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Tree species diversity in the adopted forest of Barangay Verdu, Bayugan City, Agusan Del Sur, Philippines

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ABSTRACT

Tree species composition significantly shapes the structure and function of forest ecosystems. Tree species vary in the ecosystem services they provide, including carbon sequestration, nutrient cycling, soil conservation, and wildlife habitat. This study assessed the tree species diversity in the adopted forest of Bayugan National Comprehensive High School, situated in Barangay Verdu, Bayugan City, Agusan Del Sur, Philippines. A quadrat sampling method was employed to survey trees in the area. Nine 20 m x 20 m quadrats were established, and identification of species was done. A total of 31 tree species were recorded in the area, including Himbabaod or *Neonauclea formicaria* (Elm.) Merr. from the Rubiaceae family is a highly numbered species with an importance value of 29.55. The Moraceae family has the highest number of species in the area. Species diversity was also computed using Shannon-Weiner and Simpson's Index, which resulted in moderate to very high diversity. Two vulnerable species were present, *Shorea negrosensis* and *Nephelium lappaceum* according to DAO 2017-11, whereas *Sandoricum koetjape* and *Palaquium pinnatinervium* were vulnerable and endangered according to IUCN, respectively. The majority of the trees are saplings and poles which suggests a tree-growing initiative as well as more conservation efforts in protecting the area.

Keywords: Tree species, diversity, adopted forest, conservation status.

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INTRODUCTION

Background of the study

Tree species composition is a critical factor that plays a significant role in shaping the structure and function of forest ecosystems. Forest ecosystems consist of diverse species, including trees, shrubs, herbs, and wildlife. Trees are particularly essential to the functioning of these ecosystems, as they provide many ecosystem services, including carbon sequestration, nutrient cycling, soil conservation, and wildlife habitat (Why Are Trees So Important? n.d.).

The Philippines is a country in Southeast Asia that is known for its rich biodiversity and extensive forest cover. However, over the past several decades, the country has experienced a significant decline in its forest ecosystem status due to deforestation, forest degradation, and unsustainable land use practices (Biodiversity Management Bureau (BMB) Department of Environment and Natural Resources (DENR), 2016). Data from Global Forest Watch indicates that the Philippines' forest cover decreased by 7.6% from 2001 to 2022 (https://www.globalforestwatch.org/dashboards/country/PHL/). One of the top 11 regions of the Philippines responsible for the tree cover loss is the province of Agusan del Sur, which ranked second to the highest of the areas that lost their tree cover. The primary reason for this decline was deforestation brought on by commodities. It is also connected to increased agricultural output, industrial logging, and the conversion of forests to other land uses like mining, infrastructural development, and urbanization.

To address these issues, the Philippine government has implemented various policies and programs to conserve and restore forest ecosystems. These include

the National Greening Program (Executive Order no. 26, s. 2011) which aims to plant 1.5 billion trees in 1.5 million hectares of degraded forestlands by 2016 in cooperation with various agencies including the Department of Education and private sectors. Now, it is further implemented into the Enhanced National Greening Program (Executive Order no. 193, s. 2015) to rehabilitate more forestlands with an estimated 7.1 million hectares from 2016-2028. This program was also reinforced with the Forest Management Bureau's Community-Based Forest Management Program, which promotes sustainable forest management and recognizes the rights of indigenous peoples and local communities.

As mandated by the national government, Barangay Verdu located in the city of Bayugan, Agusan del Sur, Philippines has chosen a location to serve as a community forest reserve in collaboration with the DENR Bayugan City. In addition, Bayugan National Comprehensive High School (BNCHS) Youth for Environment in Schools Organization (BNCHS YES-O) also adopted a 1-hectare forest from that community forest reserve which was called the BNCHS Forest Park Project in 2012. The adopted forest was a denuded area that resulted in selective logging and small-scale mining in the past decades. Thus, the adopted forest in Verdu is a reforestation program implemented by the local government, DENR, and BNCHS to restore and rehabilitate the degraded forest areas. The project involves various activities such as tree planting, forest monitoring, and capacity building of local communities in sustainable forest management.

