people with one Bama male. Of which, 186 (51%) are female and 177 (49%) are male.
- 57 (15.7%) are children below 9 years old.
- 60 (16.5%) belong to the ages 10-18 years old,
- 190 (52.2%) are in the productive years between the ages 19-54 years old. Of this group, 86 females are in their reproductive years.
- 57 (15.7%) are 55 years old and above.
- The average household size of this village is 4.
- 59 (16.2%) have not attended school. This number also includes children who have not reached school age yet.
- 240 (66%) of the surveyed population have attended primary education between Grades 1-5.
- 48 (13%) of the surveyed population have reached middle school between Grades 6-9.
- 7 (2%) have proceeded to attend high school
- Only 2 (0.5%) males have proceeded to attend university level education.
- 7 (2%) attended monastic education. Two are females and 5 are males.
- 242 (66%) are farmers; 118 are female-farmers. The rest of the surveyed population are children, students, and dependents.
- There are 5 persons with disabilities in this village.

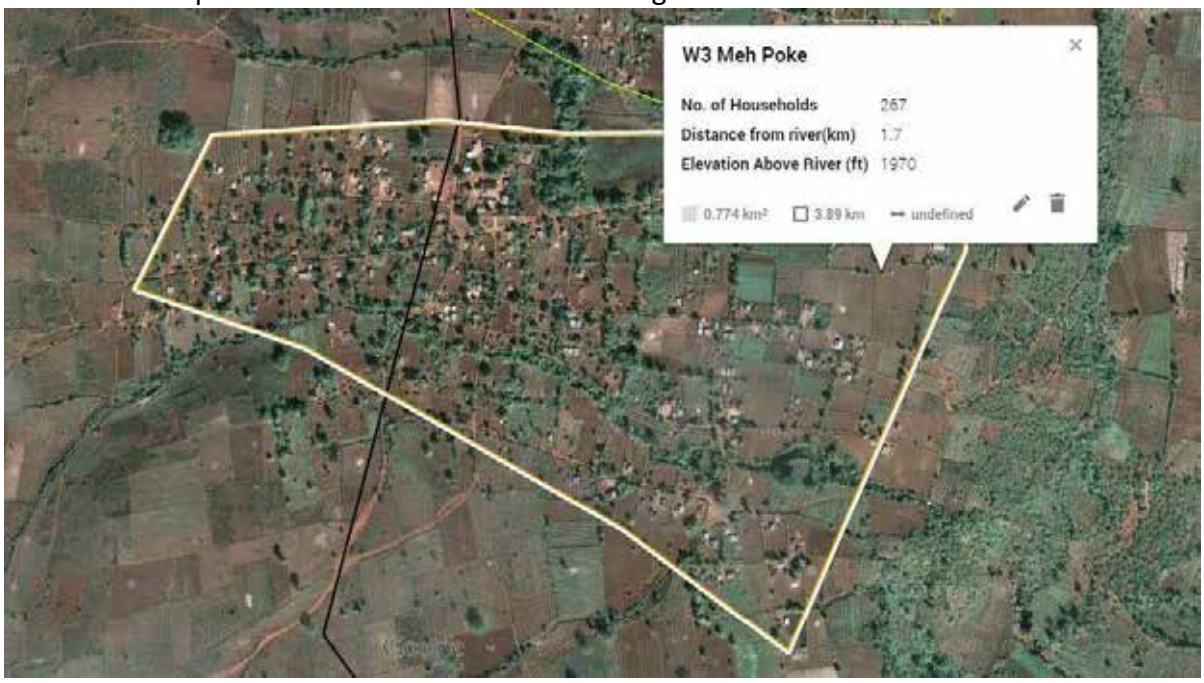


Figure 1: Image of Me Poke Village

The population sample of Me Poke revealed only one person not belonging to the Danu group – he was Burmese or Bama. The population by age and household size are presented in the tables below.

Table 1: Population of Me Poke by Age Group

Age Group (years)	Female (number of persons)	Male (number of persons)
0-9	24	33
10-18	37	23
19-27	33	28
28-36	26	27
37-45	27	27
46-54	10	12
55-63	11	16
64 and above	18	12

Table 2: Population of Me Poke by Household Size

Age Range	Number of Persons
1-2	13
3-4	42
5-6	26
7-9	7
10+	0
Grand Total	**88**

Gender

Of the 88 household sample eight households were reported to have a female household head. Other information regarding gender is presented in the tables below.

Table 3: Education Levels by Gender of Me Poke

Education Level	Female	Male	Grand Total
Child or no education	37	22	59
Primary (grade 1-5)	124	116	240
Middle School (grade 6-9)	19	29	48
High School (grade 10-11)	4	3	7
College/University	0	2	2
Monastic Education	2	5	7
Preschool	0	1	1
Grand Total	**186**	**178**	**364**

Table 4: Occupation of Respondent by Gender of Me Poke

Occupation	Female	Male	Grand Total
Child	9	13	22
Casual Labour	4	3	7
Farmer	118	124	242
Housewife	6	1	7
Student	31	29	60
Dependant	18	8	26
Grand Total	**186**	**178**	**364**

Vulnerability

The following information was recorded on vulnerability.

Table 5: Households with Disabled People at Me Poke

No. of Households with Disabilities	**5**
Type of Disability	**Total Number**
Dumb	0
Paralysis by Stroke	0
Deaf	1
Blind	0
Lame	2
Mentally Ill	2

Livelihood and Economic Activities of Households

Based on the results of the household survey, where 88 household samples were taken in Meh Poke, farming income reveals that corn is the most planted cash crop by 82 households (93%). Income from corn is 53% of the total income generated from all crops produced. Rice is the second most planted crop and vegetable is the third. However, for cash income, sugarcane is the second highest cash income earner.

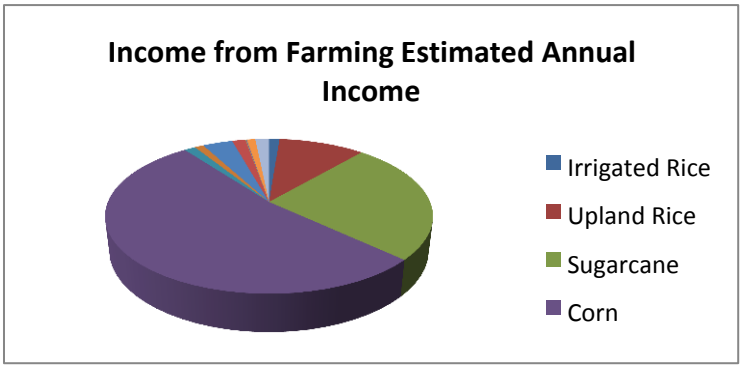


Figure 2: Annual Farming Income for Mae Poke

Income from forest and non-timber forest products is shown in the pie below that timber/wood generates Kyats 2924000 (45%) income and firewood generates Kyats 2,757,000 (42.6%) income. Sixty-seven percent (67%) of the households generate Kyats 48,368.42 cash income and household fuel from firewood. Loss of access to the forest will impact not only the 57 households but also those households buying their firewood from the households gathering firewood.

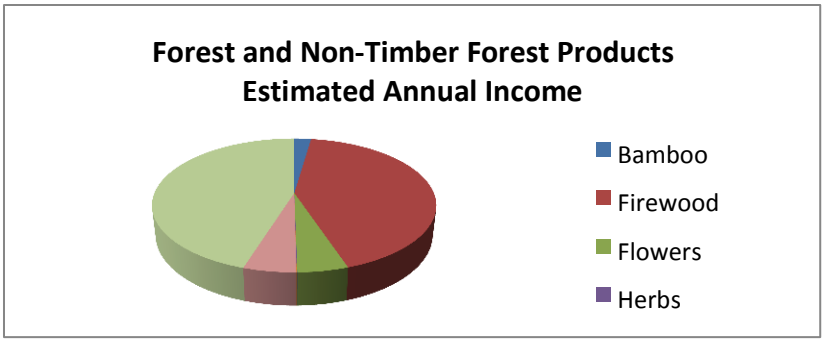


Figure 3: Annual Income from Timber and NTFPs for Me Poke

Other sources of household income that are non-agricultural based are shown in the pie chart below. Labour services are the highest income earner.

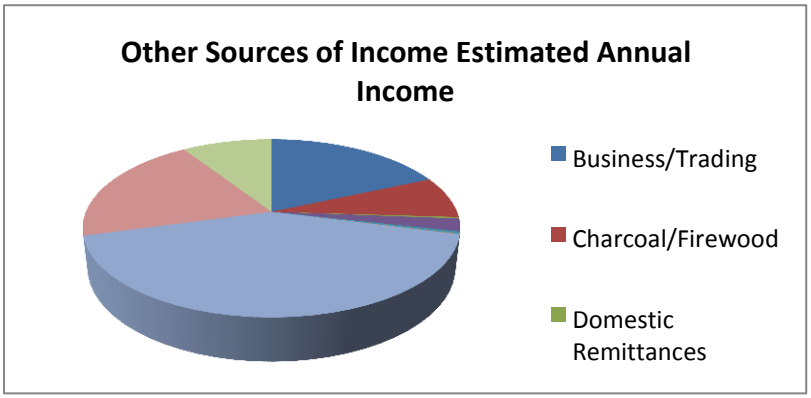


Figure 4: Other Sources of Income for Me Poke

Village Profile of Nawnghkio Kone

Population

Based on the Household Baseline Survey, where 19 (33%) of the total 55 households of Nawnghkio Kone were included in survey shows the following:

- 86 (100%) are Danu people in this village. Of which 40 (47%) are female AND 46 (53%) are male
- 21 (24%) are children below 9 years old
- 11 (12.7%) belong to the ages 10-18 years old
- 42 (49%) are in the productive years between the ages 19-54 years old. Of this group, 19 females are in their reproductive years.
- 12(14%) are 55 years old and above
- Average household size is 4
- 10 (11.6%) have not attended school. This could be attributed to children who have not reached school age
- 64 (74%) of the surveyed population have attended primary education between Grades 1-5. Of this number, 31 are female and 33 are male.
- 5 (5.8%) of the surveyed population have reached middle school between Grades 6-9
- 4 (4.7%) have reached high school. Of this number, 2 are females and 2 are males.
- 3 (3.5%) have attended monastic education, where 2 are females.
- 52 (60%) are farmers and the rest are children students and dependents. There are 24 female farmers and 28 male-farmers.
- There are 3 disabled persons in this village

Figure 1: Image of Nawnghkio Kone Village

The population sample of Nawnghkio Kone revealed all sampled households belonging to the Danu group. The population by age and household size are presented in the tables below.

Table 1: Population of Nawnghkio Kone by Age Group

Age Group (years)	Female (number of persons)	Male (number of persons)
0-9	8	13
10-18	5	6
19-27	9	4
28-36	8	9
37-45	2	4
46-54	3	3
55-63	3	4
64 and above	2	3

Table 2: Population of Nawnghkio Kone by Household Size

Age Range	Number of Persons
1-2	0
3-4	11
5-6	3
7-9	3
10+	1
Grand Total	**18**

Gender

Of the 18 household sample one household was reported to have a female household head. Other information regarding gender is presented in the tables below.

Table 3: Education Levels by Gender of Nawnghkio Kone

Education Level	Female	Male	Grand Total
Child or no education	2	8	10
Primary (grade 1-5)	31	33	64
Middle School (grade 6-9)	3	2	5
High School (grade 10-11)	2	2	4
Monastic Education	2	1	3

Grand Total	**40**	**46**	**86**

Table 4: Occupation of Respondent by Gender of Nawnghkio Kone

Occupation	Female	Male	Grand Total
Child	1	1	2
Farmer	24	28	52
Housewife	1	0	1
Student	9	9	18
Dependant	5	8	13
Grand Total	**40**	**46**	**86**

Vulnerability

The following information was recorded on vulnerability.

Table 5: Households with Disabled People at Nawnghkio Kone

No. of Households with Disabilities	**3**
Type of Disability	**Total Number**
Dumb	0
Paralysis by Stroke	1
Deaf	1
Blind	0
Lame	0
Mentally Ill	1

Livelihood and Economic Activities of Households

Just like the other 3 villages, Nawnghkio Kone households have the same ranking for the top two crops: corn, rice and the third highest income earner are peanuts. Based on the 19 (33%) household survey samples, no household among the surveyed are planting sugarcane. Of the 19 households, 18 households are planting corn and 16 households are planting rice. Corn provides an annual average income per household of Kyats 814,055.56 and rice provides an annual average income of Kyats 275,750 per household. Both rice and corn are staple food of the households.

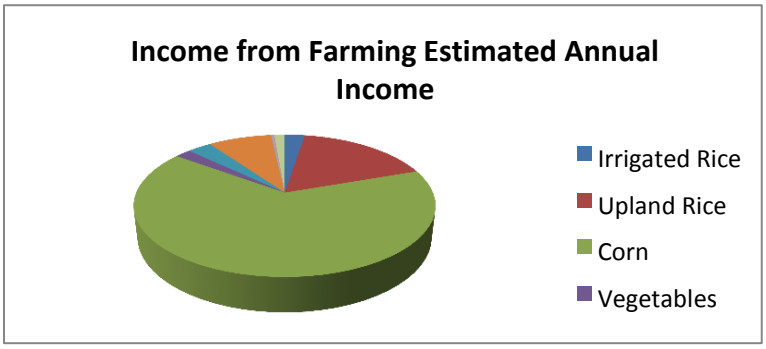


Figure 2: Annual Farming Income for Nawnghkio Kone

From the forests, timber, bamboo and other NTFPs are harvested. Around 7 households are exploiting the forest for its bamboo, firewood, flowers, fruits and vegetables. Three households mentioned that they get timber but for household use not for selling, hence no cash income is reflected in their data. Other households gather fruits also for consumption. Cash income from the forest comes from bamboo and firewood.

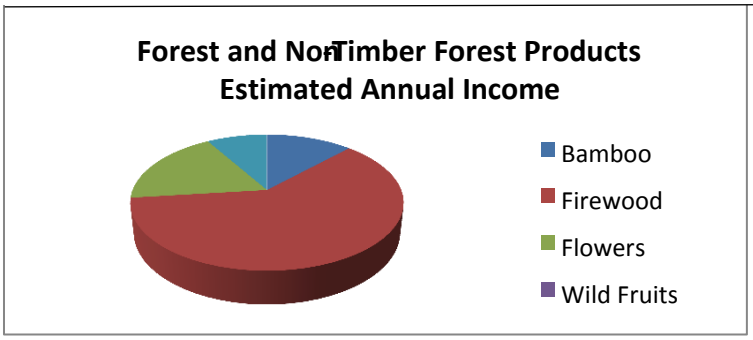


Figure 3: Annual Income from Timber and NTFPs for Nawnghkio Kone

Other sources of income are shown on the pie below. Livestock is the most interesting income earner for this village since 42% of the surveyed households are engaged in this activity. The total income earned from livestock raising is estimated at Kyats 3,195,000. Most of these are poultry/chicken. There are very few cattle among the survey household.

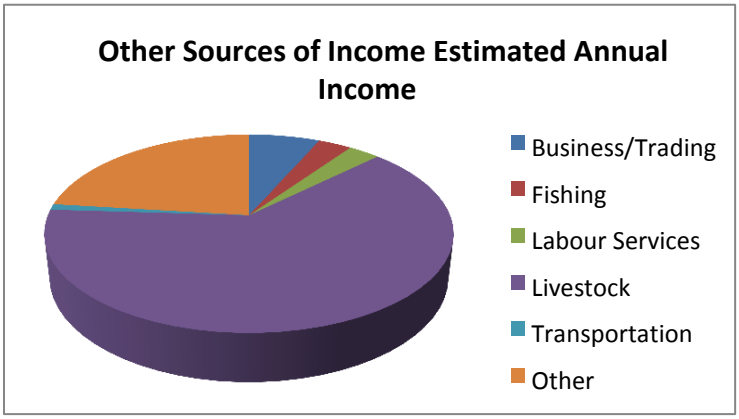


Figure 4: Other Sources of Income for Nawnghkio Kone

Village Profile of Ma Gyi Yae

Population

Based on the Household Baseline Survey, where 11 (41%) of the total 27 households of Ma Gyi Yae were included in survey shows the following:

- 47 (82.5%) are Danu; 4 are Shan and 1 female Palaung are the ethnic composition in this village.
- 12 (23%) are children below 9 years old .
- 11 (21%) belong to the ages 10-18 years old.
- 24 (46%) are in the productive years between the ages 19-54 years old. Of this group, 10 females are in their reproductive years.
- 5 (9.6%) are 55 years old and above.
- Average household size in this village is 5.
- Seven people have not attended school.
- 42 (80.7%) have attended primary education Grade 1-5. Of this number, 19 are female and 23 are male.
- Only 2 females have proceeded to Middle School, which is the highest educational attainment in this village and 1 female attended monastic education.
- The main occupation in this village is farming. There are 28 farmers with 17 are female-farmers. The rest of the village population are children, students and dependents.
- There are no disabled persons in this village.

