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Diversity, Species Richness, and Importance Value of Flora in USTP-Claveria Campus

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ABSTRACT

This study aimed to determine the species richness, biodiversity, and importance value of selected plants of different land uses in USTP Claveria Campus, Barangay Poblacion, Claveria, Misamis Oriental. Seven sample plots (land uses) comprising 70 sample points were established throughout the 65-ha campus for data collection. The measurement of biometrics and biomass of each plant were conducted to determine the species richness, diversity indices, absolute density, absolute density of each species, relative density of a species, dominance, relative cover, absolute frequency, relative frequency, and importance value of trees using the point-centered quarter method (PCQM). General findings revealed that the campus is rich in tree species (38). Importance values are high for *Acacia mangium* Willd. (Sites 1 and 6), *Swietenia macrophylla* King (Sites 2, 3, 4), *Vitex parviflora* Juss. (Site 5) and *Schizolobium parahyba* (Vell.) S.F. Blake (Site 7). Species diversity is high at Site 3 (3.27). This study generates a piece of essential information in the implementation relevant to the present and future development of the campus, valuation (i.e. Expanded Reducing Emissions from Deforestation and Forest Degradation), assessment (EIA), and accreditation (i.e. UI Green Metrics World University Ranking).

***Keywords**:* Inventory, species richness, diversity, valuation, importance value

INTRODUCTION

The level of biodiversity of plant species is one of the indicators of the success of adopting agroforestry as a land-use system. Agroforestry education in USTP Claveria started in 1996, an output of the Agroforestry Support Program for Empowering Communities Through Self-reliance program (ASPECTS). When Misamis Oriental State College of Agriculture and Technology (MOSCAT) President Juan A. Nagtalon took office, he segregated 25-ha as the field laboratory for the newly created program. Sporadic development projects were implemented like the construction of dirt roads, the establishment of woodlots, the establishment of natural vegetative strips in almost all parts of the agroforestry field laboratory. It was in the next decade that most of the present developments were established through the assistance (i.e., financial, technical, and planting materials) of the Southeast Asian Network for Agroforestry Education (SEANAFE), Philippine Agroforestry Education and Research Network (PAFERN), Institute of Agroforestry (IAF), Ecosystem Research and Development Service 10 (ERDS 10) and others. Almost all agroforestry systems and technologies were established in this period.

Aside from the agroforestry systems, there are also bambusetum (Palma 2008), rattan genebank, and palmetum. Dipterocarp species from ERDS 10 such as *Shorea contorta* S. Vidal, *Hopea plagata* (Blanco) S. Vidal, *Shorea almon* Foxw., and *Shorea polysperma* (Blanco) Merr. were also established in different sites between 2001-2005. Except for the dipterocarp hedge garden, which was established by *Agencia Espanola Cooperaccion Internationale* (AECI) in 2006. All these developments are now well-established and provide different ecological and economic services to USTP students, the community, visitors, and the administration. For example, Palma and Dagonio (2024) showed that Site 5 is capable of stocking carbon at 327.97 t/ha while the standing Dipterocarp tree's economic value (computation based on the volume) is at PhP 2,221,300.00.

With all these potentials, some undergraduate research and faculty-initiated studies of the flora and fauna were conducted. Most of these are inventories with little or no emphasis on diversity, species richness, and important values. This information is still wanting. While many of the potential ecotourism sites in Mindanao were studied (Amoroso et al., 2012; Aribal et al., 2015; Coritico et al., 2020; Pito et al., 2020). This man-made development project's success in bringing nature faster necessitates an in-depth study. The findings can be an input for developing policy briefs on alternative biodiversity conservation strategies by the local government to develop a model for conservation and sustainable land-use practices. Not only to satisfy knowledge but also as a requirement for the updating of the USTP Claveria Campus Land Use Development and Infrastructure Plan (LUDIP) and preparing the documents for the environmental impact assessment (EIA).

OBJECTIVES OF THE STUDY

An essential part of the LUDIP preparation is the brief profile of the SUC biophysical condition and detailed presentation of flora and fauna. For the detailed description, the flora and fauna population and vulnerability to hazards, forestry, and land uses are needed for updating or revision or are currently being processed. For the SUC Land Use Development and Infrastructure Plan, data are important for the development phasing and development costs for environmental management and social development. Hence, the study was conducted to determine the tree component species richness, importance value, and diversity.