However, the inventory of tree species present and the diversity of that adopted forest are not yet known. Therefore, this study aims to assess the tree species present, their diversity, and their conservation status in the area. The results of this study will serve as baseline information for effective forest management strategies and the formulation of site policies.

Objectives

The main objective of this study is to assess the diversity and species composition of trees in the adopted forest of Bayugan National Comprehensive High School in Barangay Verdu, Bayugan City, Agusan Del Sur, Philippines.

Specifically, it aims to answer the following objectives:

1. To determine the species of trees present in the adopted forest of Bayugan National Comprehensive High School in Barangay Verdu, Bayugan City;
2. To determine the species diversity and evenness;
3. To determine the species' relative density, relative frequency, and importance value;
4. To determine the conservation status of the tree species.

METHODOLOGY

Research site

Figure 1 shows the adopted forest of Bayugan National Comprehensive High School, geographically located at 8°43'40'' N, 125°41'55'' E. This is situated at Barangay Verdu, Bayugan City, Agusan Del Sur, Philippines. The (1) hectare adopted forest is part of the Verdu Community Watershed and Protected Agro Forest Reserve.

Research design and sampling

A descriptive type of research was employed in the study to assess the tree species composition and diversity of the adopted forest.

Figure 2 shows the sampling layout of the adopted forest. The survey utilized a quadrat sampling where each quadrat has a 20m x 20m dimension. All species of trees within the 20x20 m quadrants were recorded (Demetillo et al., 2015). The minimum diameter at breast height (DBH) of at least 1 cm was deemed a tree for this study. A total of nine (9) quadrats were measured in the area with geographical coordinates shown in Figure 2 using a cellular phone with a Global Positioning System (GPS) application.

Data gathering procedure

An approval letter was sent to the DENR and the Barangay Captain of the Barangay Verdu before the conduct of the study.

Different materials were used starting from site establishment until the identification and counting of tree species. Straw threads, bamboo sticks, meter tapes, and GPS devices were used to establish the quadrats and obtain the coordinates; while pencil, data sheets, and masking tape were used for the listing and marking of the tree species. In addition, a forester from the DENR, a local guide, and a farmer from the area help to identify and count the species of each quadrat. Trees were identified using their diagnostic features such as flower and fruit, stem, bark, leaf apex, leaf arrangement, leaf base and leaf margin (Lleno et al., 2023). In the case of an unidentified tree species, pictures of the tree's features were taken. Additionally, Co's Digital Flora of the Philippines (CDFP) and philippineplants.org were used as online identification resources (Pelser et al., 2011 onwards).

Data analysis

Relative density (RD), relative frequency (RF), and its importance value index (IVI) were calculated.
Each species' density was estimated using the formula:

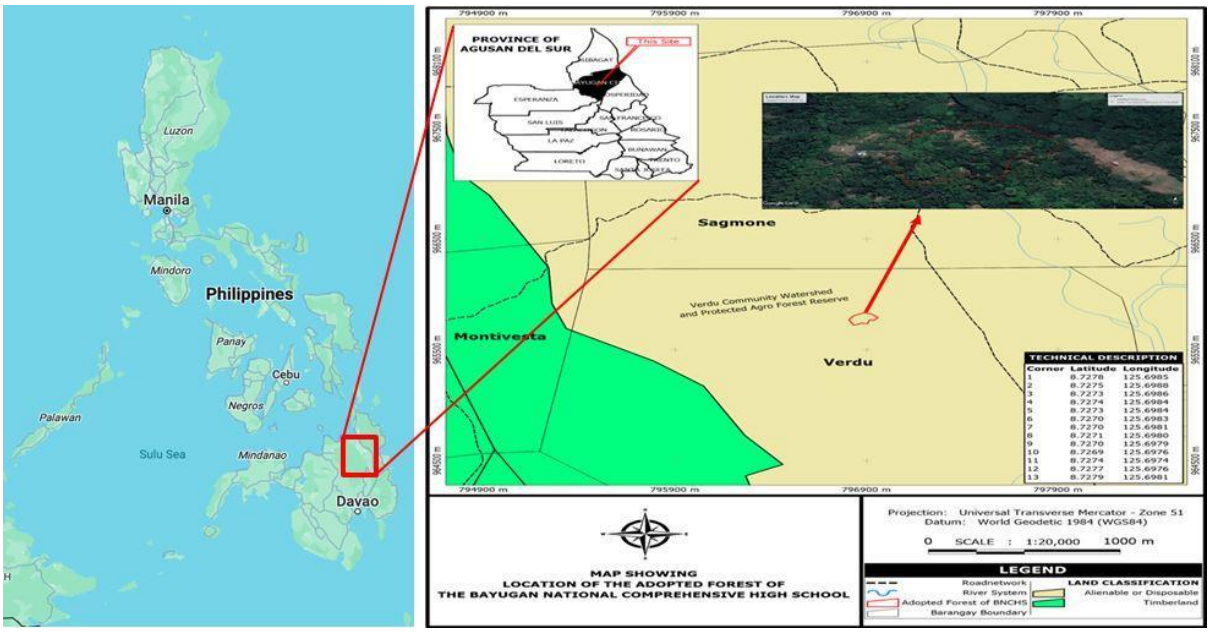

Figure 1. Map showing the location of the adopted forest of Bayugan National Comprehensive High School.

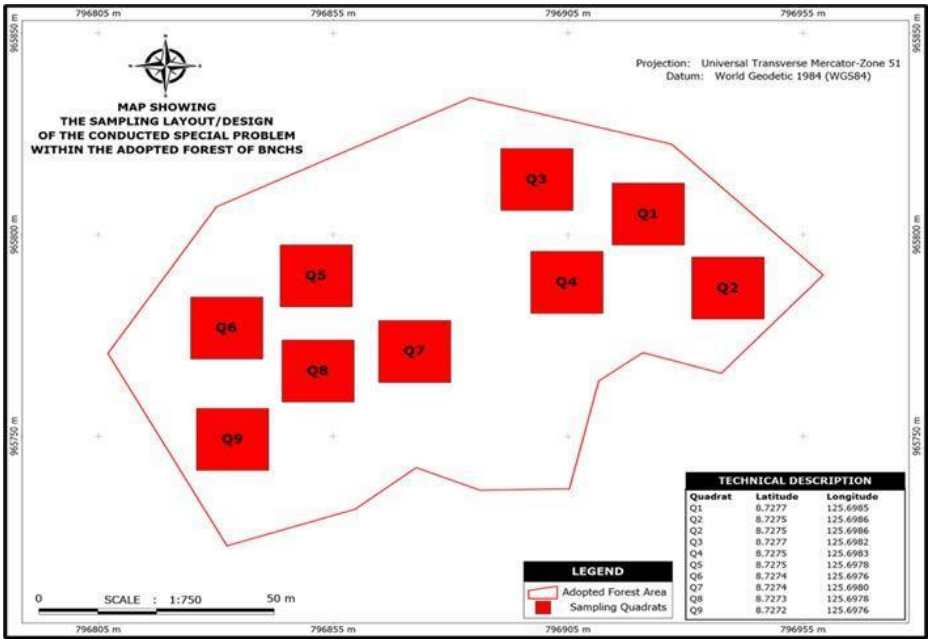

Figure 2. Sampling lay-out of the adopted forest.

Relative Density (RD) = species density / Total densities for all species

The density of each species was recorded as the number of individuals per total quadrat sampled.
The frequency measures the occurrence of species over the total quadrat studied and the relative frequency was calculated using the formula,

Relative Frequency (RF) = (Species frequency /Total frequencies for all species) x 100%

The Importance Value (IV) Index was calculated by adding RF and RD for each species (Damhoureyeh, 2019; Sarkar, 2015).
Diversity indices such as Shannon and Simpson evenness were also computed using these formulas:

Shannon-Wiener Diversity (H'):

H' = -∑_(i=1)^s (pi x ln pi)

Where S is the total number of species, pi is the proportion of individuals to the i^{th} species expressed as a portion of the total cover and ln is the log base n.