Figure 1: Image of Ma Gyi Yae Village

The population sample of Ma Gyi Yae revealed five persons not belonging to the Danu group – two Shan and one Palaung. The population by age and household size are presented in the tables below.

Table 1: Population of Mae Gyi Yae by Age Group

Age Group (years)	Female (number of persons)	Male (number of persons)
0-9	8	4
10-18	3	8
19-27	4	3
28-36	4	5
37-45	2	2
46-54	2	2
55-63	2	0

64 and above	1	2

Table 2: Population of Ma Gyi Yae by Household Size

Age Range	Number of Persons
1-2	0
3-4	5
5-6	5
7-9	1
10+	0
Grand Total	**11**

Gender

Of the 11 household sample no household was reported to have a female household head. Other information regarding gender is presented in the tables below.

Table 3: Education Levels by Gender of Ma Gyi Yae

Education Level	Female	Male	Grand Total
Child or no education	4	3	7
Primary (grade 1-5)	19	23	42
Middle School (grade 6-9)	2	0	2
Monastic Education	1	0	1
Grand Total	**26**	**26**	**52**

Table 4: Occupation of Respondent by Gender of Ma Gyi Yae

Occupation	Female	Male	Grand Total
Child	1	2	3
Farmer	17	21	38
Student	8	3	11
Grand Total	**26**	**26**	**52**

Vulnerability

No vulnerable or disabled persons were reported for this village survey.

Livelihood and Economic Activities of Households

Ma Gyi Yae is, in terms of population and number of household, the smallest village of the 6 villages. Only 11 (41%) household samples were included in the household survey.

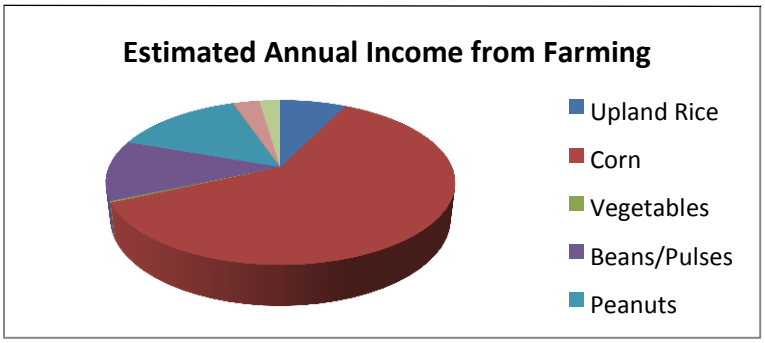


Figure 2: Annual Farming Income for Ma Gyi Yae

Consistent with the other villages, corn and rice are the crops most favoured to be planted being a staple food of the households. But in terms of income generation, corn (61%), pulses/beans (14.3% and peanuts (11.8%) are the top income earners. Also, more households (81.8%) are engaged in corn farming.

Exploitation of timber and non-timber forest product seems low in this village. Activities are focused mainly on firewood gathering wherein 54.5% of the households engage in this activity. Timber seems to be a high income earner but only 2 households (18%) are doing this activity.

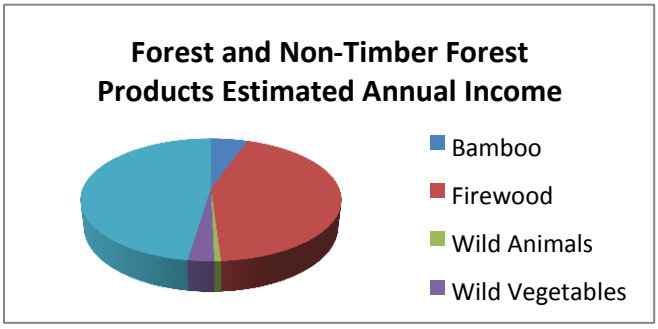


Figure 3: Annual Income from Timber and NTFPs for Ma Gyi Yae

Other sources of income outside farming are focused mainly on 3 activities: livestock raising, charcoal production, and provision of labour services.

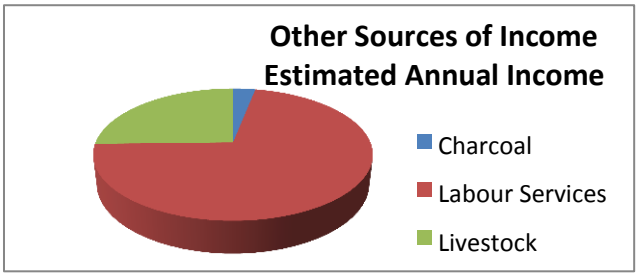


Figure 4: Other Sources of Income for Ma Gyi Yae

Village Profile of Yae Twi Gyi

Population

Based on the Household Baseline Survey, where 66 (33%) of the total 200 households of Yae Twi Gyi were included in survey shows the following:

- 334 (99%) are Danu, one female Shan and 1 male Bama are the ethnic composition in this village. Of this number, 174 are female Danu.
- 84 (25%) are children below 9 years old.
- 60 (17.9%) belong to ages 10-18 years old
- 160 (47.6%) are in the productive years between the ages 19-54 years old. Of this group, 85 females are in their reproductive years.
- 35 (10.4%) are 55 years old and above.
- Average household size in this village is 5.5
- 74 (22%) have not attended school and some are children who have not reached school age
- 238 (71%) have attended primary school. Of this number, both females and males share 50% each.
- Only 8 have reached middle school and 7 of these are females.
- Two males have reached high school.
- 1 female attended college education
- 3 attended vocational/technical school 9 attended monastic education.
- There are 216 (64%)farmers; 2 fishermen; 5 are working as casual labourer and 113(33.6%) are students, children and dependents
- There are 6 disabled persons in this village

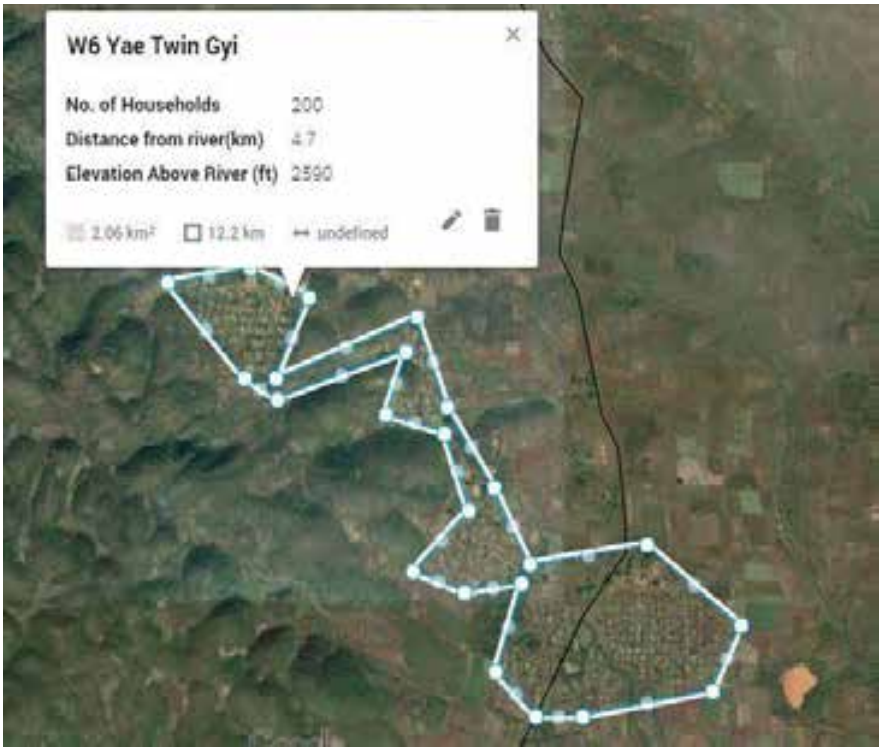


Figure 1: Image of Yae Twin Gyi Village

The population sample of Mae Poke revealed two persons not belonging to the Danu group – one Shan and one Burmese (Bama). The population by age and household size are presented in the tables below.

Table 1: Population of Yae Twin Gyi by Age Group

Age Group (years)	Female (number of persons)	Male (number of persons)
0-9	46	38
10-18	27	33
19-27	26	29
28-36	30	20
37-45	17	15
46-54	12	11
55-63	10	7
64 and above	8	10

Table 2: Population of Yae Twin Gyi by Household Size

Age Range	Number of Persons
1-2	2
3-4	20
5-6	36
7-9	6
10+	2
Grand Total	**66**

Gender

Of the 63 household sample, three households were reported to have a female household head. Other information regarding gender is presented in the tables below.

Table 3: Education Levels by Gender of Yae Twin Gyi

Education Level	Female	Male	Grand Total
Child or no education	44	30	74
Primary (grade 1-5)	119	119	238
Middle School (grade 6-9)	7	1	8
High School (grade 10-11)	0	2	2
Vocational/Technical School	1	2	3
College/University	1	0	1
Monastic Education	3	6	9
Preschool	0	1	1
Grand Total	**175**	**161**	**336**

Table 4: Occupation of Respondent by Gender of Yae Twin Gyi

Occupation	Female	Male	Grand Total
Child	22	17	39
Casual Labor	4	1	5
Fisherman	0	2	2
Housewife	6	0	6
Student	28	26	54
Dependant	9	5	14
Grand Total	**175**	**161**	**336**

Vulnerability

Table 5: Households with Disabled People at Yae Twin Gyi

No. of Households with Disabilities	5
Type of Disability	**Total Number**
Dumb	0
Paralysis by Stroke	1
Deaf	2
Blind	1
Lame	1

Livelihood and Economic Activities of Households

Based on the results of the household survey in Yae Twi Gyi, of which 66 sample households were interviewed, the top three income earners from farming are corn (53%), rice (26.3%) and sugarcane (7.7%). But in terms of number of households planting cash crops, corn (100%), rice (87.8%) and fruits (70%) have the most number of households planting these crops.

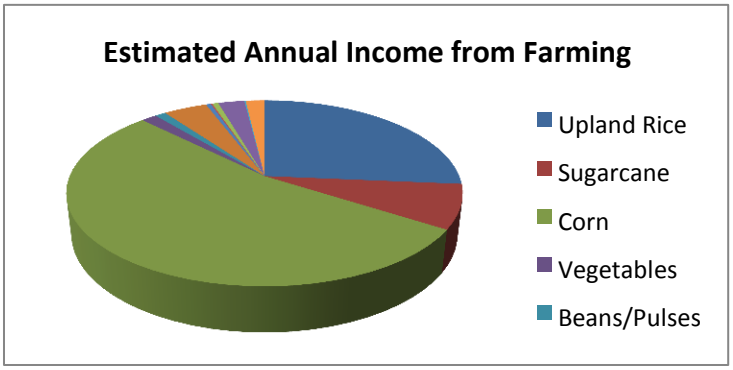


Figure 2: Annual Farming Income for Yae Twi Gyi

Income from forests comes from bamboo, firewood, timber/wood, wild vegetables, fruits, honey and other things as shown in the pie below. Income from wood/timber of 18 households is estimated at Kyats 3,781,000; from firewood of 40 households is estimated at Kyats 2,185,000 and from bamboo of 19 households is estimated at Kyats 607,000. Inundation of the side slopes of the river where most of the forest area are located will impact the villagers for their source of firewood, bamboo and wood whether for household consumption and/or for cash income.

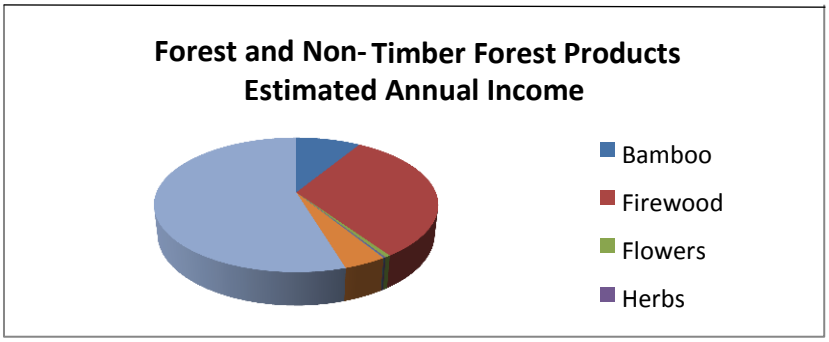


Figure 3: Annual Income from Timber and NTFPs for Yae Twi Gyi

Other sources of income which are non-farming activities are labour services, charcoal making and livestock raising. Charcoal making may be affected most because the source of wood for charcoal is from the forests. However, with 72.7% of the village households engaged in providing labour services, the households will gain cash income during construction of the dam and facilities and the access road. This benefit from the project will be experienced by all of the six villages.

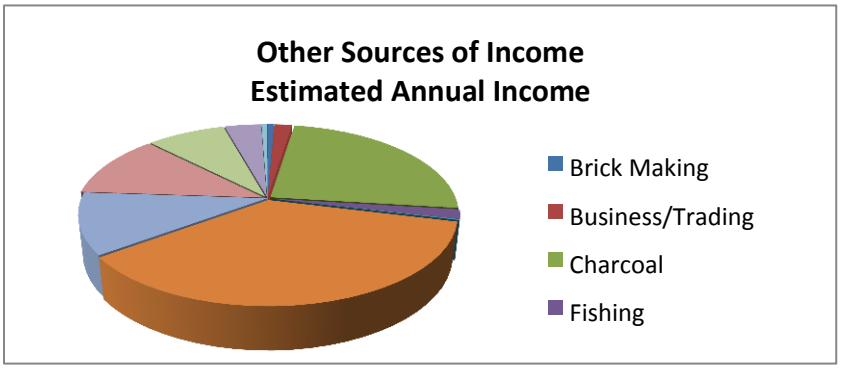


Figure 4: Other Sources of Income for Yae Twi Gyi

Village profile of Hpet Yin Kone:

Village Overview

Hpet Yin Kone is a village of approximately 180 households located on the left bank of the Mytinge River in the 'Lower Left' quadrant for Middle Yeywa EIA analysis. The SIA survey for Hpet Yin Kone was conducted in 2017. The village has medium road access via an unpaved but relatively low incline branch road that meets route 41 in the village tract village Kyauk Ku (also the market centre). Travel time from Hpet Yin Kone to Kyauk Ku by motorbike is 30-45 minutes; travel time to Nawnghkio town is approximately 3 hours.

The village was founded in 1885 as part of an expansion from a nearby community (possibly Tawng Kham, unclear). Hpet Yin Kone is almost entirely Danu and has been like that for since its founding. There were four founding households. There is a Palaung village nearby (60 minutes by motorbike) and the two communities get along well, attending each other's religious and cultural ceremonies. On the day of the visit for qualitative research, there was a Danu ceremony and several Palaung people in attendance. Over the last 10-15 years, road access has improved allowing the community to more easily reach health and education services. Previously, their village was located in a 'black' area (i.e. controlled by non-state actors) but now conflict problems do not exist. Over 10-15 years has doubled in size from 90 households.

Livelihoods in the village revolve around farming with paddy and peanut as the most traditional crops, the former for consumption and the latter for both consumption and market. In the last 10 years, farmers have also begun to grow sesame, soybean, and corn for market. Farmland in the village is not registered with government (i.e. no formal tenure) but all households have traditional control over at least a small amount of land. Approximately 25 households are large farmers with 15+ acres, 50-80 are small farmers with 3-5 acres, and the rest have between 8 and 10 acres. There is no irrigated farmland. Farming practices include the use of fertilizer and pesticides, though this has only become common in the last few years. Mechanization is limited to hand tractors, of which there are approximately 100 in the village. No livestock is raised for market, but most households have chickens and about half also raise pigs. Livestock face health problems, the villagers reported that every few years a disease would wipe out livestock.

