

Species Richness and Riparian Vegetation of Plants in Cagayan de Oro River, Mindanao, Philippines

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ABSTRACT

Plants are producers; they take the energy emitted from the sun and turn it into simple sugars which is then turned into ATP (Adenosine Triphosphate), energy usable by the plant and animals) through cellular respiration. Other

animals then eat them and receive ten percent of the energy contained in the plant, also known as the ten percent rule. Assessment of plants was conducted along Cagayan de Oro River. It was surveyed for six months, three months each in the wet and in the dry seasons. The four sampling sites in Oro River revealed a total of 97 species belonging to 81 genera and 52 families. Of this number, 62 species were angiosperms, 1 gymnosperms, 24 pteridophytes, and 10 bryophytes. Family Verbenaceae has the highest number of species with six (6) species followed by Moraceae, Araceae and Arecaceae, with both 4 species each. Station 1 has the highest number of species (61), followed by Station 2 (50), Station 4 (36), and Station 3 (30). The study revealed 6 threatened species both locally and nationally. Of these threatened species, 5 were considered vulnerable, 1 endangered, 4 endemic species. Majority of the plant species (63.3 %) that were identified within the study area have economic values. It is recommended that the soft vegetation features of the riparian ecosystem in Oro River will be planted with indigenous or endemic species of trees and interspersed with economic species of plants to improve the quality and biodiversity of the river systems.

Keywords: Plant ecology, floral diversity, riparian vegetation, conservation status, Cagayan de Oro river

INTRODUCTION

The Philippines is considered as one of the megadiverse country in the world. Considering 7,107 islands and islets, the Philippines has many endemic species of plants. However, the country is regarded as one of the biodiversity hotspots in the world. This means that the country is one of the world's biologically richest but has the most threatened ecosystems. For the past decades, natural and anthropogenic causes have cost the country considerable number of species.

Plants are key regulators of ecosystem functions such as soil fertility and stability, water availability, and pest control. Decisions concerning vegetation management on rangeland should take these multiple considerations into account.

The role of plants in the ecosystem is that they form the largest visible part of an ecosystem. Often both the community and the ecosystem are named for the dominant plant present-that is, the plants that, by virtue of their size or numbers, modify and control the environment.

River and riparian vegetations are complex and dynamic systems supporting high biodiversity (Chovanec *et al.* 2000). Despite this fact, they are among the environments most disturbed and threatened by humans (Nilsson and Svedmark 2002). Likewise, riparian vegetation plays a crucial role in reducing input of matter from the terrestrial to the aquatic environment (Anbumozhi *et al.* 2005). Studies have shown that land uses affect not only the rivers and streams but also the diversity of the riparian vegetation (Brookes 1994).

Cagayan de Oro River originates from the northwestern slopes of the Kalatungan Mountains of Bukidnon Province. With a watershed area of approximately 115,000, it takes the name of Cagayan de Oro River after the confluence with Bulaong River and flows directly towards north along 16 barangays in a wider river bed reaching the sea at Macabalan Bay of Cagayan de Oro City. This study deals on the species richness and assessment of plants in the riparian vegetation in 4 sampling areas along the Oro River of Cagayan de Oro.

OBJECTIVES OF THE STUDY

This study was conducted to determine the species richness and assessment of vascular plants in Oro River, Cagayan de Oro. Specifically, it aimed to: a) identify the species of plants in each of the sampling sites; b) determine which site has high species richness; c) assess the conservation status of each species; and d) recommend policies for the proper management of the river and riparian ecosystems.

METHODOLOGY

Entry Protocol

The researchers asked permission from the DENR-10 to conduct the study. A wildlife Gratuitous Permit No. 2011-04 was given in pursuant to Republic Act 9147 and its Implementing Rules and Regulations- Joint DENR-DA-PCSD Admin. Order No.01, Series of 2004 and in accordance with DAO No. 2004-55, issued by the Office of the Regional Executive Director, DENR, Cagayan de Oro City, Philippines.