Simpson's Diversity (D):

$$D = \frac{\Sigma\, n(n-1)}{N(N-1)}$$

Where D is the diversity index, n is the total number of organisms of a particular species, and N is the total number of organisms of all species

Shannon Index measures species richness and distribution diversity while Simpson Evenness measures species evenness in the distribution of species and individuals per quadrat. Both indices were interpreted using Fernando Biodiversity Scale (Coracero and Malabrigo, 2020) shown in table 1.

Endemism was assessed using the Co's Digital Flora of the Philippines, while conservation status was assessed using the International Union for Conservation of Nature Red list (IUCN) for the worldwide category and DAO 2017-11 for the Philippine scheme (Coracero and Malabrigo, 2020).

Table 1. Fernando Biodiversity Scale

Relative Values	Shannon Index	Evenness Index
Very high	3.5 and above	0.75 - 100
High	3.0 - 3.49	0.5 - 0.74
Moderate	2.5 - 2.99	0.25 - 0.49
Low	2.0 - 2.49	0.15 - 0.24
Very low	1.9 and below	0.05 - 0.14

RESULTS AND DISCUSSION

Tree species

A total of 604 trees belonging to 27 genera, 21 families, and 31 species were recorded in the adopted forest in Barangay Verdu, Bayugan City. Table 2 shows the list of tree species recorded.

Table 2 shows that the Moraceae family contains the most species in the area, followed by the Lamiaceae, and the same number of species is found in the Annonaceae, Araliaceae, Fabaceae, Meliaceae, and Rubiaceae families. In addition, the families with the highest number of individuals belong to the family Rubiaceae (26.41%). The most prevalent species in the area is *Neonauclea formicaria (Elm.) Merr.* or locally known as Himbabaod, is a member of the Rubiaceae family. This dominant tree in the area was also recorded as the dominant tree species in Dagohoy Watershed in the Municipality of Alicia, Bohol (Initial Environmental Examination, 2018). A previous silviculture study of Claveria (1953) revealed that this tree can be a reforestation crop in the Philippines. One study also showed that Himbabaod or *Neonauclea formicaria (Elm.) Merr.* is economically important as fuelwood (Terrestrial Biodiversity Assessment, n.d.).

The following trees are also large in numbers such as *Leucosyke capitellata (Poir.) Wedd, Syzygium leucoxylon*, and *Ficus nota (Blanco) Merr.* In contrast, *Terminalia copelandii, Gnetum gnemon L., Averrhoa bilimbi L., Artocarpus heterophyllus Lam*., and *Sandoricum koetjape* have the lowest number. One species was unidentified in the area. Tree diagnostic features such as stem, bark, leaf apex, leaf base, and leaf margin were photographed for further identification. This suggests an intricate identification of species in this community forest reserve.

The bulk of the trees in the area were found to be saplings and pole trees, which shows that the forest is actively regenerating. This was confirmed through an interview with a local who stated that several mining and logging operations in the past had resulted in the denudation of the forest. Thus, reforestation activities should be conducted in the area.

Table 3 shows the occurrences of tree species in each quadrat. Based on the table, the most frequent species present in the area is the *Ficus nota (Blanco) Merr.* while *Tetrapanax papyrifer (Hook.) K.Koch, Terminalia copelandii, Gnetum gnemon L., Lansium domesticum, Sandoricum koetjape, Leucaena leucocephala, Artocarpus heterophyllus Lam., Ficus pseudopalma Blanco, Averrhoa bilimbi L., Nephelium lappaceum, Palaquium pinnatinervium,* and to be identified species are the least frequent species. These species can be found in one area only among the sampling areas being surveyed. It has also shown that among the quadrats, quadrats 1 and 5 have 13 species present while quadrat 6 has the least number of species present. This data may suggest a diverse species in the area.