Market access is primarily to Nawnghkio. Farmers group together to finance a large truck to ship their harvest to a broker.

Forest and river use is limited. Forest is an income supplement for a few households, generally via honey and hunting, the product of which is sold in the village. The river is rarely used and then only for a small amount of supplementary fishing.

There is a school in the village but only at a post-primary level, for further education children must travel to Kyauk Ku and beyond. Healthcare is accessed in Kyauk Ku.

Demographics

Hpet Yin Kone is a Danu village with 259 of the 261 members of interviewed households being Danu.

Table 1: Sample population of Hpet Yin Kone by Ethnicity

Ethnic Group	Female	Male	(blank)	Total
Bamar		1		1
Danu	131	127	1*	259
Shan	1			1
Total	**132**	**128**	**1**	**261**

*One Danu child's gender was not recorded,

Age figures for Hpet Yin Kone indicate that well over half of the population is under 27 (60%) and just 11 % above 55. There was little difference by gender across age groups.

Table 2: Sample population of Hpet Yin Kone by Age Group

Age Group	Female	% of Female	Male	% of Male	(blank)	Total	% of Total
0-9	20	15%	28	22%	1	49	19%
10-18	28	21%	23	18%		51	20%
19-27	27	20%	27	21%		54	21%
28-36	21	16%	16	13%		37	14%
37-45	9	7%	7	6%		16	6%
46-54	15	11%	8	6%		23	9%
55-63	11	8%	13	10%		24	9%
64 >	1	1%	5	4%		6	2%
Total*	**132**		**127**		**1**	**260**	

*One male individual's age was not recorded

Table 3: Sample Households of Hpet Yin Kone by Household Size

Number of Household Members	Number of Households
1-2	3
3-4	25
5-6	23
7-9	7
10+	1
Total	**59**

Education

Well over half of the members of respondents' households have a primary education. There is no middle school in the village and the number of students who are able to go to middle school in Kyauk Ku or beyond is determined by their family's ability to pay for room and board.

Table 4: Education levels of sample population of Hpet Yin Kone by Gender

Education Level	Female	Male	Blank	Total
Child/No education/Other	17	15	1	33
Kindergarten	1	2		3
Monastic Education	6	18		24
Primary School	92	76		168
Middle School	13	9		22
High School	2	7		9
Graduate/University	1	1		2
Total	**132**	**128**		**261**

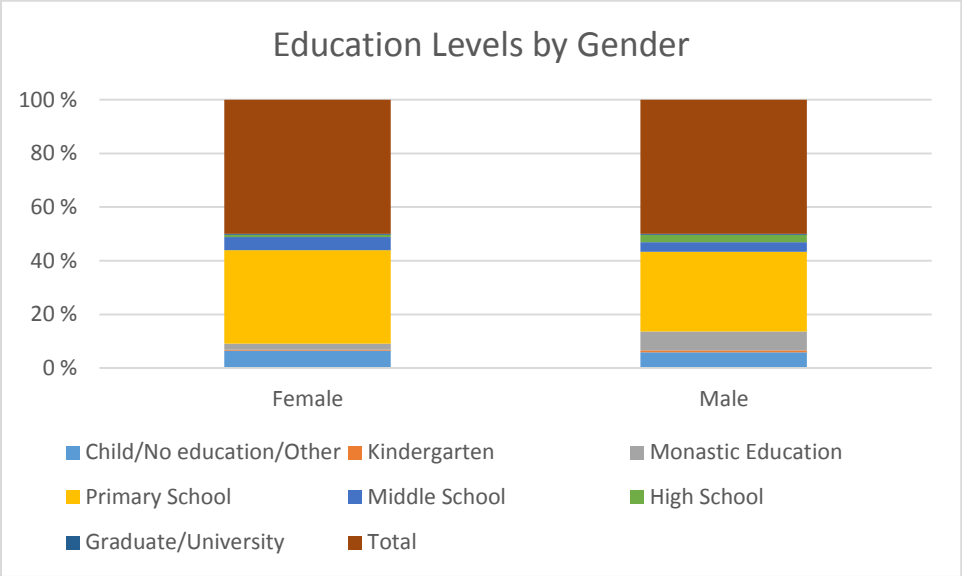


Figure 1: Education levels by gender of Hpet Yin Kone

Table 5: Occupation of Respondents by Gender of Hpet Yin Kone sample population

Occupation	Female	Male	Blank	Total
Child	2	8	1	11
Dependent	4	2		6
Farmer	96	87		183
Mason		1		1
Monk		1		1
Other	1	1		2
Student	27	27		54
Government staff/ Formal Employment	2	1		3
Total	**132**	**128**	**1**	**261**

Vulnerability

Of the 54 households interviewed as part of the survey, three were reported as having a female household head.

Table 6: Households with Disabled People in Hpet Yin Kone Sample

Type of disability	Number of afflicted individuals
Mute	1

Livelihoods

As with most of the impact zone's villages, the majority of income comes from the sale of agricultural crops. Hpet Yin Kone's position in the lower left quadrant means it relies primarily on corn as the major crop, but with other crops playing important roles, including rice, as well as sesame and groundnut.

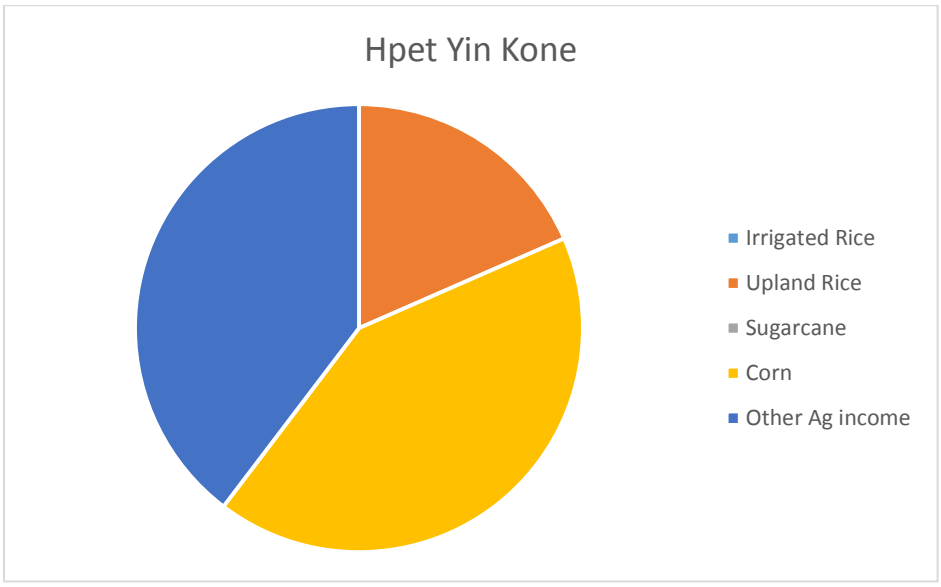


Figure 2: Estimated annual income from major crops

Income from forest sources makes up a very small proportion of the average income in Hpet Yin Kone.

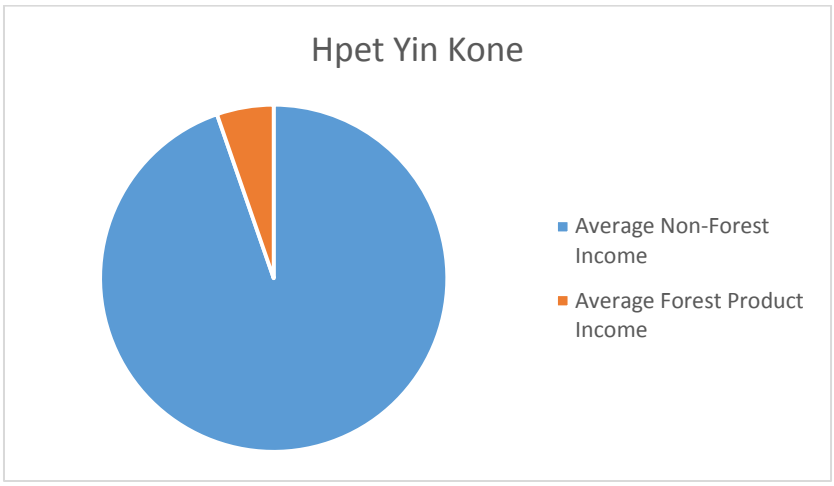


Figure 3: Forest income vs. Non-forest income

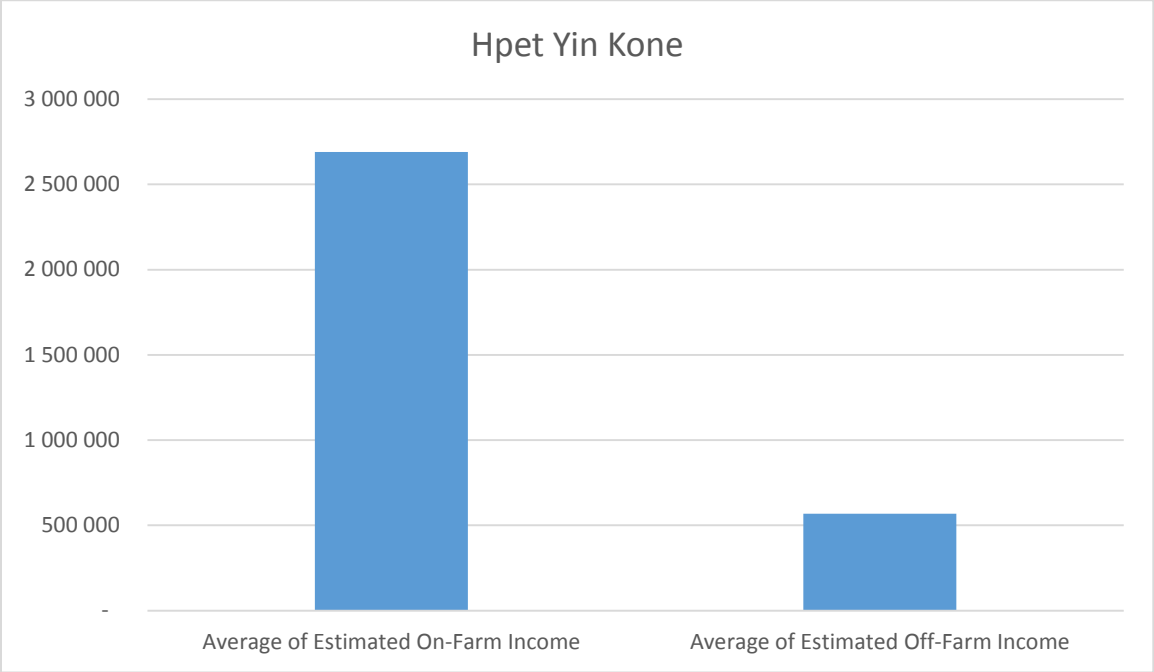


Figure 4: Agriculture income vs. Non-Agricultural income

Village profile of Kone Nyaung

Village Overview

Kone Nyaung is a village of approximately 250 households located on the Left Bank of the Myitnge River in the 'Upper Left' quadrant for EIA analysis. The SIA survey was conducted in 2017. Historically, the village had extremely poor road access being located even further from the main than the other impact zone villages of Thar Si and Pin Ping. These traditional routes meant a travel time to Kyauk Ku of some 3 hours in good weather by 4x4. However, villages reported that a new bridge has been constructed over the Myitnge River that connects them to Kyaukme Township, reportedly as part of the Upper Yeywa hydropower project, This bridge was reported to have cut down travel time to markets and services dramatically.

The main agricultural crops in Kone Nyaung is corn and groundnut and most farmers also grow some paddy for consumption. The entire corn harvest is sold while some groundnut is sold and some processed into oil for village consumption. Every household in the village has access to at least some land and all farmland is taunggya (upland fields). However, the increase in population has meant that over time average farm sizes are decreasing. Unlike other villages, 1/3 of farmers have been able to register their land and hold a formal Land Use Certificate and the rest of the farmers are waiting eagerly to get their own documents, which they expect will happen within 12 months. While they were initially skeptical of the process, the benefits of land registration are now clear to them. A small number of households (4-5) have large holdings of between 50 and 100 acres; 1/3 of the village are small holders with less than 10 acres and practice shifting cultivation, planting approximately two acres each year. The remainder are medium sized farmers with between 20 and 30 acres. Market access is to a village called Nyaung Pine, outside the impact zone.

There is very little forest use in Kone Nyaung apart from hunting for 'fun'. Over time they have had problems with deforestation as land was cleared to create more taunggya fields.

Kone Nyaung has a primary school but it has only recently been recognized by government and will only receive government funding for teachers from next year. At the time of interview, the community pays for teachers who provide education up to the 6th grade. Beyond that, families who are able to pay send their children further afield to Lashio or Namlan. There is no rural health center in the village; for healthcare they go to Nyaung Pine or Kyaukme. Two young women have been selected from within the community to receive nursing training but this has not yet occurred.

Water access comes from several springs north of the village and tube wells. There are more than 60 tube wells in the village. The political party USDP provided cash to support the purchase of solar panels for 50% of the village shortly before the 2015 election; the rest of the village shares these panels.

Demographics

Unlike other villages in the impact zone, Kone Nyaung is a very much a mixed village with a large Shan minority population. As a result, the largest ethnic grouping is actually mixed Danu/Shan individuals.

Table 1: Kone Nyaung demographics by ethnic group

Ethnic Groups	Female	Male	Total
Bamar		2	2
Danu	71	70	141
Danu/Shan	92	85	177
Shan	38	30	68
Total	**201**	**187**	**388**

Age figures for Kone Nyaung indicate that over 55% of the population is under 27, with just 12% over 55.

Table 2: Population of Kone Nyaung by age group

Age Group	Female	% Female	Male	% Male	Total	% of Total
0-9	**48**	**23%**	**43**	**23%**	**91**	23%
10-18	**37**	**18%**	**36**	**19%**	**73**	18%
19-27	**32**	**15%**	**29**	**15%**	**61**	15%
28-36	**25**	**12%**	**28**	**15%**	**53**	13%
37-45	**26**	**13%**	**16**	**8%**	**42**	11%
46-54	**14**	**7%**	**17**	**9%**	**31**	8%
55-63	**11**	**5%**	**9**	**5%**	**20**	5%
over 64	**15**	**7%**	**12**	**6%**	**27**	7%
Total	**208**		**190**		**398**	

Table 3: Population of Kone Nyaung by household size

Number of Household Members	Number of Households
1-2	5
3-4	29
5-6	34
7-9	13
Total	**81**

Education

The lack of government recognized schools has driven up the proportion of villagers in Kone Nyaung who lack an education, particularly among women. Men have disproportionate access to monastic education to replace government schools but women are much less likely (12 women with monastic education compared to 66 men) to be educated by religious institutions.

Table 4: Education Levels by Gender of Kone Nyaung

Education Level	Female	Male	Total
Not known		1	1
Middle School	4	5	9
Monastic Education	12	66	78
Primary School	97	77	174
No Education	88	37	125
Unknown/Other	6	4	10
Graduate	1		1
Grand Total	**208**	**190**	**398**

Table 5: Occupation of respondents by gender of Kone Nyaung

Occupation	Female	Male	Total
Dependent	27	21	48
Farmer	151	135	286
Novice		5	5
Student	29	29	58
Other	1		1
Grand Total	**208**	**190**	**398**

Vulnerability

Of the 81 households interviewed as part of the survey, seven were reported as having a female household head.

Table 6: Households with Disabled People in Kone Nyaung

Type of disability	Number of afflicted individuals
Deaf	2
Lame	1
Other	1

Livelihoods

As with other zone 4C (left bank) villages, Kone Nyaung is heavily reliant on corn as a source of income, with it accounting for just under half of the average households annual income.