A preliminary survey was conducted along the target areas. A letter asking permission to conduct the study was given to the captains of the communities. The researchers personally visited and explained to the captains and officers the objectives of the study.

Sampling Areas

The area studied is along the stretch of Oro River, from upstream of Dansolihon down to Lumbia (Upstream), Taguanao (Middle, Taguanao Bridge), and ends at Puntod, (Downstream, Puntod Bridge).

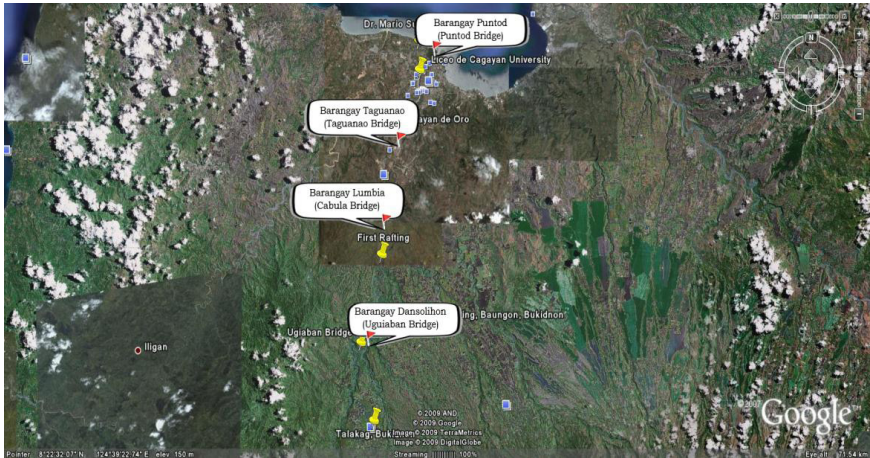


Figure 1. Map Shows the Four Sampling Stations in Cagayan de Oro river.

Four (4) sampling sites were selected as shown in Figure 1:

Sampling Station I ($08^{\circ}17'427$ N; $124^{\circ}35'124$ E, elevation: 4.9 masl): Upstream of Dansolihon's (Plate 1) with ecological condition considered pristine and with very few households.

Sampling Station II ($08^{\circ}23'324$ N; $124^{\circ}36'774$ E, elevation: 3.7 masl): Lumbia station (Plate 2) covers the potential pollution loads from upstream of Dansolihon up to the bridge.

Sampling Station III ($08^{\circ}23'317$ N; $124^{\circ}37'776$ E, elevation: 2.74 masl): Taguanao Bridge (Plate 3) station with pollution activities from Lumbia up to Mambuaya

Sampling Station IV ($08^{\circ}29'862$ N; $124^{\circ}38'983$ E, elevation: 2.74 masl): Puntod Bridge station (Plate 4) located near the mouth of Oro River with 'outfall' of all 'point' and 'non-point' pollution discharges by residential, commercial, and industrial establishments in the city poblacion.

For each sampling site, the riparian vegetation was described and the species of plants were identified, collected, and photographed (Plates 5-6). Representative specimens for each species were collected and processed as herbarium vouchers. These herbarium specimens were deposited at Central Mindanao University Museum and Liceo de Cagayan University Herbarium.

RESULTS AND DISCUSSION

A. Species Richness in Riparian Vegetation

The number and kinds of species of plants and land use changes in a riparian vegetation will not only affect water quality but consequently alter the composition of the river biodiversity, including macrophytes.

Inventory of plants in four sampling sites in Oro River revealed a total of 97 species (Plates 7-9) belonging to 81 genera and 52 families. Of this number, 62 species were angiosperms, 1 gymnosperms, 24 pteridophytes and 10 bryophytes (Table 1). Family Verbenaceae has the highest number of species with six (6) species, followed by Moraceae, Araceae and Arecaceae with both 4 species each. Station 1 has the highest number of species (61), followed by Station 2 (50), Station 4 (36), and Station 3 (30). Some of these species were also observed along the Pulangui River in Bukidnon (Amaroso 1993).