Table 2. List of tree species on the adopted forest.

Family	Local Name	Scientific Name	No. of Individuals
Anacardiaceae	Mangga	*Mangifera indica*	9
Annonaceae	Anangilan	*Cananga odorata (Lam.)*	4
	Rabana	*Annona muricata*	2
Araliaceae	Hagdang Uwak	*Polyscias nodosa*	3
	Payong-payong	*Tetrapanax papyrifer (Hook.) K.Koch*	5
Clusiaceae	Mangosteen	*Garcinia mangostana*	9
Combretaceae	Lanipao	*Terminalia copelandii*	1
Dipterocarpaceae	Red Lauan	*Shorea negrosensis*	28
Fabaceae	Falcata	*Falcataria falcata (L.)*	40
	Madre de Cacao	*Gliricidia sepium*	3
Gentianaceae	Malakape	*Utania volubilis*	4
Gnetacea	Bago	*Gnetum gnemon L.*	1
Hypericaceae	Ulingon	*Cratoxylum sumatranum*	21
Lamiaceae	Abgao	*Premna odorata Blanco*	14
	Gmelina	*Gmelina arborea*	4
	Lagundi	*Vitex negundo*	10
Meliaceae	Lanzones	*Lansium domesticum*	2
	Santol	*Sandoricum koetjape*	1
Mimosaceae	Ipil-ipil	*Leucaena leucocephala*	2
Moraceae	Antipolo	*Artocarpus blancoi (Elmer) Merr.*	17
	Langka	*Artocarpus heterophyllus Lam.*	1
	Niyog-niyogan	*Ficus pseudopalma Blanco*	7
	Tubog	*Ficus nota (Blanco) Merr.*	54
Myrtaceae	Sagimsim	*Syzygium brevistylum*	59
Oxalidaceae	Iba	*Averrhoa bilimbi L.*	1
Rubiaceae	Buyon	*Mussaenda philippica A.*	26
	Himbabaod	*Neonauclea formicaria (Elm.) Merr.*	133
Sapindaceae	Rambutan	*Nephelium lappaceum*	9
Sapotaceae	Tagkan	*Palaquium pinnatinervium*	2
Urticaceae	Anagasi	*Leucosyke capitellata (Poir.) Wedd.*	130
Species to be identified			2

Table 3. Occurrences of tree species in quadrats.

Family	Scientific Name	Quadrats								
		1	2	3	4	5	6	7	8	9
Anacardiaceae	*Mangifera indica*	√	√		√		√	√	√	
Annonaceae	*Cananga odorata (Lam.)*	√				√				√
Annonaceae	*Annona muricata*		√						√	
Araliaceae	*Polyscias nodosa*	√							√	
Araliaceae	*Tetrapanax papyrifer (Hook.) K.Koch*					√				
Clusiaceae	*Garcinia mangostana*	√	√	√					√	
Combretaceae	*Terminalia copelandii*			√						
Dipterocarpaceae	*Shorea negrosensis*	√	√		√			√		
Fabaceae	*Falcataria falcata (L.)*	√		√	√	√	√		√	√
Fabaceae	*Gliricidia sepium*								√	√
Gentianaceae	*Utania volubilis*					√		√	√	
Gnetacea	*Gnetum gnemon L.*									√
Hypericaceae	*Cratoxylum sumatranum*			√	√		√	√		
Lamiaceae	*Premna odorata Blanco*			√		√		√		
Lamiaceae	*Gmelina arborea*	√							√	
Lamiaceae	*Vitex negundo*	√	√							
Meliaceae	*Lansium domesticum*					√				
Meliaceae	*Sandoricum koetjape*					√				
Mimosaceae	*Leucaena leucocephala*									√

Table 3. Continues.