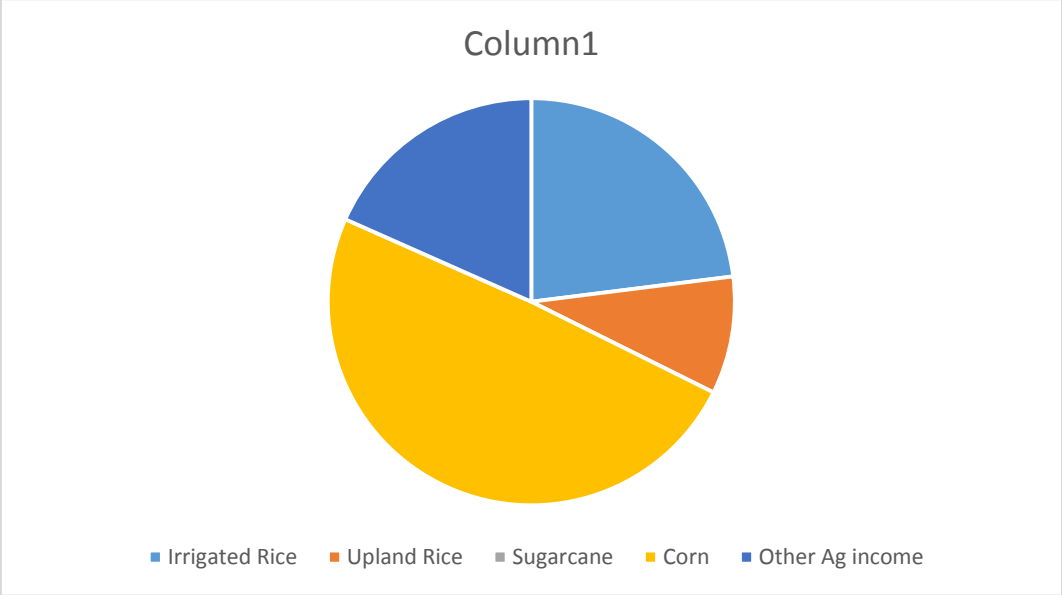


Figure 1: Estimated annual income from major crops

Given the levels of deforestation that surround Kone Nyaung, it is unsurprising that levels of forest income are very low. Just 3% of income for most households comes from forest-related sources.

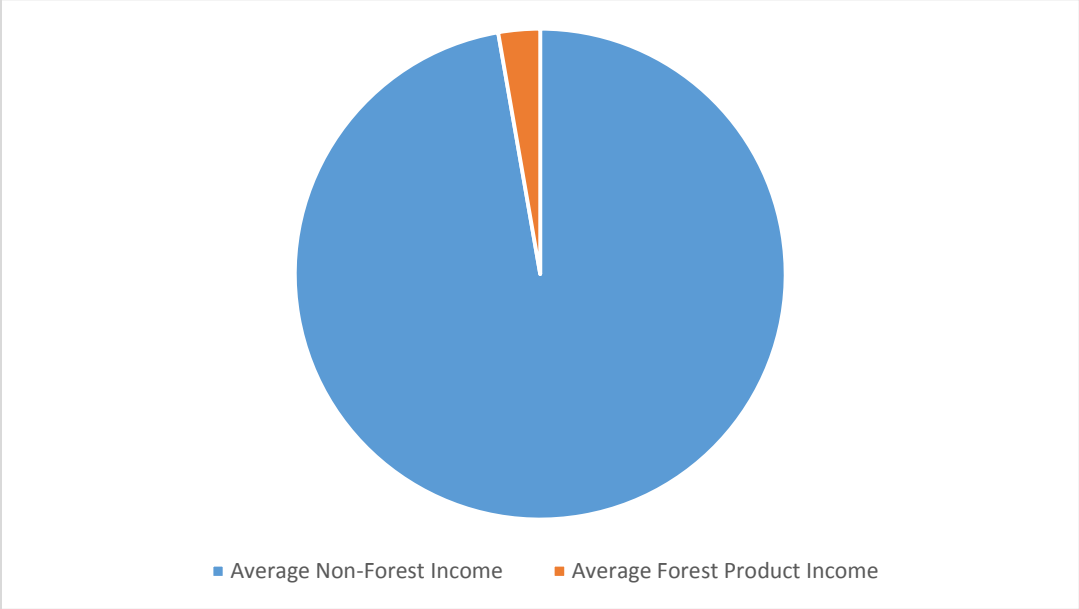


Figure 2: Forest income against non-forest income

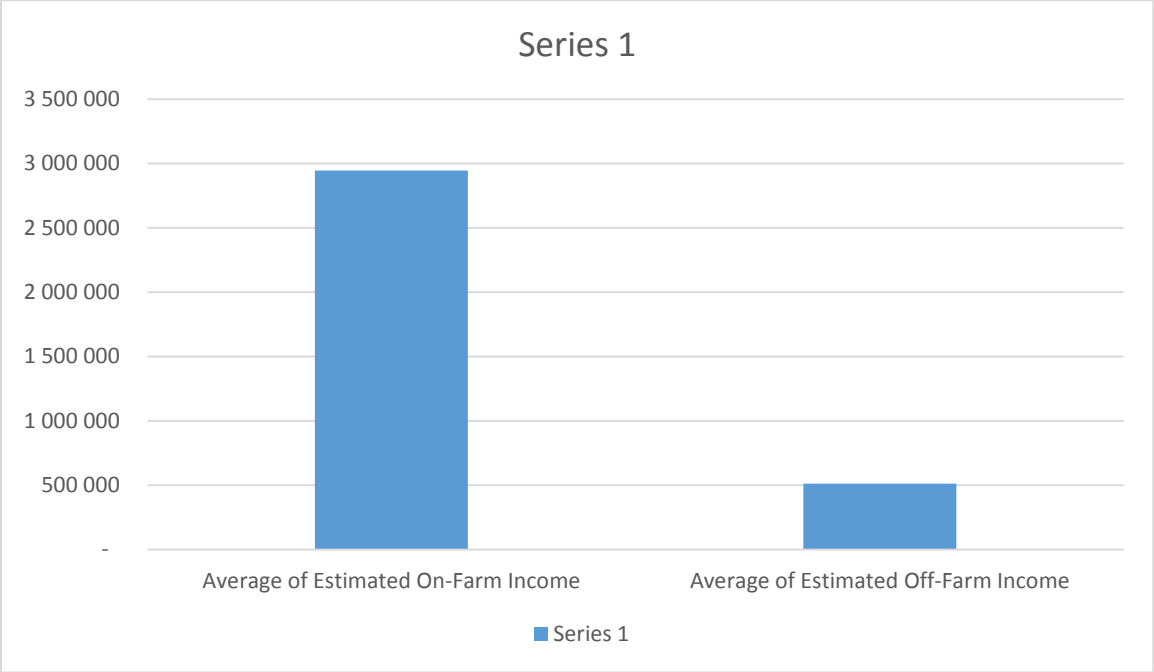


Figure 3: Agriculture income against non-agricultural income

Village profile of Kyauk Hson:

Village Overview

Kyauk Hson is a village of approximately 200 households located on the left bank of the Myitnge River in the 'Lower Left' quadrant for the Middle Yeywa EIA analysis. The SIA survey was conducted in 2017. The village has very good road access as route 41 passes through the village approximately halfway between the village of Kyauk Ku and the Myitnge river. Kyauk Ku is approximately 30 minutes by car and Nawnghkio town is approximately 2 hours by car.

The village was founded over 200 years ago, but has only grown to its current size in recent decades. For example, 70 years ago there were only 30 households. Over the last 10-15 years, the village has experienced significant improvements in transportation access accompanied by better education and healthcare resources. The main road through their village was constructed in 2000 (approx.) and paved between 10 and 12 years ago.

Kyauk Hson's inhabitants primarily rely on agriculture and their primary grips is corn. However, they also grow ground nut, soybean and also a small amount of sugarcane as well as paddy for consumption.

All households have access to their own land, and there are some significant land holdings. Approximately 30% of the village are larger land-owners, having between 30 and 50 acres. A further 20% have between five and ten acres while half of the households farm smaller plots generally between three and five. All land was traditionally taungya, but in recent years expansion of the village has reduced shifting cultivation and meant some farmers even plant a second winter crop. However, they have sought to replace shifting cultivation with crop rotation—the only village in the impact zone which reported considering this as a step. There is limited mechanization compared to other villages with only some households using small machines and a continued reliance on buffalos and cows by many households.

The village has faced land challenges as 1500 acres were seized in 2004 by politically connected individuals. Some has been planted with mango trees and is an active plantation while the remaining 800 continue to be farmed by the original users. The villagers have initiated the process of petitioning for the return of their land.

Every household raises chickens and approximately 2/3 has pigs raised for their own consumption.

The nearest market to purchase goods is Kyauk Ku, but for selling their harvest most households transport it to Nawnghkio. For groundnut, however, they grind and sell the oil themselves directly to Mandalay.

Forest use is limited to hunting trips for personal use or to be shared with others in the village. There is no market for hunted meat.

There is a school that goes up to 7th grade in the village, two years ago they received additional resource which brought it up from 5th grade. There are now six government teachers and three teachers paid for by the village, but this is not enough: in total the school has 200 students. They have requested additional teaching resources from the township government. There is a small health clinic in the village and one resident government staff nurse/midwife.

Electricity is provided for some households by small hydro-generators, each of which power between four and five households. There are seven of these turbines across the village while the rest of the community relies on solar panels. There is good water access from several springs and a pond.

Demographics

Kyauk Hson is a Danu majority village with a small number of members from other ethnic groups. Of the interviewed households' 260 members, 252 were Danu.

Table 1: Sample population of Kyauk Hson by Ethnicity

Ethnic Group	Female	Male	Grand Total
Bamar		4	4
Danu	130	122	252
Other	1	2	3
Shan	1		1
Grand Total	**132**	**128**	**260**

Age figures for the members of sampled households indicate that 55% of the population is under 27. There was little difference by gender across age groups.

Table 2: Sample population of Kyauk Hson by Age Group

Age Group	Female	% of Female	Male	% of Male	Total	% of Total
0-9	22	17%	28	22%	50	19%
10-18	26	20%	25	20%	51	20%
19-27	20	15%	21	16%	41	16%
28-36	25	19%	19	15%	44	17%
37-45	17	13%	12	9%	29	11%
46-54	11	8%	7	5%	18	7%
55-63	6	5%	14	11%	20	8%
64 and above	5	4%	2	2%	7	3%

Table 3: Sample households of Kyauk Hson by Household Size

Number of Household Members	Number of Households in Kyauk Hson Sample
1-2	2
3-4	26
5-6	18
7-9	8
10+	0

Education

147 of the 260 respondent household members have a primary education. There is now a middle school in the village which has improved education access. This was stressed as a recent and significant improvement for village conditions by community members. High school access is to Kyauk Ku or Nawnghkio.

Table 4: Sample population of Kyauk Hson by Gender

Education	Female	Male	Grand Total
Child	3	11	14
Don't Know	6	10	16
High School	9	4	13
Kindergarten	5	1	6
Middle School	14	13	27
Monastic Education	2	19	21
No Education	14		14
Other	1		1
Primary School	78	69	147
University		1	1
Grand Total	**132**	**128**	**260**

Table 5: Occupation of Respondents by Gender of Kyauk Hson sample population

Occupation	Female	Male	Total
Child	3	9	12
Dependent	5	6	11
Farmer	89	88	177
Government Staff	1		1
Other	2	5	7
Student	29	17	46
(blank)	3	3	6
Grand Total	**132**	**128**	**260**

Vulnerability

Of the 55 households interviewed as part of the survey, five were reported as having a female household head.