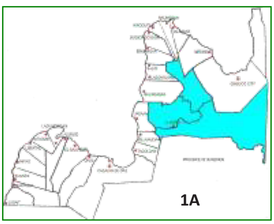
MATERIALS AND METHODS

Study Sites

The study was conducted in the Agroforestry Field Laboratory (AFL), a 25-ha field laboratory within the 65-ha USTP Claveria Campus. Since 2000, a variety of agroforestry systems have been established, bamboo and rattan plantations that have spread in different areas. This site is considered one of the corridors of the municipality, a home to different wildlife (i.e., birds, reptiles, and others). Also, a potential agro-ecotourism destination. The terrain is dominantly undulating to rolling and rolling to hilly. The slope ranges of these terrains are 8-18 % and 18-30 %. Based on rainfall distribution, the municipality of Claveria and Barangay Poblacion belongs to Type III, which is relatively dry from November to April and wet during the rest of the year.

Figure 1

Map of the study area. 1A) The provincial map of Misamis Oriental showing the location of the Municipality of Claveria. 1B) Site map of USTP Claveria showing the locations where the transect lines and sample points where established



Site 1 encompasses two agroforestry systems developed in the year 2001. These are the multistorey agroforestry system and the enhanced natural vegetative strips (alley cropping). The multistorey agroforestry system is bounded by *Acacia mangium*. The fruit tree components within the boundary include some indigenous trees and animals. Meanwhile, the contours were planted with *Lansium domesticum* Corr. and taro (gabi).

Site 2 cut across a multistorey agroforestry system, shelterbelt/windbreak *(Swietenia macrophylla)*, silvopasture (free-range sheep + trees), and woodlot *(Shorea contorta* and *Diptercarpus validus Blume)*. The multistorey system, established in 2002, consisted of trees, fruit trees, coffee, ferns, and free-range chicken and swine. A belt/ strip of *S. macrophylla* was established in 2003 to protect the free-range goat and from floods and demarcation. Mixed species of trees were introduced, allowing sheep to browse the grasses.

Site 3 is a stretch of land planted with *Pterocymbium tinctorium* (Blanco) Merr. (Taluto) and several *Dipterocarp* spp. established by *Agencia Espanola Cooperation International* (AECI) as a hedgegarden (future source of macropropagation cuttings) in 2006. Previously, it was an old nursery site of the field laboratory. Many species of trees and palms remained or became overgrown, resulting in a forested landscape.

Figure 2

Dipterocarp hedge garden established by AECI in 2006

Site 4 is a secondary forest located in the middle of the AFL. It is accessible only by a dirt road.

Site 5 is located in one of the oldest developments on campus. A home to *Shorea contorta* (White lauan), *Vitex parviflora* (Molave), *Acacia mangium* (Mangium), other species. The plantation was established in 1998.

Figure 3

Shorea contorta and Vitex parviflora woodlot established in 1998

Site 6 is located in front of the Administration building. A quadrangle planted with Brazilian fire tree, Benguet pine, and other tree species

Site 7 is called a mini-forest. It is one of the oldest forests on the campus, and it is planted with mangium and mahogany. Other trees were also introduced by wildlife (birds) and wind.

Establishment of Transect Lines

A transect lines were established at random locations within the research sites. For this research study, the length was 100 m. Using a meter tape, extend the tape measure for 100 m in the direction specified. The line was kept as straight as possible.

Figure 4

Layout of the transect lines at Site 5 (4A) and Site 2 (4B)

Setting-up of Sampling Points

The PCQM method is one of the alternative methods when vegetation is sparse or when tree access is challenging or in areas with just a few hundred trees per hectare (Hijbeck et al., 2013; Khan, 2016). It is quick sampling, requiring few labor and logistics (Khan, 2016). PCQM also has weaknesses like any other approach. Several authors (Engeman et al., 1994; Magnussen & Boyle, 1995; White et al., 2008) mentioned the limitation, which is its statistical uncertainty could be partly due to a number of sampling points or when the small individual sample is considered (Volpato et al., 2010). Kumarathunge et al. (2011) stated otherwise. Their study concluded that the PCQ method is a precise sampling technique that can be used to estimate tree diversity in natural forests. Further, it is recommended as an effective sampling technique for tree diversity given the higher precision, saving time and costs.