Species richness differs in 4 sampling sites and dependent on the quality of the riparian vegetation and land use. Of the four sites, sampling site I which is located upstream in Barangay Dansolihon had the most number of species and decreasing downstream (Table 1). The high species richness in upstream sampling site is due to more hard riparian vegetation characterized by tree roots, rocks and river banks covered with big trees and with epiphytes. The low species richness in sampling sites III and IV is due to the alteration of the riparian vegetation as human settlement, industrial and agricultural areas. Thus land use changes have affected the species richness in a riparian vegetation as also shown in the study of Harding *et al.* (1998).

In terms of uniqueness to each of the stations, 16 species were found only in sampling site 1, 11 species in sampling site 2, 2 species in sampling site 3 and 14 species in sampling site 4.

Table 1. Total Number of Families, Genera and Species in Oro River, Cagayan de Oro

Plant Groups	Families	Genera	Species	Endemic	Threatened
Angiosperms	32	55	62	4	1
Gymnosperms	1	1	1	0	0
Pteridophytes	10	17	24	0	5
Bryophytes	9	8	10	0	0
TOTAL	52	81	97	4	6

B. Conservation Status and Economic Uses of Plant Species

As basis for the protection, conservation and monitoring of the species, assessment of the status was necessary. The study revealed 6 threatened species both locally and nationally. Of these threatened species, 5 were considered vulnerable viz; (*Asplenium nidus*, *Cyathea contaminans*, *Drynaria quercifolia*, *Microsorium punctatum*, and *Psilotum nudum*) and one endangered species (*Vitex parviflora*). Four endemic species were identified, viz; *Caryota cumingii*, *Schefflera odorata*, *Livistona merillii* and *Artocarpus blancoi*. Majority of the plant species (63.3 %) that were identified within the study area have economic values. Among the economic plants, 20 species are considered as source of food, 8 are utilized for timber/lumber, 19 are ornamental, 4 species have medicinal uses and others were undetermined due to absence of reported uses.

It is noteworthy to mention that a tree (*Ficus baletae*) observed in Sampling Site 2 is the habitat of the most primitive and rootless vascular plant, *Psilotum nudum* (Plate 10). The habitat of this rare vascular plant should be protected to avoid the loss of this primitive and rootless vascular plant.

Table 2. Number of Species in Four Stations

Plant Groups	Number of Species in Four Stations			
	1	2	3	4
Angiosperms	32	26	18	31
Gymnosperms	0	1	0	0
Pteridophytes	18	13	4	1
Bryophytes	10	10	8	4
TOTAL	61	50	30	36

Legend: Station I: Barangay Dansolihon's

Station III: Taguanao Bridge

Station II: Barangay Lumbia

Station IV: Puntod Bridge

Table 3. Plant Species in Four Sampling Sites of Cagayan de Oro River and their Economic Uses