Table 5: Households with Disabled People in Kyauk Hson Sample

Type of disability	Number of afflicted individuals
Blind	1

Livelihoods

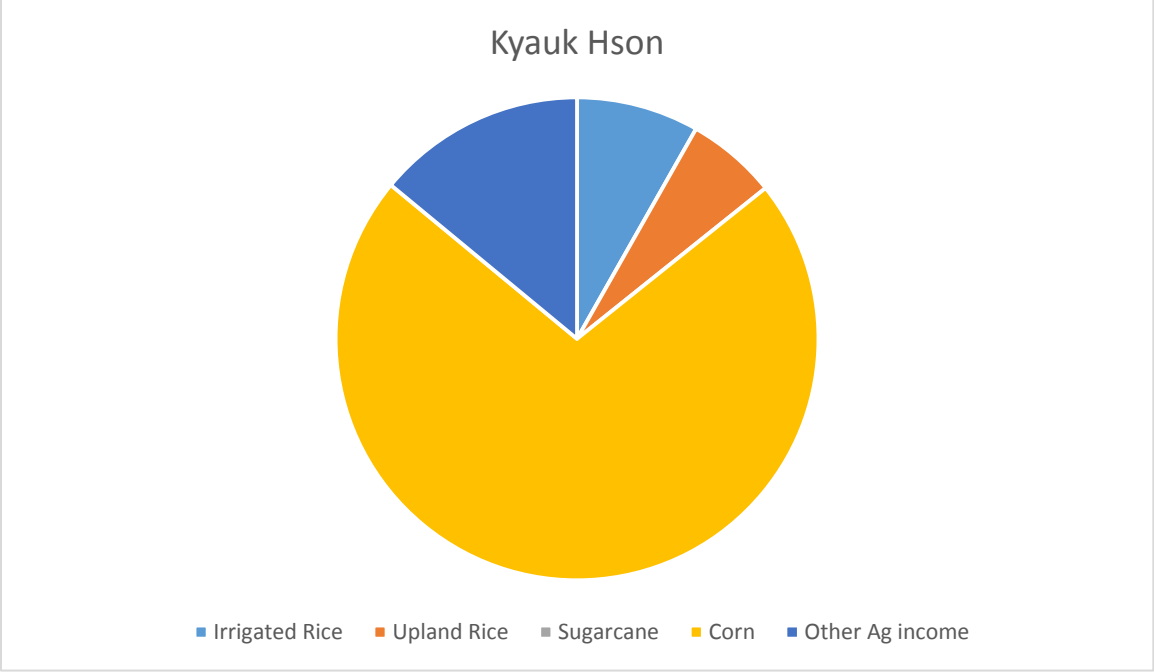


Figure 1: Estimated annual income from major crops

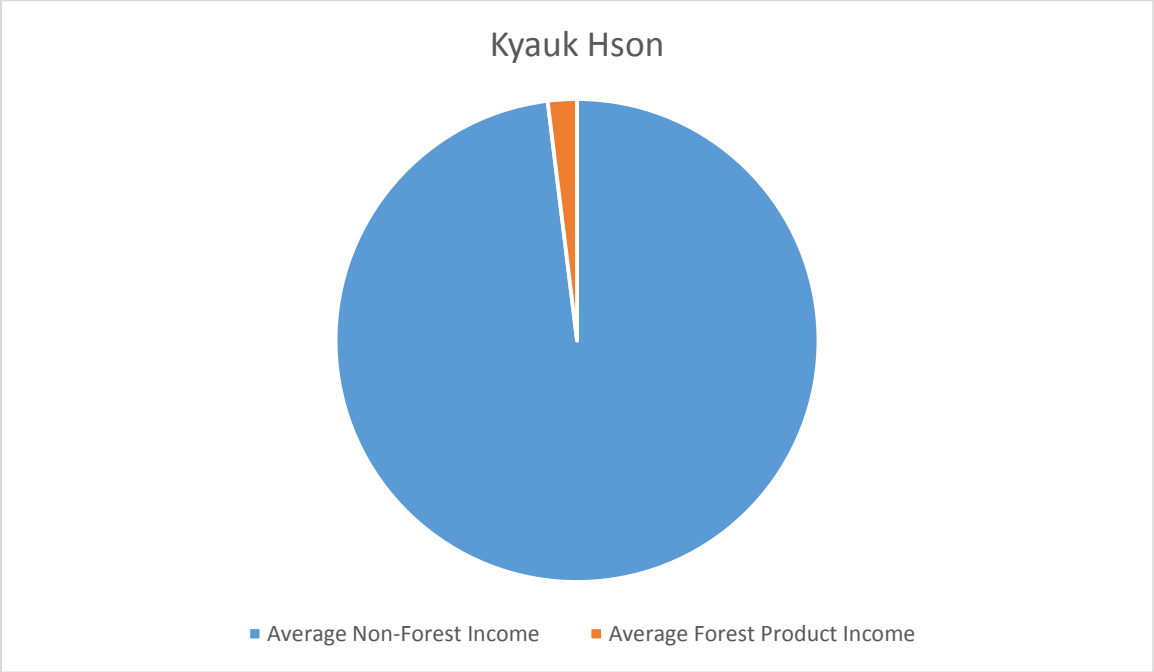


Figure 2: Forest income vs. Non-forest income

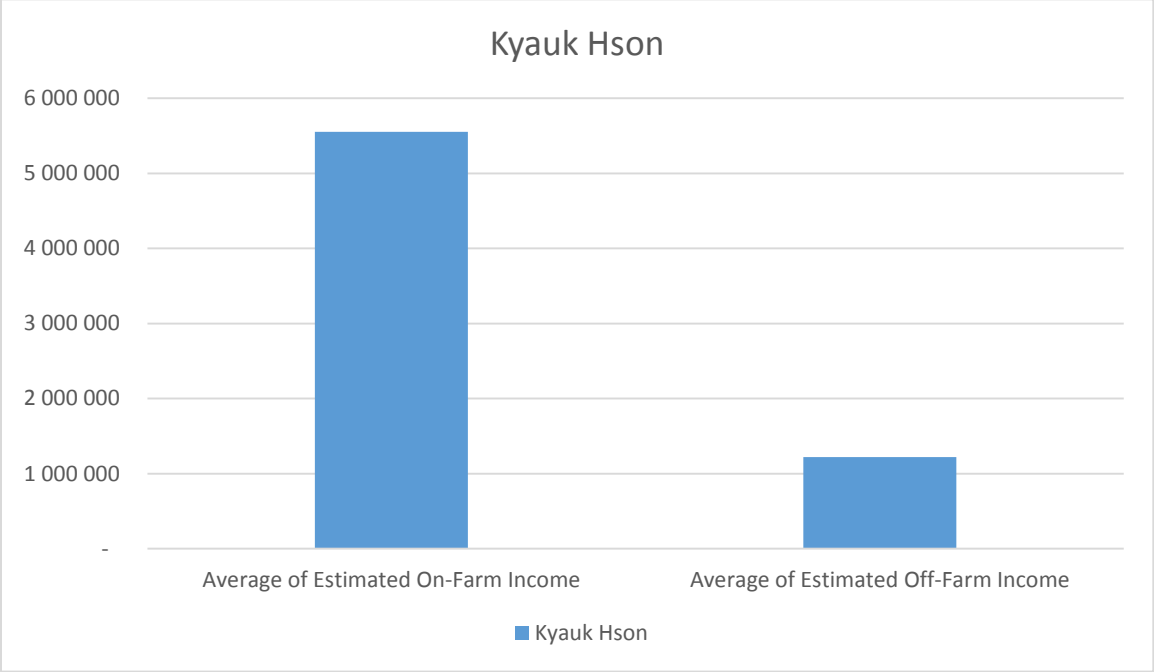


Figure 3: Agriculture income vs. Non-Agricultural income

Village profile of Nawnghkio Gyi:

Village Overview

Nawnghkio Gyi is a village of 288 households located on the right bank of the Mytinge River in the 'Upper Right' quadrant for EIA analysis. The survey was conducted in 2017. The village has good road access via an improved but unpaved branch road that meets with route 41 outside of Nawnghkio. Travel time by motorbike to Nawnghkio Gyi from Nawnghkio is approximately 40 minutes.

The village was founded in 1878 and village elders reported it was well known across Shan because the colonial leader Saya San sought refuge from British forces for several days before moving north and his eventual arrest in Hsipaw.

Livelihoods in the village revolve around agriculture, predominantly growing sugar cane, all of which is sold to the factory at Nawnghkio. In the focus group discussion, village leaders reported that there are now more than 80 agricultural machines in the village, including more than 40 large trucks used to transport cut sugar cane. The village does also grow corn which is sold to Nawnghkio for eventual shipment to China. There are no landless households in the village and as the village still has room to expand, those with less land can fell trees and create more taungyya land if they choose.

However, over time the village has become more aware of the environmental risks cutting down forests cause and so have designated certain areas (including nearer the river) as village forests to be preserved. However, they have no official community forestry paperwork or documentation.

Market access is to Kan Gyi, which hosts a 5-day rotating market. Most agricultural sales (apart from sugarcane) happen at Nawnghkio.

The village has good drinking and household use water access thanks to several in-village bore wells and two large ponds near the village that are piped into the community. There are a small number of agricultural areas that are irrigated, but as with most villages in the impact zones, most agricultural land is unirrigated, upland cropland.

All households in the village have access to solar panel, with sizes varying based on household wealth; there is no grid electricity. There is good mobile connectivity with 3G in the village.

Nawnghkio Gyi is not the village tract village, but is where the village tract administrator lived (at the time of research; there has since been a local election the results of which are unknown) and has a small office building. There is a middle school within the village; for high school students must travel to Nawnghkio or the village tract village of Kan Gyi. The village has its own rural health center staffed with two junior midwives whose primary role is providing child and maternal health, including vaccinations. For additional health care and to access medication, villagers must travel to Nawnghkio or Kan Gyi

Demographics

Nawnghkio Gyi has a mixed ethnicity population, as shown in table below. Within the households interviewed, some 71% of household members are Danu while another 11% of Shan. The remaining population are primarily Shan-Danu mix, but there is a small population of Bamar villagers as well.

Table 1: Sample population of Nawnghkio Gyi by Ethnicity

Ethnic Group	Female	Male	Total
Danu	123	122	245
Other	32	29	61
Shan	14	23	37
Total	**169**	**174**	**343**

Age figures for Nawnghkio Gyi indicate that well over half the population is under 36 (56%) and just seven per cent above 64. There is little gender difference across age groups, with the exception of the 37-45 age bracket which has a notably smaller proportion of men than women.

Table 2: Sample population of Nawnghkio Gyi by Age Group

Age group	Female	% of Female	Male	% of Male	Total	% of total
0-9	17	10%	18	10%	35	10%
10-18	26	15%	31	18%	57	16%
19-27	28	16%	29	16%	57	16%
28-36	25	15%	25	14%	50	14%
37-45	24	14%	15	9%	39	11%
46-54	25	15%	26	15%	51	15%
55-63	15	9%	19	11%	34	10%
64 and above	10	6%	13	7%	23	7%

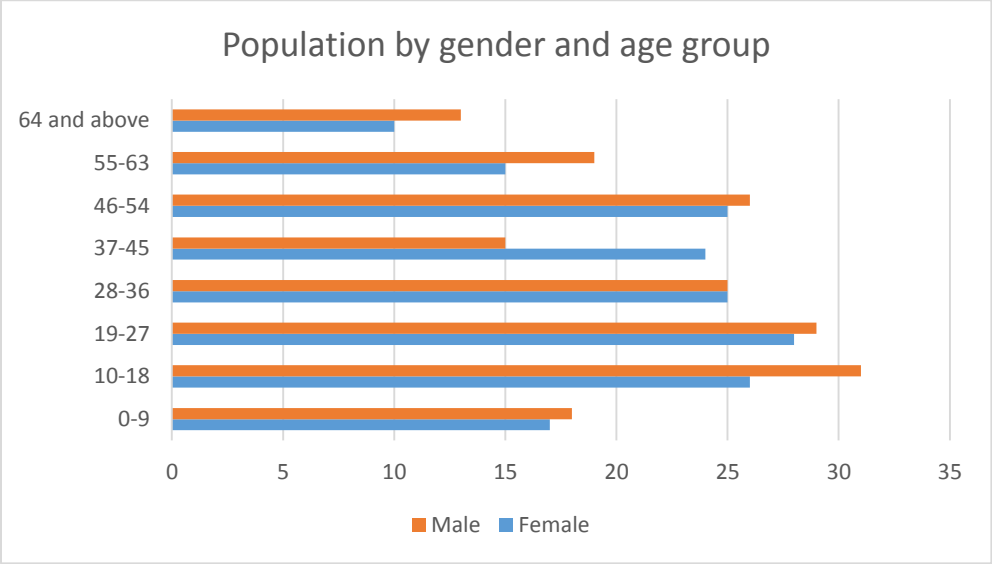


Figure 1: Population by gender and age group

Households in Nawnghkio Gyi tend to be between three and six people; 20, or 27%, of households interviewed consisted of four people.

Table 3: Sample households of Nawnghkio Gyi by Household Size

Number of Households Members	Number of Households
1-2	5
3-4	31
5-6	28
7-9	10
10+	0
Total	**74**

Education

Well over half of respondents' households have only a primary school education. The presence of a middle school in the village will likely see the proportion of residents with somewhat higher education increase, but it that is a slower process. The small number of high school students is unsurprising.

Table 4: Education levels of sample population of Nawnghkio Gyi by Gender

Education Level	Female	Male	Total
No Education/Child	11	4	15
Kindergarten	4	3	7
Monastic Education	2	9	11
Primary	99	102	201
Middle School	31	28	59
High School	9	19	28
Graduate	2		2
University	7	5	12

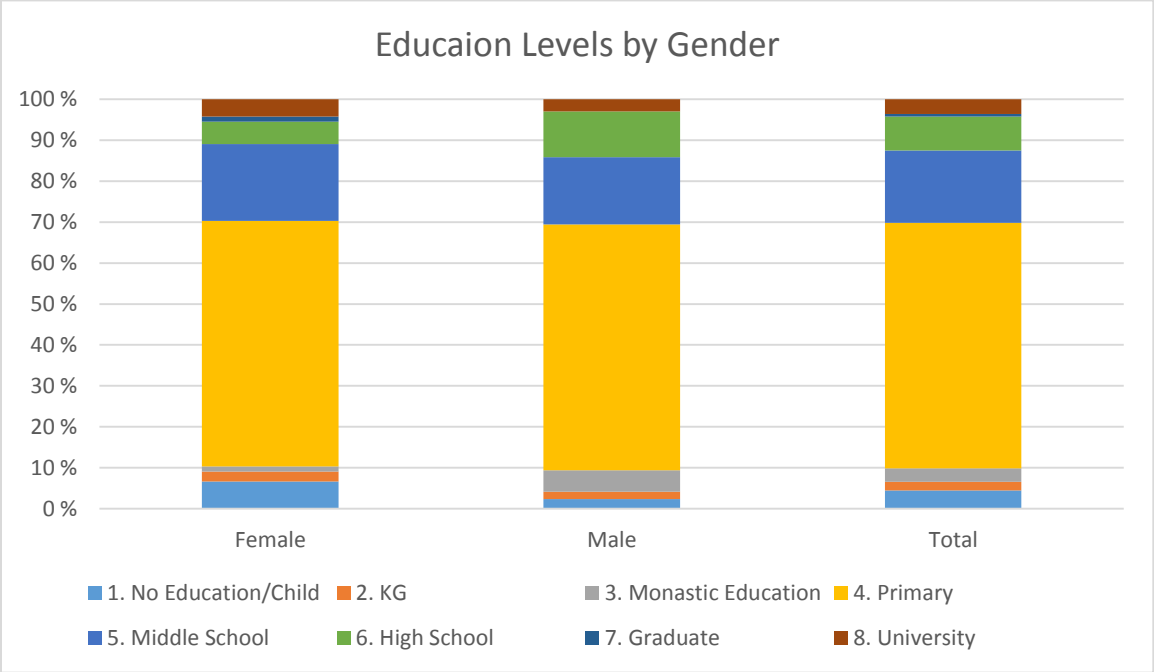


Figure 2: Education levels by gender

Occupations and Livelihoods

Table 5: Occupation of Respondents by Gender of Nawnghkio Gyi sample population

Occupation	Female	Male	Total
Farmer	122	130	252
Student	27	28	55
Dependent	12	9	21
Child	3	2	5
Driver	0	2	2
Government staff/Formal Employment	3	2	5
Other	2	0	2
Totals	**169**	**173**	**342**

Vulnerability

Of the 74 households interviewed as part of the survey, eight were reported as having a female household head.

Table 6: Households with Disabled People in Nawnghkio Gyi Sample

Type of disability	Number of afflicted individuals
Deafness	2
Mute	2
Other	2

Livelihoods

As with most of the impact zones' villages, the majority of income comes from the sale of agricultural crops. Nawnghkio Gyi's position in the upper right quadrant means it has ready access to the Nawnghkio sugar mill; as a result, the vast majority of it income from comes sugar cane. As noted in the baseline's main text, Nawnghkio Gyi has the highest estimated income of any village in the impact zone.

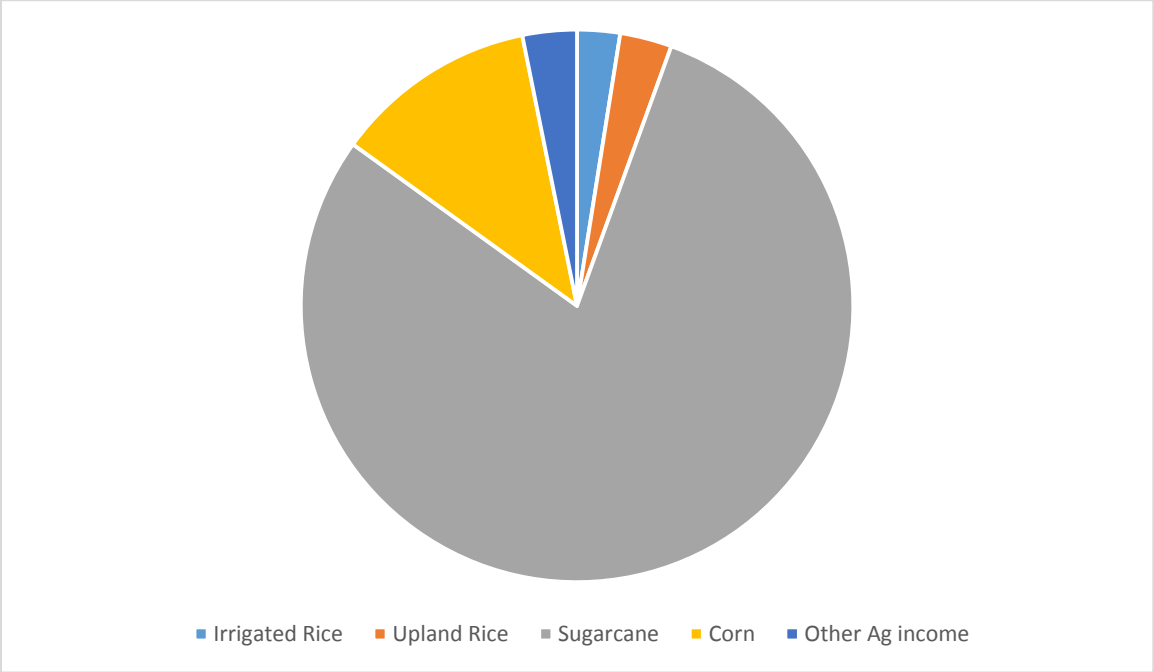


Figure 3: Estimated annual income from major crops

In keeping with the other villages in the impact zones, only a small proportion of income in Nawnghkio Gyi comes from forest products. Figure 2 shows the proportion of estimated average income received from forest products.

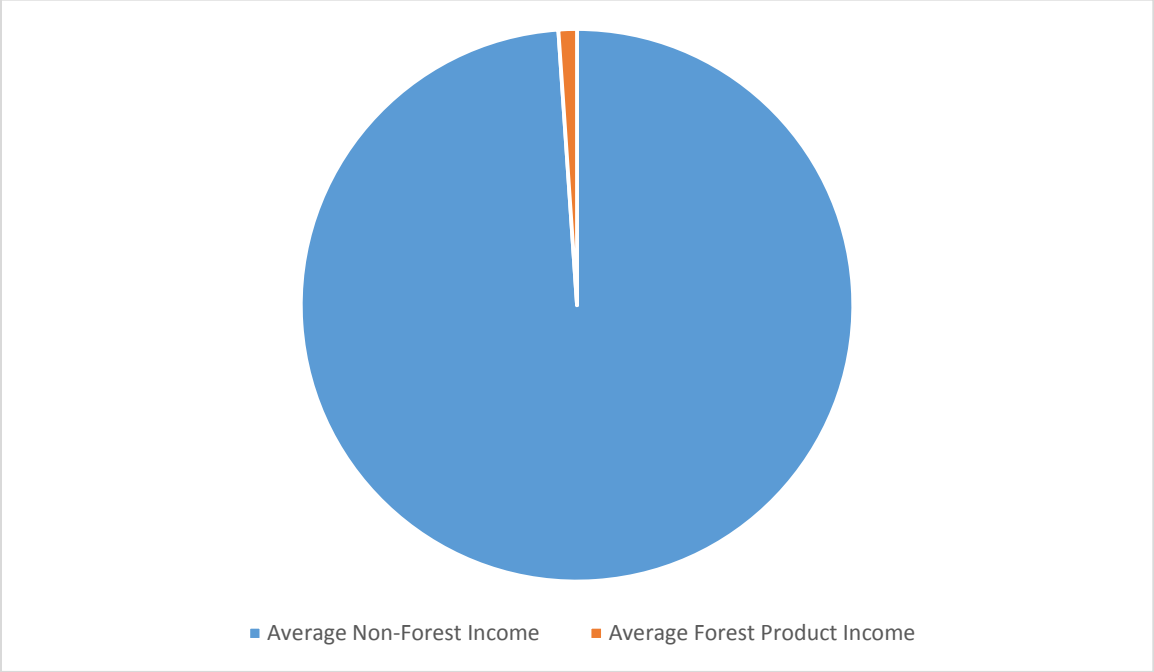


Figure 4: Forest income vs. Non-forest income

However, in order to understand the full importance of income forest products, it is necessary to evaluate its position among only households who receive income from these sources. Of the 85 total households interviewed, a total of 72 received at least some income from forest product, with the average income from forest products at MMK 104,153. Given incomes in Nawnghkio Gyi averaged over 6.5 million kyat, this remains an extremely small proportion of total income (approximately 1.5%).