Moraceae	*Artocarpus blancoi (Elmer) Merr.*	√		√		√		√	√
Moraceae	*Artocarpus heterophyllus Lam.*				√				
Moraceae	*Ficus pseudopalma Blanco*								√
Moraceae	*Ficus nota (Blanco) Merr.*	√	√	√	√	√	√	√	√
Myrtaceae	*Syzygium leucoxylon*		√	√	√	√	√	√	√
Oxalidaceae	*Averrhoa bilimbi L.*			√					
Rubiaceae	*Mussaenda philippica A.*	√			√		√		
Rubiaceae	*Neonauclea formicaria (Elm.) Merr.*	√	√		√	√	√	√	√
Sapindaceae	*Nephelium lappaceum*					√			
Sapotaceae	*Palaquium pinnatinervium*	√							
Urticaceae	*Leucosyke capitellata (Poir.) Wedd.*		√	√	√	√	√	√	√
Species to be identified									√

√- present.

Table 4 shows the density, frequency percentage, relative density, relative frequency, and importance value of tree species. Based on the results, *Neonauclea formicaria (Elm.) Merr.* got the highest importance value of 29.55, followed by *Leucosyke capitellata (Poir.) Wedd.* (IVI=29.05), *Ficus nota (Blanco) Merr.* (IVI=17.54), *Falcataria falcata (L.)* (IVI=14.15). In contrast, species with the least important value of 1.24 are *Artocarpus heterophyllus Lam., Averrhoa bilimbi L., Gnetum gnemon L.,* and *Terminalia copelandii.*

Table 4. Density, frequency percentage, relative density, relative frequency, and importance value of tree species in the adopted forest.

SPECIES	Density	Frequency (%)	RD	RF	IVI
Annona muricata	0.22	22.22	0.33	2.15	2.48
Artocarpus blancoi (Elmer) Merr.	1.89	55.56	2.81	5.38	8.19
Artocarpus heterophyllus Lam.	0.11	11.11	0.17	1.08	1.24
Averrhoa bilimbi L.	0.11	11.11	0.17	1.08	1.24
Cananga odorata (Lam.)	0.44	33.33	0.66	3.23	3.89
Cratoxylum sumatranum	2.33	44.44	3.48	4.3	7.78
Falcataria falcata (L.)	4.44	77.78	6.62	7.53	14.15
Ficus nota (Blanco) Merr.	6	88.89	8.94	8.6	17.54
Ficus pseudopalma Blanco	0.78	11.11	1.16	1.08	2.23
Garcinia mangostana	1	44.44	1.49	4.3	5.79
Gliricidia sepium	0.33	22.22	0.5	2.15	2.65
Gmelina arboarea	0.44	22.22	0.66	2.15	2.81
Gnetum gnemon L.	0.11	11.11	0.17	1.08	1.24
Lansium domesticum	0.22	11.11	0.33	1.08	1.41
Leucaena leucocephala	0.22	11.11	0.33	1.08	1.41
Leucosyke capitellata (Poir.) Wedd.	14.44	77.78	21.52	7.53	29.05
Mangifera indica	1	66.67	1.49	6.45	7.94
Mussaenda philippica A.	2.89	33.33	4.3	3.23	7.53
Neonauclea formicaria (Elm.) Merr.	14.78	77.78	22.02	7.53	29.55
Nephelium lappaceum	1	11.11	1.49	1.08	2.57
Palaquium pinnatinervium	0.22	11.11	0.33	1.08	1.41
Polyscias nodosa	0.33	22.22	0.5	2.15	2.65
Premna odorata	1.56	33.33	2.32	3.23	5.54
Sandoricum koetjape	0.11	11.11	0.17	1.08	1.24
Shorea contorta S. Vidal	3.11	44.44	4.64	4.3	8.94
Syzygium brevistylum [C.B.Rob.] Merr.	6.56	77.78	9.77	7.53	17.3
Terminalia copelandii	0.11	11.11	0.17	1.08	1.24
Tetrapanax papyrifer (Hook.) K.Koch	0.56	11.11	0.83	1.08	1.9
Utania volubilis	0.44	33.33	0.66	3.23	3.89
Vitex negundo	1.11	22.22	1.66	2.15	3.81
To be identified	0.22	11.11	0.33	1.08	1.41