FAMILY			Station				Economic Uses
A. ANGIOSPERMS							
	Species Name	Common name	1	2	3	4	
Anacardiaceae	<i>Mangifera indica</i> L.	Mangga	x		x	x	Food
	<i>Tabernaemontana pandacaqui</i> L.	Kampupot	x				
Amaranthaceae	<i>Amaranthus caudatus</i> L.	Amaranthus				x	
	<i>A. spinosus</i> L.	Kolitis			x	x	
	<i>A. viridis</i> L.	Kolitis			x	x	
Annonaceae	<i>Annona muricata</i> L.	Guayabano, babana		x			Food
Araceae	<i>Amorphophallus campanulatus</i> (Roxb.) Bl. Ex Decne.	Pongapong / tungkod-langit			x		
	<i>Colocasia esculenta</i> L. Schott & Endl.	Gabi		x			Food
	<i>Philodendron laserum</i> (Jacq.) Scott.	Toothed philodendron	x				
	<i>Xanthosoma sagittifolium</i> L. Schott	Gabi-gabi	x	x			
Araliaceae	<i>Schefflera odorata</i> (Bico.) Merr. & Rolfe	Galamay-amoy	x	x	x		Firewood
	<i>Schefflera</i> sp.	Tiglima	x				
	<i>Polyscias</i> sp.	Aralia / Polyscias	x			x	
Arecaceae	<i>Caryota cumingii</i> Lodd. ex Mart	Patikan / Pugahan	x		x		
	<i>Cocos nucifera</i> L.	Lubi	x	x	x	x	food
	<i>Livistona merrillii</i> Becc.	Livistona		x			Raw material for handycrft Ceiling
	<i>Nypa fruticans</i> Wurm	Nipa				x	
Asclepiadaceae	<i>Dischidia platyphylla</i> Schltr.	Timbang-timbang	x	x			
Balsaminaceae	<i>Impatiens balsamina</i> L.	Kamantigi	x	x			ornamentals
	<i>Impatiens montalbanica</i>	Jewelweeds / Balsams	x				ornamentals
Bignoniaceae	<i>Spathodea campanulata</i> Beauv.	African Tulip Tree	x	x			Timber for light construction
Caricaceae	<i>Carica papaya</i> L.	Kapayas	x	x	x		Food
Commelinaceae	<i>Commelina odorata</i>		x			x	
Combretaceae	<i>Terminalia catappa</i> L.	Talisay				x	Timber
Convolvulaceae	<i>Ipomea aquatica</i> Forssk.	Kangkong		x			Food
Cucurbitaceae	<i>Cucurbita maxima</i> Duch.	Kalabasa		x	x	x	Food
Cyperaceae	<i>Cyperus rotundus</i> L.	Kogon				x	ceiling
Euphorbiaceae	<i>Mallotus</i> sp.	Dalayap	x		x	x	firewood
	<i>Jatropha curcas</i> L.	Tuba-tuba				x	Medicinal
	<i>Manihot esculenta</i> Crantz	Balaghoy	x				Food
Fabaceae	<i>Mimosa pudica</i> L.	Makahiya	x	x		x	Medicinal
	<i>Acacia mangium</i> Willd.	Mangium		x	x	x	Lumber
Flagellariaceae	<i>Flagellaria indica</i> L.		x				
Meliaceae	<i>Lansium domesticum</i> Corr. Serr.	Lansones				x	Food
	<i>Swietenia macrophylla</i> King	Mahogany		x		x	Lumber
	<i>Sandoricum koetjape</i> (Burm. f.) Merr.	Santol				x	Food
Moraceae	<i>Artocarpus blancoi</i> (Elm.) Merr.	Antipolo	x			x	Food
	<i>A. heterophyllus</i> Lamk.	Nangka	x			x	Food
	<i>Ficus balet</i> Merr.	Balite	x	x			Timber