Non-farm income makes up a somewhat larger proportion of income, but continues to account for less than 20%, despite the fact that Nawnghkio Gyi is perhaps the village with best access to the large market centers of Nawnghkio and Kan Gyi.

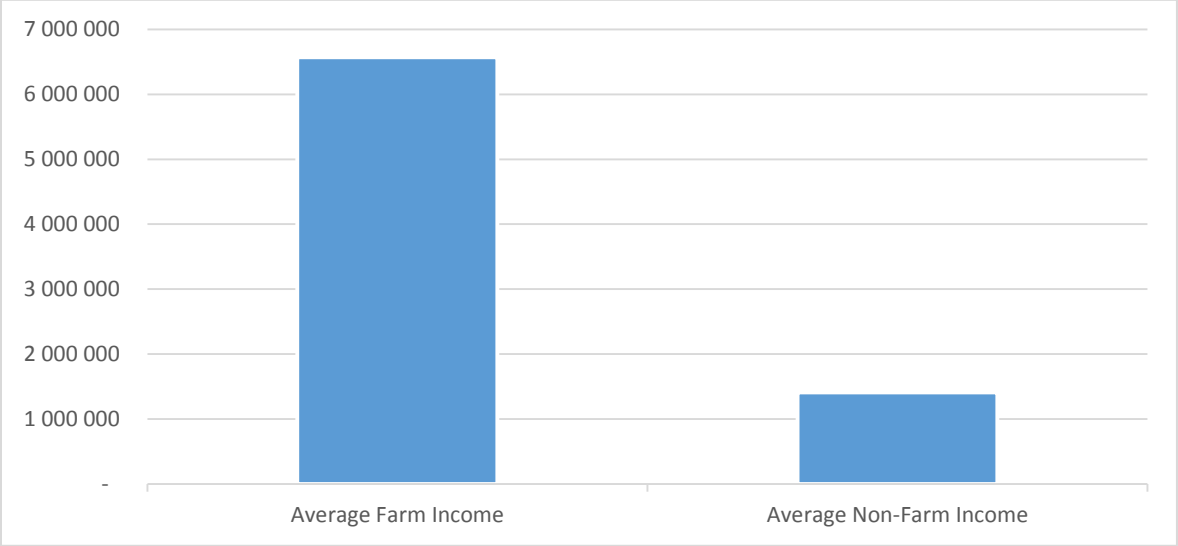


Figure 3: Farm income vs. Non-farm income

Village profile of Tawng Hkan:

Village Overview

Tawng Hkam is a village of 112 households located on the left bank of the Mytinge River in Zone 4D (lower left bank) within the indirect impact zone. The survey was conducted in 2017. The village has medium road access via an unpaved but relatively low incline branch road that meets route 41 in the village tract village of Kyauk Ku (also the market center). Travel time from Hpet Yin Kone to Kyauk Ku by motorbike is 20-25 minutes; travel time to Nawnghkio town is approximately 2.75 hours.

The eastern part of the village was founded in 1870, with the western portion springing up some 30 years later. As a result of this two-stage founding, the village has two of certain key infrastructure such two Nat shrines, two cemeteries etc. However, the founding story of the village is unclear.

Livelihoods in the village revolve around farming with paddy and peanut as the most traditional crops, the former for consumption and the latter for both consumption and market. In the last 10 years, farmers have also begun to grow sesame, soybean, and corn for market. Farmland in the village is not registered with government (i.e. no formal tenure) but all households have traditional use of at least a small amount of land. Most household have between 8 and 10 acres of land; a few larger farmers have 30-40 acres. As of the last 2-3 years, the village no longer is able to rest parts of upland farmland each year in a shifting pattern, instead planting their entire holding. Many households (100 or more) have and use hand tractors in agriculture; there are no large tractors used in the village.

Households raise livestock but only for their own consumption. All households have chickens and over half have a pig. In recent years households have sold their cows and buffaloes used to work the land and replaced them with hand tractors.

Market access is primarily to Kyauk Ku; the village jointly has a truck to take their agricultural products.

Forest use is limited, honey and other products are sometimes collected and sold within the village but this has limited contribution to incomes. There are local orchards within the village, primarily mango, totaling between 200 and 400 trees. Djenkol bean trees and avocado trees are common within the village.

Tawng Hkam has a primary school; middle school and high schools are located at Kyauk Ku. The village school has 7 staff (1 principal, 5 teachers, 1 clerk) and provides education for 55 students. There is no rural health center in the village and no government health staff. Several villagers received first aid/mid-wife trainings from the government.

Water access is a primary concern of the village as the nearest water supply is three miles from the village. It is a natural reservoir that is pumped to holding tanks in the village. Electricity is provided by household solar panels; 50% of households have them, the remainder cannot afford.

Demographics

Tawng Hkan is a Danu village with all but one of the 112 members of interviewed households reporting as ethnically Danu.

Table 1: Sample population of Tawng Hkan by ethnicity

Row Labels	Female	Male	Total
Bamar		1	1
Danu	54	57	111
Total	**54**	**58**	**112**

Age figures for Tawng Hkan indicate that just over half the population is under 27 with just 9% over 55. There was little difference by gender across age groups.

Table 2: Sample population of Tawng Hkam by age group

Age Group	Female	% Female	Male	% Male	Total	% of Total
0-9	12	22%	10	17%	22	20%
10-18	5	9%	9	16%	14	13%
19-27	14	26%	13	22%	27	24%
28-36	8	15%	6	10%	14	13%
37-45	6	11%	6	10%	12	11%
46-54	6	11%	6	10%	12	11%
55-63	2	4%	4	7%	6	5%
64 and above	1	2%	4	7%	5	4%
Total	54		58		112	

Table 3: Sample households of Tawng Hkam by household size

Household Members	Households in sample
1-2	2
3-4	18
5-6	6
7-9	2
10+	0

Education

Over half of the members of respondent households have a primary education. There is no middle school in the village and access to further education in Kyauk Ku and beyond is by motorbike and reflects ability of the household to pay for boarding and other school costs.

Table 4: Education levels of sample population of Tawng Hkam by Gender

Type of Education	Female	Male	Total
Child	1	2	3
High School		5	5
Middle School	8	6	14
Monastic Education	4	8	12
No Education	4	2	6
Pre School	1	1	2
Primary School	32	29	61
Unknown	4	5	9
Total	**54**	**58**	**112**

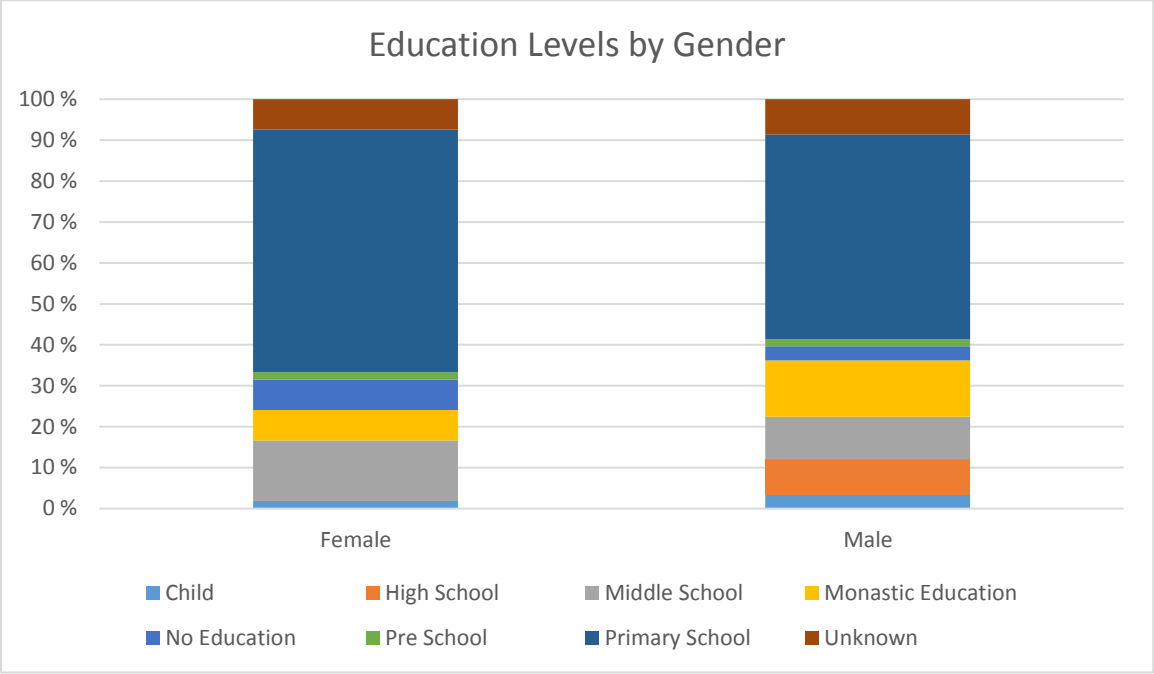


Figure 1: Education levels by gender

Table 5: Occupation of Respondents by Gender of Tawng Hkam sample population

Row Labels	Female	Male	Total
Child	4	6	10
Dependent	2	2	4
Farmer	36	40	76
Student	12	10	22
Total	**54**	**58**	**112**

Vulnerability

Of the 28 households interviewed as part of the survey, one was reported as having a female household head.

Table 5: Households with Disabled People in Tawng Hkam Sample

Type of disability	Number of afflicted individuals
Deaf	2
Mute	1
Deaf/Mute	1

Livelihoods

As with most of the impact zone's villages, the majority of income comes from the sale of agricultural crops. Tawng Hkan's position in Zone D means it relies primarily on corn as the major crop, but with other crops playing important roles, including rice, as well as sesame and groundnut.

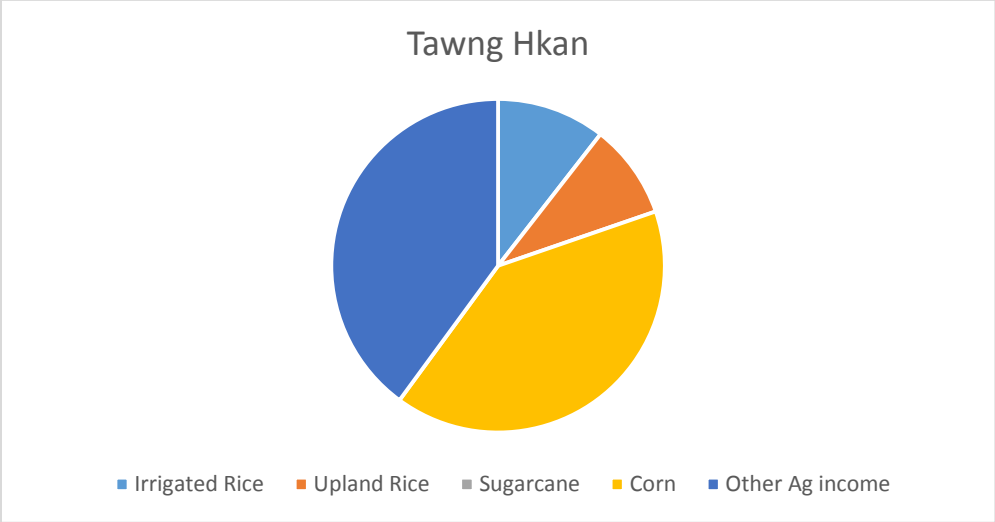


Figure 2: Estimated annual income from major crops

Forest income makes up a vanishingly small proportion of the average household income for households in Tawng Hkan, less than 1%.

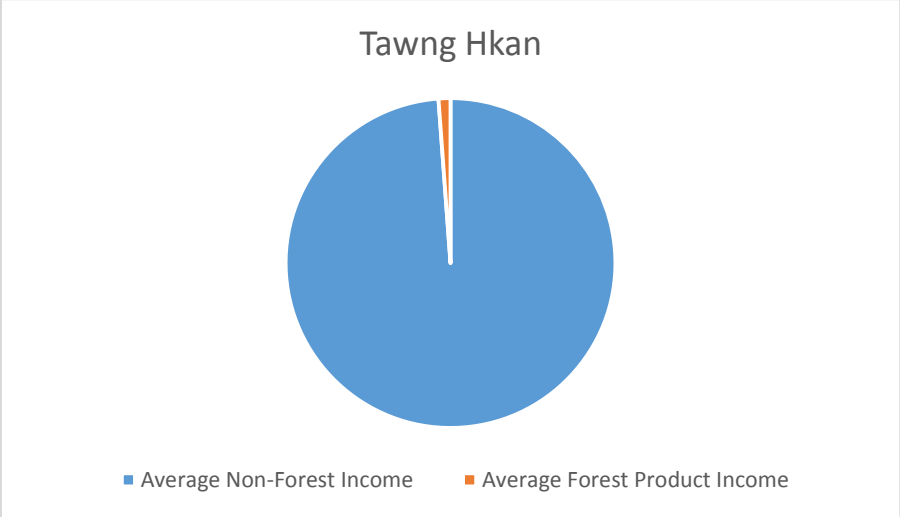


Figure 3: Forest income against non-forest income

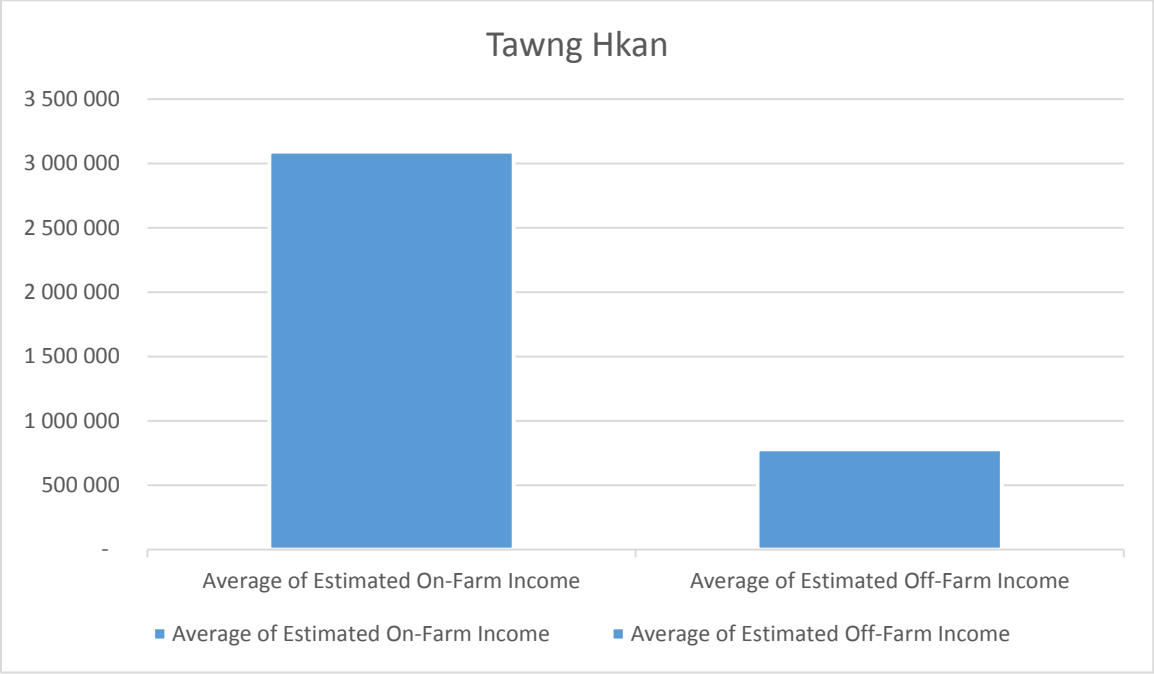


Figure 4: Agriculture income against non-agricultural income

Village profile of Pin Ping:

Village Overview

Pin Ping is a village of more than 300 households located on the left bank of the Mytinge River in the 'Upper Left' quadrant for Middle Yeywa EIA analysis. The SIA survey for Pin Ping was conducted in 2017. The village has extremely poor road access via an unimproved, bad quality dirt road that is extremely steep. In dry season the village is accessible by 4x4; in monsoon it is only accessible by motorbike and local 'trologyi' transport. This road connects to route 41 just south of the dam site as the road climbs out of the valley up to the plateau. Travel time to Kyauk Ku village and market center is 2.5 hours in good weather by 4x4; travel time to Nawnghkio town is 4-5 hours. In poor weather or by motorbike, these travel times can increase significantly.