In the PCQM, the nearest plant is determined at each quadrat. This is done by randomly placing the sampling points in the stratified site. To begin, a table of random numbers is secured, and 10-15 two-digit random numbers are derived. Process the random numbers by arranging them in ascending order. Draw an imaginary line perpendicular to the transect line. The line should be established on each point (10 points). At each point, a bamboo stake (5 cm width) will be stuck in the ground at a 90^0 angle. Record all the important information. Repeat the process for the entire set of sampling points.

Figure 5

Setting up of sampling points

Materials Needed

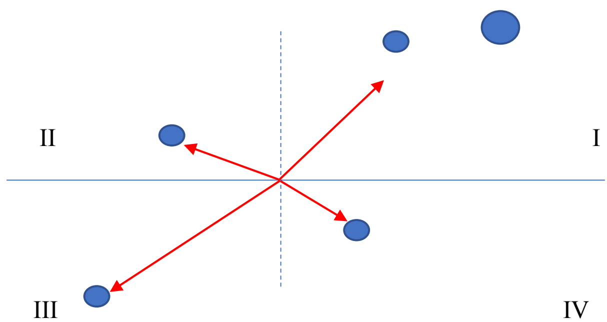
The research study necessitated the following materials and equipment during data collection and analysis: meter tape (30 m), geographic positioning system (eTrex, 32x), diameter tape, clinometer (PM5, Suunto), clipboards, papers, pencil/ ballpen, first aid kit, calculator, computer, boots, raincoats, bolo, helmet.

Data Collection

The nearest tree relative to the sampling point was recorded. Primary data like species, diameter at breast height, and distance from the sampling point were collected. Other data, such as merchantable height, total height, elevation, slope, climate, etc., were also taken though only plant data was considered for subsequent analysis. Only one tree was recorded for each quadrat.

Figure 6

Data collection



Data Analysis

Species richness, diversity indices (Shannon-Wiener Index - Equation 1; Simpson's Index – Equation 2), Similarity Index (Equation 3), absolute density, the absolute density of each species, the relative density of a species, dominance, relative cover, absolute frequency, relative frequency, and importance value were calculated at each site following the computation espoused by Mueller-Dombois and Ellenberg (1974).

The scheme of the Fernando Biodiversity Scale (Fernando, 1998) was used in the interpretation of the diversity index where the relative values of very high, high, moderate, low, and very low for Shannon Index of 3.5 and above, 3.0-3.49, 2.5-2.99, 2.0-2.49, 1.9 and below, respectively.

$$H' = \sum \left[\left\{\frac{ni}{N}\right\}\right] x\ ln(ni/N)$$

$$\lambda = \sum \frac{ni(n-1\ \ )}{N\ (N-1)}$$

$$Sim = \sum \frac{2\sum nc}{\sum n2 + \sum n2}$$

RESULTS AND DISCUSSION

Species Richness

Species richness is defined as the number of species per specified number of individuals. It can be determined by tabulating the number of woody species in each plot (Kunwar & Sharma, 2004). From a total of 280 tree individuals representing 40 species, 25 genera, and 30 families were identified. Across sites, the average species richness of 9 was observed. Maximum species richness (17) was observed in Site 3, while the minimum (4) in Site 7 (Table 1). Boinot et al. (2022) found that agroforestry systems affect abundance and species composition in 79% (22/28) of the studies reviewed.

The deliberate increase in the number of species can be attributed to land use change, enhancement of instructional delivery, and long-term ecological development programs, among others. In the late 1970's, the 25 ha was once a coffee plantation. Due to the rising insurgency, the plantation was abandoned and slowly transformed into grassland with sparse coffee over time. The development of the agroforestry program in 1996 encouraged the MOSCAT administration to segregate 25 ha as the agroforestry field laboratory (AFL). From a simplified agriculture or non-native species, the AFL transitioned into an agroforestry systems and technologies to a biologically diverse system (Ollinaho & Kroger, 2021).

The potential of AFL for eco-tourism is immense. Recognizing this potential, the administration assigned the area as a laboratory for the agroforestry students. Several agroforestry and forestry development projects were established as models for the students and visitors. These include multistorey agroforestry systems, woodlots planted with dipterocarp species, rattan genebank, bambusetum, molave forest, and fernery, among others. In a span of 20 years, the AFL was transformed into a species-rich area.