	<i>Ficus septica</i>	Auli		x		x	Firewood
Moringaceae	<i>Moringa oleifera</i> Lam.	Kamungay		x	x	x	Food
Musaceae	<i>Musa sapientum</i> L.	Saging	x			x	Food
Myrtaceae	<i>Psidium guajava</i> L.	Bayabas				x	Food
Passifloaceae	<i>Passiflora edulis</i> Sims	Passion fruit	x				Food
Poaceae/ gramineae	<i>Bambusa vulgaris</i> Schrud. ex J.C. Wendl.	Kawayan	x	x	x		Fence/furniture
	<i>Paspalum conjugatum</i> Berg.	Carabao-grass				x	
	<i>Cymbopogon citratus</i> (DC.) Stapf	Tanglad				x	Food
Rubiaceae	<i>Neonauclea</i> sp.	Kalamansanai	x				Firewood
Rutaceae	<i>Citrus</i> sp.	Citrus		x		x	Food
Sapotaceae	<i>Chrysophyllum cainito</i> L.	Kaimito	x			x	Food
Solanaceae	<i>Capsicum frutescens</i> L.	Sili	x	x			Food
	<i>Solanum melongena</i> L.	talong		x		x	Food
	<i>Solanum</i> sp.					x	
Sonneratiaceae	<i>Sonneratia alba</i> J. Sm.					x	Firewood
Sterculiaceae	<i>Kleinhovia hospita</i> L.	Tan-ag	x	x	x	x	Medicinal
Verbenaceae	<i>Doranta repens</i> L.	Golden rosary	x				Ornamental
	<i>Gmelina arborea</i> Roxb.	Gmelina		x	x		Lumber
	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Light blue snakeweed		x	x	x	
	<i>Tectona grandis</i> L.	Tekla/teakwo od		x			Lumber
	<i>Vitexparviflora</i> Juss.	Kamagong	x				Lumber
	<i>Lantana camara</i> L.	Baho-baho	x				
Vitaceae	<i>Cissus</i> sp.	Grape ivy	x				Ornamental
B. Gymnosperms							
Pinaceae	<i>Pinus kesiya</i>	Benguet Pine		x			Ornamental
C. Pteridophytes							
Aspleniaceae	<i>Asplenium nidus</i> Linn.	Pugadlawin	x				Ornamental
	<i>A. polyodon</i> Forst f.	Sickle spleenwort	x				ornamental
Cyatheaceae	<i>Cyathea contaminans</i> (Wall) Copel.	Pakong- buwaya	x				ornamental
Davalliaceae	<i>Davallia solida</i> (G. Forst) Sw.	Rabbit's-foot fern	x	x			ornamental
Lomariopsidaceae	<i>Nephrolepis hirsutula</i> (Forst.) Presl.	Alolokdo	x	x	x		ornamental
	<i>N. bisserata</i>	Bold sword fern	x	x			Ornamental
	<i>Nephrolepis cordifolia</i> (L.) Presl		x				ornamental
Lygodiaceae	<i>Lygodium circinnatum</i> (Burm.) Sw.	Nitongputi	x	x	x		furniture
Pteridaceae	<i>Adiantum caudatum</i>	Alambrillong- gubat	x				ornamental
	<i>Acrostichum aureum</i> L.	Mangrove fern				x	

	<i>Pityrogramma calomelanos</i> (L.) Link.	Pakong-kalabao		x			
	<i>Pteris glaucovirens</i> Goldm.		x				
	<i>P. mutilata</i> L.	Buntot-kapon		x			
	<i>P. vitata</i>	Ladder brake	x	x	x		
Polypodiaceae	<i>Drynaria sparcisora</i>			x			Ornamental
	<i>Drynaria quercifolia</i> (Linn.) J. Sm.	Pakpak-lawin	x	x	x		ornamental
	<i>Microsorium punctatum</i> (Linn.) Copel.	Climbing bird's nest fern	x				ornamental
	<i>Pyrossiaadnacens</i>	Pagong-pagongan	x	x			
Psilotaceae	<i>Psilotum nudum</i> (L.) P. Beauv.	Whisk fern		x			ornamental
Selaginellaceae	<i>Selaginella involvens</i> (Sw.) Spring.	Medicinal spikemoss / Arbovitae fern		x			Ornamental
	<i>Selaginella sp.</i>	Spreading club moss	x				ornamental
Thelypteridaceae	<i>Christella parasitica</i> (Linn) Lev.	Lokdo-lokdo	x	x			
	<i>Macrothelypteris sp. 1</i>	Mariana maiden fern		x			
	<i>Thelypteris sp. 1</i>		x				