Ping Ping has existed as a village for over 200 years, though it has grown significantly in the last fifty years. A village elder present for an interview reported that when he was young, there were just 40 households in the village. Far from the main routes connecting larger towns, there has been little out migration: village leaders reported that just 15 people had moved out of the village.

Corn is the main agricultural crop, grown in upland fields and then transported to Nawnghkio for sale and eventual use in China. Other crops that are grown either for local sale or household use include upland rice, ground nut, and sesame. All the land is upland/Taungya and there is one harvest per year. None of the village's farmland is registered with the government so land tenure is based on tradition rather than fiat. Of the approximately 300 households in the village, some 200 have land while the remaining households work as laborers. Villagers measure land in 'blocks', 12 of which is equivalent to an acre. As of the last few years, farmers increasingly use chemical fertilizer and approximately 50 households have hand tractors. There are several large tractors in the village also and crop rotation remains common.

Livestock is raised by only a small number of households (approx. 40) for consumption. There are two households that have converted some of their farmland into tea plantations. Forest use is limited to hunting for household consumption and collecting honey or mushrooms.

Pin Ping has both a primary and a middle school, the latter of which was recently introduced. The nearest high school is in Kyauk Ku village, though wealthier households, the only ones who can afford further education, send their children to Mandalay or Pyin Oo Lwin for high school. There is a government-run rural health center in the village with two midwives stationed there responsible for pre-natal care and immunizations in the surrounding villages.

Water access is via a series of wells and one large pond that is used for washing and livestock drinking water. Each household has its own large water tanks that store monsoon rains. Some households have to fetch drinking water from other villages during the hot season.

Demographics

Pin Ping is a Danu village; all members of interviewed households were ethnically Danu

Table 1: Sample population of Pin Ping by Ethnicity

Group	Female	Male
Danu	199	190

Age figures for Pin Ping indicate that half of the population is under 27 (52%) with just 12% over 52. There is little difference in the population's age distribution by gender.

Table 2:Sample population of Pin Ping by Age Group

Age Group	Female	% female	Male	% male	Total	% of total
0-9	40	20%	33	17%	74	19%
10-18	31	16%	30	16%	61	16%
19-27	34	17%	32	17%	66	17%
28-36	27	14%	32	17%	59	15%
37-45	25	13%	19	10%	44	11%
46-54	19	10%	10	5%	29	7%
55-63	9	5%	16	8%	25	6%
64 >	11	6%	14	7%	25	6%
Not known	3	2%	4	2%	7	2%
Grand Total	**199**		**190**		**390**	

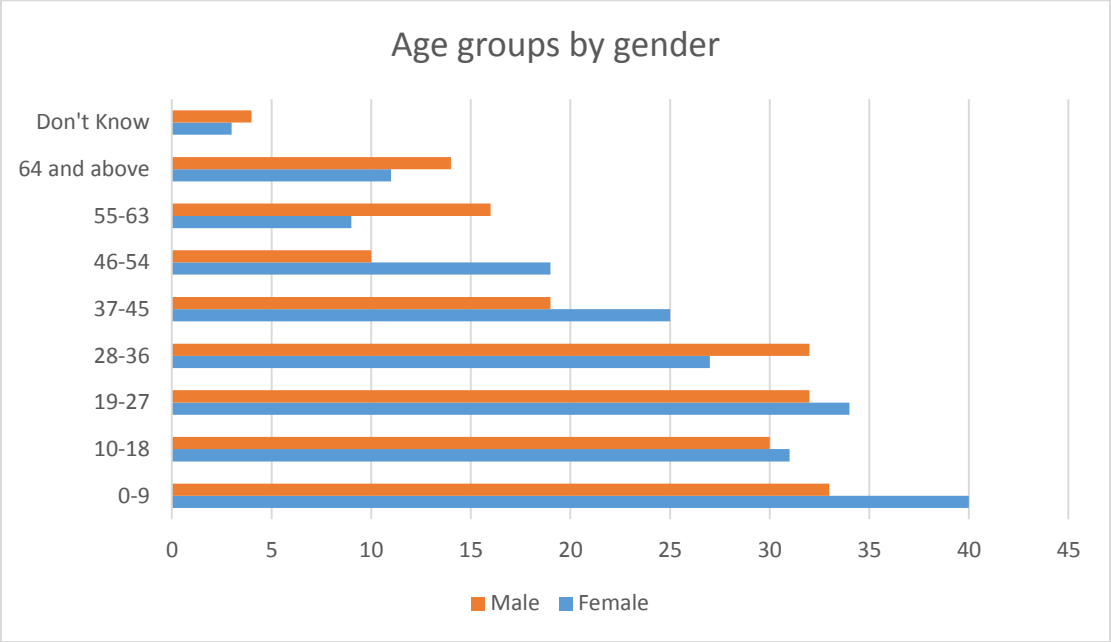


Figure 1: Age group by gender

Household size is similar to other villages, with 3-4 and 5-6 being the most common household sizes. 28% of interviewed households have 4 people in their households.

Table 2 Sample households of Pin Ping by Household Size

Number of Households Members	# of Households
1-2	6
3-4	37
5-6	24
7-9	15
10+	1
Total	**83**

Education

Education levels are low in Pin Ping: as with other villages a large proportion, over 50%) of the members of respondent households have primary education, but Pin Ping also has a high proportion (over 30%) who reported having no education. Most of these are women—men reported much higher levels of monastic education which is less accessible to women—suggesting a larger gender education gap than is found in other areas of the impact zone. While a small number of these individuals would be children, this is still much higher than villages in other parts of the impact zone and reflects the lack of access to education in the village until recent years, and the continued challenges of accessing education facilities beyond the village given poor transportation links.

Table 3: Education levels of sample population of Pin Ping by Gender

Education level	Female	Male	Total
Primary School	81	75	156
No Education/Child	89	32	122
Monastic Education	7	48	55
Middle School	19	25	44
High School	1	7	8
Unknown	2	6	8
Adult Literacy Campaign (AAA)	3		3
Graduate	1		1

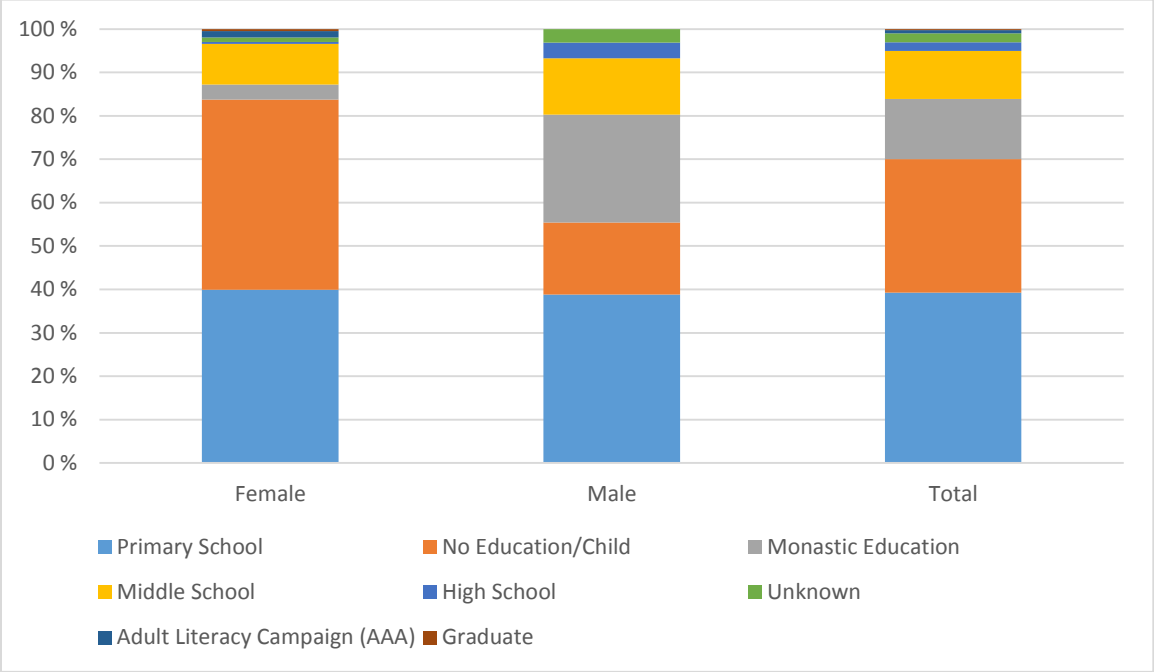


Figure 2: Education by gender of respondents

Table 4: Occupation of Respondents by gender of Pin Ping sample population

Occupation	Female	Male	Total
Farmer	149	141	290
Dependent/Child	26	22	48
Student	20	21	41
Novice		1	1
Trader		1	1

Vulnerability

Of the 83 households interviewed, 8 were reported as having a female household head.

Table 5: Households with disabled people in Pin Ping Sample

Type of Disability	Number of Afflicted Individuals
Blindness	1
Deafness	2
Other	

Livelihoods

As with most of the impact zone's villages, the majority of income comes from the sale of agricultural crops. Pin Ping's position in cone4 the upper left quadrant means its farmers rely primarily on corn as the major cash crop, but upland rice and secondary crops, such as groundnut, are also common.

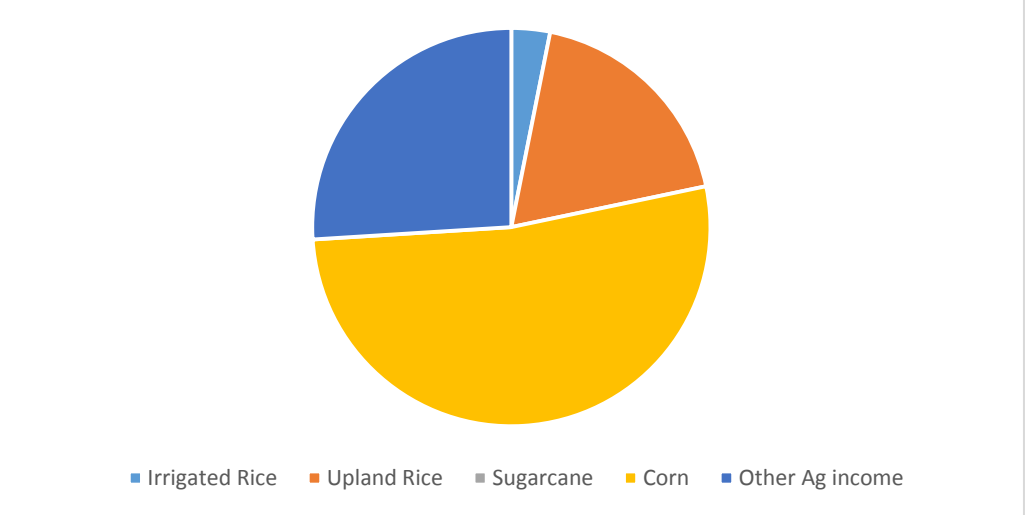


Figure 3: Estimated annual income from major crops

Income from forest sources makes up a very small proportion of the average income in Pin Ping.

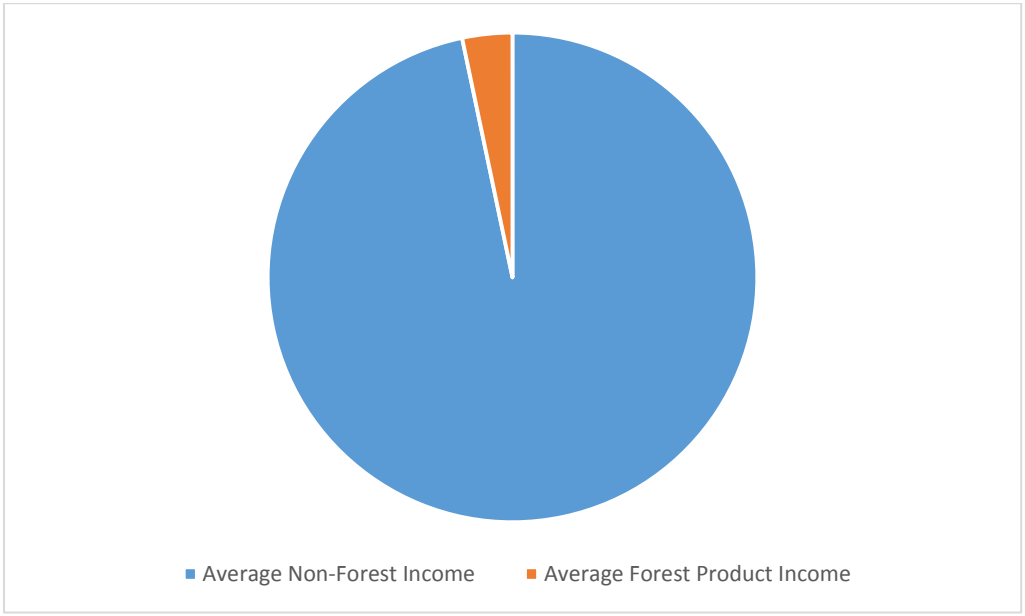


Figure 4: Forest income vs. Non-forest income

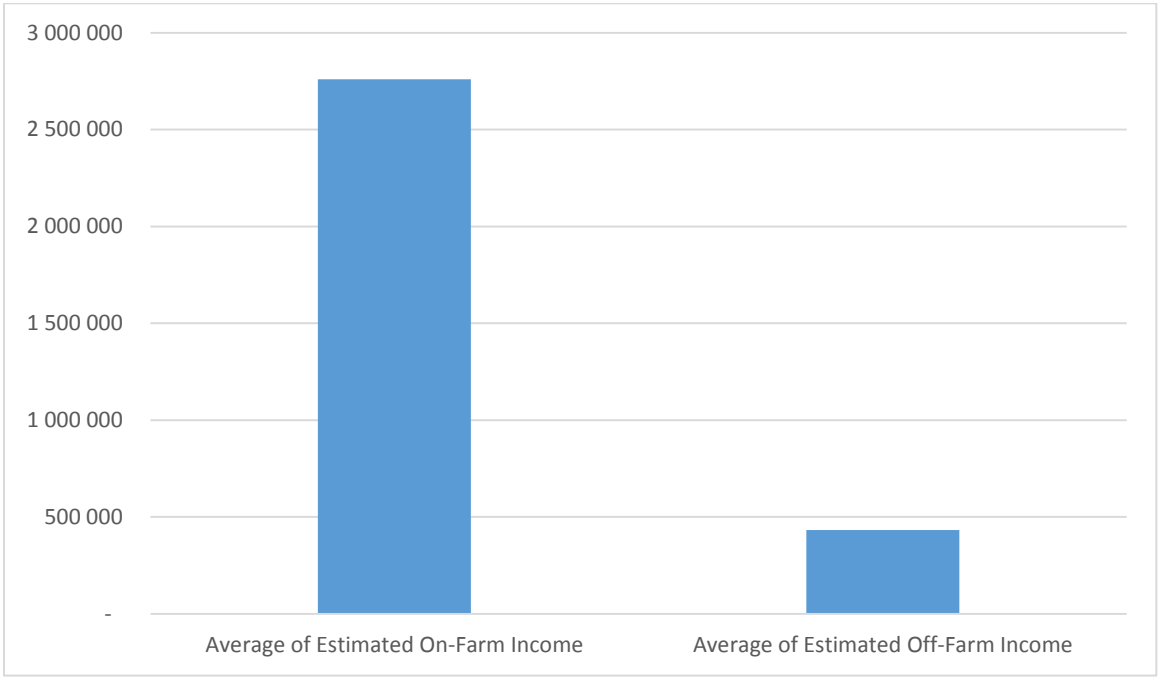


Figure 5: Farm income vs. Non-Farm income

Village profile of Thar Si

Village Overview

Thar Si is a village of approximately 275 households located on the left bank of the Myitnge River in zone 4C of the indirect impact zone. The socio-economic survey was conducted in 2017. The village has extremely poor road access via an unimproved, bad quality dirt road that is extremely steep. In dry season the village is accessible by 4x4; in monsoon it is only accessible by motorbike and local 'trologyi' transport. This road connects to route 41 just south of the dam site as the road climbs out of the valley up to the plateau. Travel time to Kyauk Ku village and market center is 1.5 hours in good weather by 4x4; travel time to Nawnghkio town is 3.5-4.5 hours. In poor weather or by motorbike, these travel times can increase significantly.