Diversity indices

Table 5 shows the summary of diversity measures for trees in the adopted forest. The Shannon-Wiener Index score of 2.52 indicates that there is moderate species diversity in the area. This may be due to some logging activities before which resulted in the decrease of species richness in the area. However, the Simpson's Index score is 0.91 which indicates a very high diversity of the tree species. These contrasting values of diversity may indicate that the Shannon-Wiener Index is more sensitive to species richness and rare species while Simpson's index is more sensitive to relative abundance (Zeleny, 2023). Thus, the diversity of tree species in the area is classified from moderate to very high diversity.

Endemicity and conservation status

The endemicity and conservation status of the tree species in the selected forest are shown in Table 6. The endemicity percentage of tree species is shown in Figure 3. Data shows that the majority (55%) of the tree species are natives with 21% endemic. Despite having native trees, 45% are exotic species having 9% are invasive. This suggests more management strategy in the area because of the presence of these invasive species.

Table 5. Summary of diversity measures for trees in the adopted forest.

Diversity Index	Value	Interpretation
Shannon-Wiener	2.52	Moderate
Evenness Index	0.91	Very High

Table 6. Endemicity and conservation status of tree species in adopted forest.

Local Name	Scientific Name	Family Name	Endemicity	Conservation Status	
				DAO 2017-11	IUCN Redlist
Abgao	*Premna odorata Blanco*	Lamiaceae	Native	-	LC
Anagasi	*Leucosyke capitellata (Poir.) Wedd.*	Urticaceae	Native	-	LC
Anangilan	*Cananga odorata (Lam.)*	Annonaceae	Naturalized	-	LC
Antipolo	*Artocarpus blancoi (Elmer) Merr.*	Moraceae	Endemic	-	LC
Bago	*Gnetum gnemon L.*	Gnetacea	Native	-	LC
Buyon	*Mussaenda philippica A.*	Rubiaceae	Endemic	-	LC
Falcata	*Falcataria falcata (L.)*	Fabaceae	Naturalized	-	LC
Gmelina	*Gmelina arborea*	Lamiaceae	Invasive	-	LC
Hagdang Uwak	*Polyscias nodosa*	Araliaceae	Native	-	LC
Himbabaod	*Neonauclea formicaria (Elm.) Merr.*	Rubiaceae	Endemic	-	LC
Iba	*Averrhoa bilimbi L.*	Oxalidaceae	Naturalized	-	NE
Ipil-ipil	*Leucaena leucocephala*	Mimosaceae	Invasive	-	NE
Lagundi	*Vitex negundo*	Lamiaceae	Native	-	LC
Langka	*Artocarpus heterophyllus Lam.*	Moraceae	Naturalized	-	NE
Lanipao	*Terminalia copelandii*	Combretaceae	Native	-	LC
Lanzones	*Lansium domesticum*	Meliaceae	Native	-	NE
Red Lauan	*Shorea negrosensis*	Dipterocarpaceae	Endemic	VU	LC
Madre de Cacao	*Gliricidia sepium*	Fabaceae	Naturalized	-	LC
Mangga	*Mangifera indica*	Anacardiaceae	Naturalized	-	DD
Mangosteen	*Garcinia mangostana*	Clusiaceae	Cultivated, not Naturalized	-	NE
Payong-payong	*Tetrapanax papyrifer (Hook.) K.Koch*	Araliaceae	Non-native	-	LC
Rambutan	*Nephelium lappaceum*	Sapindaceae	Native	VU	LC
Sagimsim	*Syzygium brevistylum*	Myrtaceae	Native	-	NE
Santol	*Sandoricum koetjape*	Meliaceae	Native	-	VU
Tagkan	*Palaquium pinnatinervium*	Sapotaceae	Endemic	-	EN
Niyog-niyogan	*Ficus pseudopalma Blanco*	Moraceae	Endemic	-	NE
Tubog	*Ficus nota (Blanco) Merr.*	Moraceae	Native	-	LC
Ulingon	*Cratoxylum sumatranum*	Hypericaceae	Native	-	LC
Malakape	*Utania volubilis*	Gentianaceae	Native	-	NE
Rabana	*Annona muricata*	Annonaceae	Cultivated, not Naturalized	-	LC

NE - Not Evaluated, DD - Data Deficient, LC - Least Concerned, VU - Vulnerable, and EN - Endangered.