D. Bryophytes							
Family	Species Name	Common name					
			1	2	3	4	
Dicranaceae	<i>Holomitrium cylindraceum</i> (P. Beauv.) Wijk & Marg.		X	X	X	X	medicinal
Pottiaceae	<i>Hyophila involuta</i> (Hook.) Jaeg.	Inrolled Pott Moss	X	X	X	X	medicinal
	<i>Hyophila rosea</i> Williams		X	X	X	X	medicinal
Bryaceae	<i>Bryum apiculatum</i> Schwaegr.	Apiculate Bryum Moss	X	X	X		
Thuidiaceae	<i>Thuidium cymbifolium</i> (Dozy & Molke.) Dozy & Molke.	Eastern Weft-moss	X	X	X		
Thuidiaceae	<i>Thuidium glaucinum</i> (Mitt.) Bosch. & Lac.		X	X	X		medicinal
Entodontaceae	<i>Erythrodontium julaceum</i> C. Mull		X	X	X		

Liverworts							
Family	Species Name	Common name					
			1	2	3	4	
Lejeuneaceae	<i>Cololejeunea lanciloba</i> .		X	X	X	X	medicinal
Marchantiaceae	<i>Marchantia polymorpha</i>	Money liverwort	X	X			medicinal
Ricciaceae	<i>Riccia glauca</i>	crystalwort	X	X			
Total No. of species = 97			61	50	30	36	
	<i>percentage</i>		62.89	51.55	30.93	37.11	

Table 4. Threatened Plants in Riparian Vegetation along Oro

1. <i>Asplenium nidus</i> Linn.	Vulnerable
2. <i>Cyathea contaminans</i> (Wall) Copel.	Vulnerable
3. <i>Drynaria quercifolia</i> (Linn.) J. Sm.	Vulnerable
4. <i>Microsorium punctatum</i> (L.) Copel.	Vulnerable
5. <i>Psilotum nudum</i> (L.) P. Beauv.	Vulnerable
6. <i>Vitex parviflora</i> Juss.	Endangered

CONCLUSIONS AND RECOMMENDATIONS

Species richness of plants increases from upstream to downstream sampling areas. Land use changes have affected species richness in riparian vegetation. Hard vegetation such as tree roots, rocks, stone and banks covered with trees exhibited high species richness and with threatened and endemic species. It is recommended that the soft vegetation features of the riparian ecosystem in Oro River will be planted with indigenous or endemic species of trees and interspersed with economic species of plants to improve the quality and biodiversity of the river systems.

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CAGAYAN DE ORO RIVER BEFORE AND AFTER
SENDONG AND PABLO
Liceo De Cagayan University, Cagayan de Oro City
Produced with support from Commission on Higher Education (CHED)



BEFORE



AFTER



Plate 1. Station 1: Dansolihon - Uguiaban Bridge.



CAGAYAN DE ORO RIVER BEFORE AND AFTER
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BEFORE



AFTER



Plate 2. Station 2: Lumbia - Cabula Bridge.



**CAGAYAN DE ORO RIVER BEFORE AND AFTER
SENDONG AND PABLO**
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BEFORE



AFTER



Plate 3. Station 3: Taguanao - Taguanao Bridge.



CAGAYAN DE ORO RIVER BEFORE AND AFTER SENDONG AND PABLO

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BEFORE



AFTER



Plate 4. Station 4: Puntod - Puntod Bridge.



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Plate 5. Plants Sampling in Cagayan de Oro River.



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Plate 6. Plants Sampling in Cagayan de Oro River.