The village was established in 1936 by inhabitants of two other villages that were located in so-called 'brown zones' where there was active conflict between ethnic armed groups and the Myanmar government. These villagers' farmland was located near where Thar Si is today; during the conflict the villagers would often stay near their farmland and, over time, built homes and moved permanently. The village has grown significantly since that time: interviewed village elders reported that when they were young, there were just 40 households in Thar Si.

Thar Si's main cash crop is corn which grown and sold to Nawnghkio for export to China. Households also grow paddy for consumption; the bulk of this is upland paddy as there is little irrigation and most farmland is taungya. Other crops, grown for smaller scale sale and village-level consumption include black sesame and groundnut. There is no formal land tenure but almost all households have access to customarily-owned land (village leaders estimated that 8-10 households did not have land). The village's farmers are roughly split in three when it comes to land holding: one third have less than five acres, one third has between 20 and 50 acres, one third are larger farmers with between 50 and 300 acres. Land holdings in Thar Si are larger than other villages included in the impact zone. A few of the largest farmers have more than 300 acres. These larger farmers higher landless workers and larger farmers as labour across the growing season—an exception from other villages in the impact zone where non-family labour was generally reported as necessary only during peak planting and harvesting seasons.

All of Thar Si's farmers use chemical fertilizer but this is only in the last few years. Approximately one third of households have small hand tractors while four of the largest farmers have large tractors. Other households rely on buffalos and cows, or rent hand tractors from other villagers. Almost all households raise animals for household consumption; there is little sale of livestock.

Market access is primarily to Kyauk Ku's rotating market for purchasing goods while crops are sold in Nawnghkio. Due to the poor road quality, transportation costs are significant: it costs MMK 10,000 per visit to transport their harvest to the brokers in Nawnghkio.

Forest use is limited; there is no community forest and some villagers use forest products for consumption including a limited amount of charcoal production for household use and in the village. Thar Si households, as shown below, do indicate a higher reliance on forest products as contributors to income than in other impact zone villages.

Thar Si has a primary school and the nearest middle school is at the fellow impact zone village of Pin Ping, approximately 40 minutes by motorbike away. There is a high school at Taung Kham, some 20 miles away, and at Kyauk Ku. As a result, high school students have to board; for most education ends at the primary level. There is no rural health centre in Thar Si, villages generally visit the one in Taung Kham village.

Most of Thar Si accesses water from natural springs some ten minute's walk from the village centre. Five wealthy households hired a company to build each of them a tube well some years ago, each of which cost approximately MMK 2 million. Most households also have large tanks to store monsoon rains. Approximately 30% of Thar Si's households have solar panels to provide electricity, the remainder rely on candles.

Demographics

As with other villages in the impact zone, Thar Si is a Danu-majority village with small numbers of other ethnic groups who generally have married in to the community.

Table 1: Thar Si Demographics by ethnic group

Ethnic Groups	Female	Male	Total
Bamar	1	2	3
Danu	111	112	223
Other	3	4	7
Shan		1	1
Total	**115**	**119**	**234**

Age figures for Thar Si indicate that almost 60% of the population is under 27, with just 12% over 55. As with other impact zone villages, there is a large youth population.

Table 2: Sample households' population of Thar Si by age group

Age Group	Female	% Female	Male	% Male	Total	% of Total
0-9	22	19%	26	21%	48	20%
10-18	24	20%	30	24%	54	22%
19-27	20	17%	21	17%	41	17%
28-36	10	8%	12	10%	22	9%
37-45	14	12%	15	12%	29	12%
46-54	11	9%	10	8%	21	9%
55-63	11	9%	6	5%	17	7%
64 >	6	5%	5	4%	11	5%
Total	**118**		**125**		**243**	

Household size in Thar Si is similar to other villages with the 3-4 and 5-6-member households being the most common.

Table 3: Sample households of Thar Si by Household Size

Household Members	Number of Households
1-2	3
3-4	18
5-6	22
7-9	6
10+	0

Education

Education levels are similar to other impact zone villages with just under half having a primary school education. Given the isolated nature of Thar Si, monastic schools have also been an important education provider and very few have had the opportunity to attend middle school, let alone high school.

Table 4: Education levels by gender of Thar Si

Education	Female	Male	Total
Not known	1		1
High School	4	5	9
Middle School	6	6	12
Monastic Education	13	22	35
No Education	31	9	40
Primary School	48	65	113
University		1	1
Kindergarten	2	1	3
Child/Other	11	13	24
Grand Total	**116**	**122**	**238**

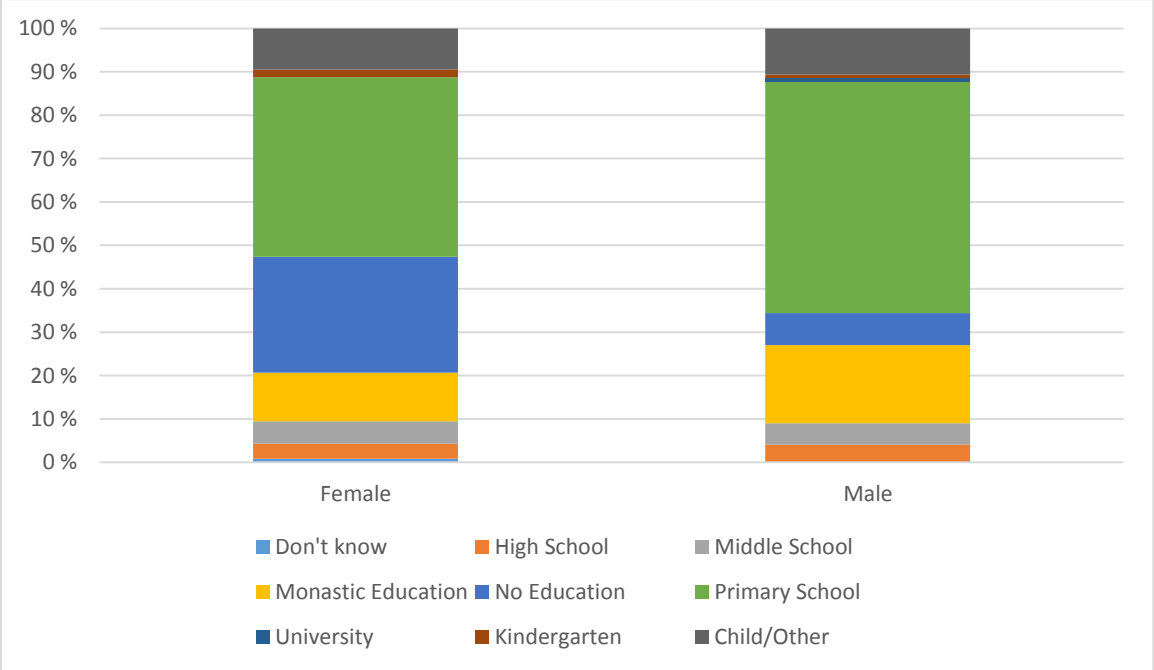


Figure 1: Education levels by gender of Thar Si

Table 5: Occupation of respondents by gender of Thar Si sample population

Occupation	Female	Male	Total
Farmer	75	80	155
Monk		1	1
Novice		2	2
Student	20	21	41
Other	2	2	4
Child/Dependent	20	18	38
Total	**117**	**124**	**241**

Vulnerability

Of the 49 households interviewed, 4 were reported as having a female household head.

Table 6: Households with disabled people in Thar Si

Type of Disability	Number of Afflicted Individuals
Deafness	1
Lame	1
Other	4

Livelihoods

As with other impact zone villages, the majority of Thar Si's income derives from the sale of agricultural crops. Interestingly, Thar Si's appears to have a more even split between different lrop types compared to the other left bank villages that tend to be more completely reliant on corn production.

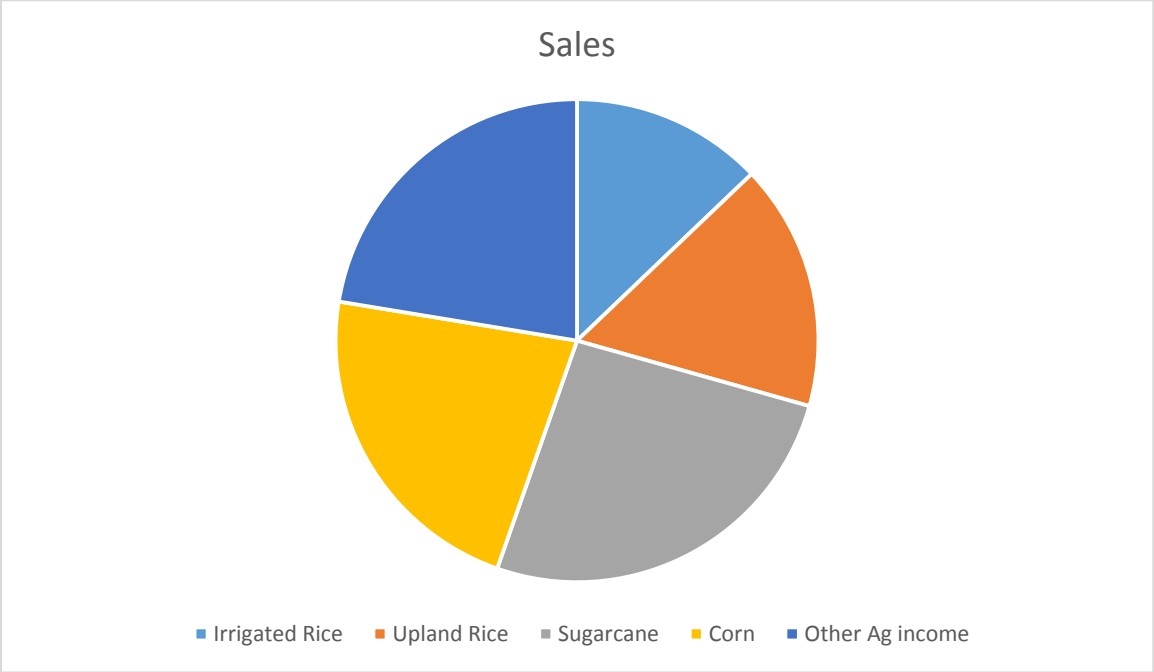


Figure 2: Estimated annual income from major crops

Of all the villages in the impact zones, Thar Si has the greatest access to forests. Other villages have cleared most available land for agriculture but the steep hills around Thar Si limit their ability to be cleared and planted. As a result, it is unsurprising that Thar Si reports a higher proportion of income derived from forest sources compared to other communities, which also affects the proportion of income derived from farm vs non-farm sources.

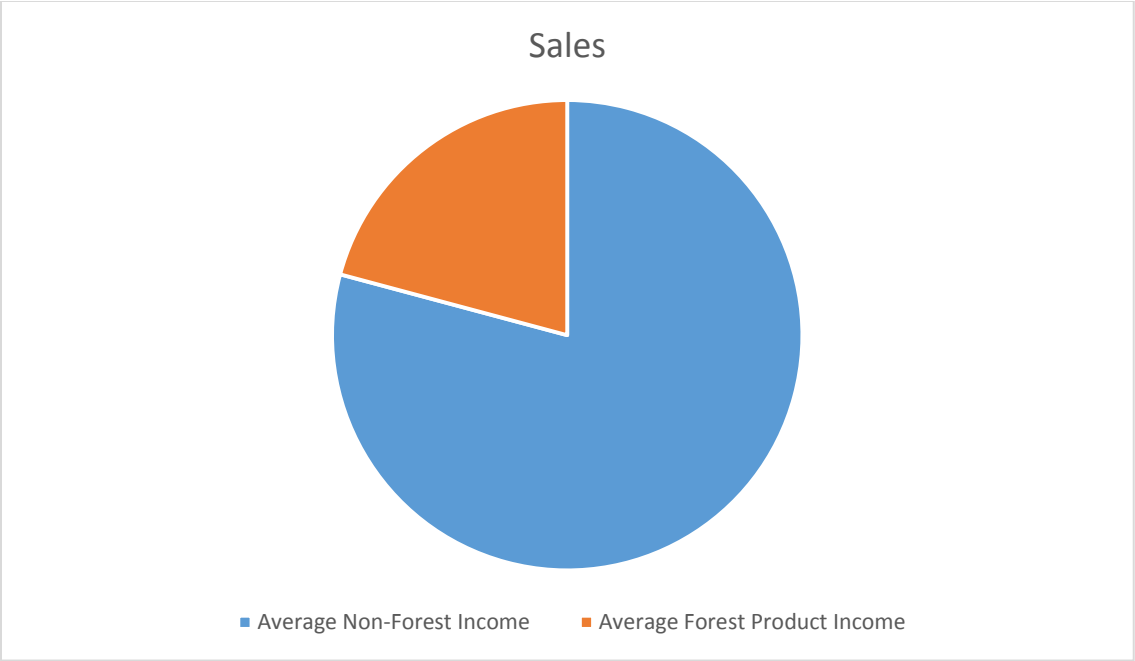


Figure 3: Forest income against non-forest income.

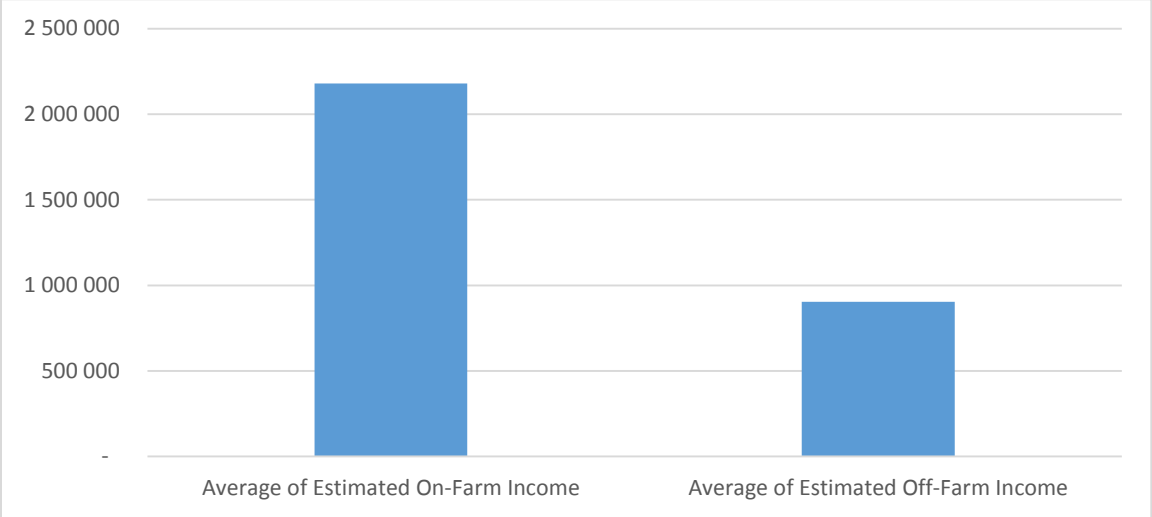


Figure 4: Agriculture income against non-agricultural income