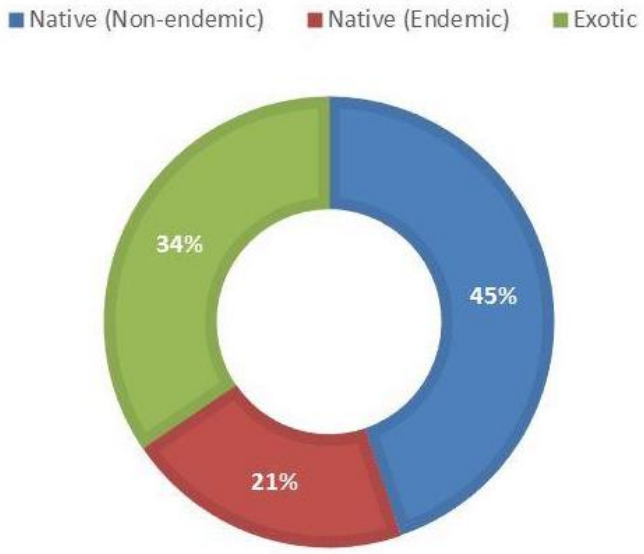

Figure 3. Endemicity of tree species in the adopted forest.

The most notable species in the area is the Tagkan (*Palaquium pinnatinervium)* because of its conservation status which is classified as “endangered”. This species is one of the indigenous tree species in Agusan Marsh Wildlife Sanctuary which contributes to a carbon stock in the area (Sarmiento and Garcia, 2021). On the other hand, species such as *Shorea negrosensis* and *Nephelium lappaceum* are vulnerable in the Philippines, while *Sandoricum koetjape* is vulnerable in a global category. Other species such as *Shorea negrosensis* and *Nephelium lappaceum* are vulnerable in the Philippines, while *Sandoricum koetjape* is vulnerable in a global category. These threatened species were used for their economic importance such as furniture and building construction (Buot et al., 2022) however their ecological status was depleted due to deforestation. Furthermore, the majority of the tree species are least concerned while some are not evaluated. Although some are not yet evaluated, this also indicates the urgent need for new methods of conservation evaluation.

CONCLUSION AND RECOMMENDATION

In conclusion, a total of thirty-one (31) tree species were recorded in the adopted forest with the majority of tree individuals being *Neonauclea formicaria (Elm.) Merr* from the Rubiaceae family with an importance value of 29.55. In addition, the family Moraceae has the most number of identified species in the area. Biodiversity indices such as Shannon-Wiener and Simpson’s indices were used and revealed that the adopted forest has moderate and very high diversity. As to conservation status, *Shorea negrosensis* and *Nephelium lappaceum* are vulnerable in the Philippines, while *Sandoricum koetjape* and *Palaquium pinnatinervium* are vulnerable and endangered in a worldwide category, respectively. This suggests tree-growing initiatives in the area as well as effective conservation management strategies to preserve and protect threatened species. The result of this study will also be baseline data for further research in the locality.

It is also recommended that future researchers determine the carbon stock of the area as well as assess other floral communities such as herbs, grass, and shrubs. To conduct more studies about the tree species composition, it would be preferable to carry out research in other parts of the community forest reserve. Due to the lack of reproductive components, several of the species could not be properly recognized at the species level. Therefore, along with their identity, the unidentified specimens' species endemism and conservation status remained unclear. To undertake a more precise and practical identification, the collection of the species' reproductive components must be done in the field with consent from the regional office of DENR.

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