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Tectona grandis L. f.
LEGUMINACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Ficus septica Burm. f.
MORACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Livistona sp.
ARECACEAE
Station 1: Barangay Dansolihon



Cassia mangium Rolfe.
FABACEAE/LEGUMINOSAE
Station 4: Puntod Bridge



Mangifera indica L.
ANACARDIACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Arenga pinnata (Wurm) Merr.
ARECACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Tabernaemontana pandacaqui Poir.
APOCYNACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Nypa fruticans Wurm.
ARECACEAE/PALMAE
Station 4: Puntod Bridge



Mallotus multiglandulosus (Reinw. Ex Bl.) Hurus
EUPHORBIACEAE
Station 4: Puntod Bridge



Leucaena leucocephala (Lam.) de Wit
FABACEAE/LEGUMINOSAE
Station 4: Puntod Bridge



Polyscias nodosa (Bl.) Seem.
ARALIACEAE
Station 1: Barangay Dansolihon



Artocarpus blancoi (Elm.) Merr.
MORACEAE
Station 1: Barangay Dansolihon

Plate 7. Aqua & Terrestrial Flora: Plants in Cagayan de Oro River.



Liceo De Cagayan University, Cagayan de Oro City
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Dischidia platyphylla Schltr.
ASCLEPIADACEAE
Station 1: Barangay Dansolihon

Impatiens balsamina L.
BALSAMINACEAE
Station 1: Barangay Dansolihon

Impatiens montalbanica
BALSAMINACEAE
Station 1: Barangay Dansolihon

Solanum sp.
SOLANACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Stachytarpetta jamaicensis (L.) Vahl.
VERBENACEAE
Station 4: Puntod Bridge

Chromolaena odorata (L.) R.M. King & H. Rob.
ASTERACEAE/COMPOSITAE
Station 3: Pelaez Bridge

Philodendron lacerum (Jacq.) Schott.
ARACEAE
Station 1: Barangay Dansolihon

Heliotropium indicum L.
BORAGINACEAE
Station 4: Puntod Bridge



Cassia tora L.
FABACEAE
Station 4: Puntod Bridge
Station 4: Puntod Bridge

Cyperus papyrus L.
CYPERACEAE
Station 4: Puntod Bridge
Station 4: Puntod Bridge

Lantana camara L.
VERBANACEAE
Station 1: Barangay Dansolihon
Station 1: Barangay Dansolihon

Xanthosoma sagittifolium Schott.
ARACEAE
Station 1: Barangay Dansolihon
Station 1: Barangay Dansolihon

Plate 8. Aqua & Terrestrial Flora: Plants in Cagayan de Oro River.



Liceo De Cagayan University, Cagayan de Oro City
Produced with support from Commission on Higher Education (CHED)



Asplenium polyodon Forst.
ASPLENIACEAE
Station 1: Barangay Dansolihon

Davallia solida (Forst.) Sw.
DAVALLIACEAE
Station 1: Barangay Dansolihon

Sphaeropteris glauca (Wall. Ex Hook) Copel.
CYATHEACEAE
Station 1: Barangay Dansolihon

Lygodium circinnatum (Burm.) Sw.
LYGODIACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Psilotum nudum (L.) Beauv.
PSILOTACEAE
Station 2: Kabula Bridge, Barangay Lumbia

Pityrogramma calomelanos (L.) Link
PTERIDACEAE
Station 1: Barangay Dansolihon

Pteris mutilata L.
PTERIDACEAE
Station 2: Kabula Bridge, Barangay Lumbia

Pteris vitata L.
PTERIDACEAE
Station 2: Kabula Bridge, Barangay Lumbia



Selaginella cf. cupressina
SELAGINELLACEAE
Station 2: Kabula Bridge, Barangay Lumbia

Acrostichum aureum L.
PTERIDACEAE
Station 4: Puntod Bridge

Drynaria sparsisora (Desv.) Moore
POLYPODIACEAE
Station 1: Barangay Dansolihon

Microsorium punctatum (L.) Copel.
POLYPODIACEAE
Station 1: Barangay Dansolihon

Plate 9. Aqua & Terrestrial Flora: Plants in Cagayan de Oro River.



Plate 10. Habit of *Ficus baletae* and the Branch with the Primitive Rootless Vascular Plant *Psilotum nudum* (inset) Observed in Sampling Site 2.