Table 1

Plant species found in the USTP Claveria Campus

Common Name	Scientific Name	No. of Individuals	Site Occurrence/s
White Lauan	*Shorea contorta* S. Vidal	31	2, 3, 4, 5
Hagakhak	*Dipterocarpus validus* Blume	4	2, 3,
Bagtikan	*Parashorea plicata* Brandis	3	3
Tangile	*Shorea polysperma* (Blanco) Merr.	2	3
Almon	*Shorea almon* Foxw.	1	3
Taluto	*Pterocymbium tinctorium* (Blanco) Merr.	3	3
Molave	*Vitex parviflora* Juss	14	1, 5
Bagras	*Eucalyptus deglupta* Blume	2	3, 5
Narra	*Pterocarpus indicus* Willd.	3	3, 6
Bagalunga	*Melia dubia* Cav.	1	3
Mangium	*Acacia mangium* Willd.	33	1, 2, 3, 4, 5, 6
Mahogany	*Swietenia macrophylla* King	60	1,2, 3, 4, 5
Pag-oringon	*Cratoxylum celebicum* Blume	1	1
Durian	*Durio zibethinus* Murr.	3	1
Rambutan	*Nephelium lappacium* L.	7	1, 3
Lanzones	*Lansium domesticum* Corr.	19	1, 2
Dita	*Alstonia scholaris* (L.) R.Br.	2	2
Kalumpit	*Terminalia microcarpa* Decne	2	2
Neem Tree	*Azadirachta indica* A. Juss.	2	2
Gmelina	*Gmelina arborea* Roxb	5	2, 4, 6
Falcata	*Falcataria moluccana* (Miq.) Barneby & Grimes	9	4
Antipolo	*Artocarpus blancoi* (Elm.) Merr.	2	4
Mangosteen	*Garcinia mangostana* L.	2	1, 2
Teak	*Tectona grandis* L.f	1	1
Bunga	*Areca catechu* L.	1	2
Jackfruit	*Artocarpus odoratissimus* Lam.	1	3
Star apple	*Chrysophyllum cainito* L.	2	3
Macadamia	*Macadamia integrifolia* Maiden&Betche	2	3
Swamp Mahogany	*Eucalyptus robusta* Smith	1	3
Kamansi	*Artocarpus camansi* Blanco	2	4
Sweet palm	*Arenga pinnata* (Wurmb.) Merr.	1	4
Mozisi	*Maesopsis eminii* Engl.	2	4
Scaly Tree Fern (Anonotong)	*Sphaeropteris glauca* (Blume) R.M. Tyron	3	4
Pink Trumpet Tree	*Tabebuia heterophylla* (DC.) Britton	6	5
Hanagdong	*Parasponia parviflora* Miq.	2	5
Mango	*Mangifera indica* L.	1	6
Norfolk Pine	*Araucaria heterophylla* (Salisb.) Franco	3	7
Brazilian Fire Tree	*Schizolobium parahyba* (Vell.) S.F. Blake	11	7
Benguet Pine	*Pinus kesiya* Royle ex Gordon	20	7
Balitbitan	*Cynometra ramiflora* L.	2	7
Malapapaya	*Polyscias nodosa* (Blume) Seem.	2	4
	TOTAL	280	

Importance Value

Based on the computed importance value for each species, the five most important species across sites (Tables 2-8) are Brazilian Fire Tree (144), Mangium (135), Mahogany (104), Molave (81.90), and Lanzones (79.2). Except for Molave and Lanzones, all species are planted exotics. Molave is a climax species that is well-adapted to the AFL. Molave and Lanzones produce fruits that may attract wildlife in the future (Elliot et al., 2003; Aribal et al., 2015). The wildlife could be an effective means of seed dispersal. Although not part of the study, we observed the presence of naturally growing Molave saplings in other sites far from the existing Molave woodlot.

For each site, the highest importance value was that of *Acacia mangium* (103), followed by *Lansium domesticum* (79.2) in Site 1 (Table 2). *Swietenia macrophylla* (80) and followed by *Shorea contorta* (67.3) in Site 2 (Table 3). In Site 3 (Table 4), *Swietenia macrophylla* (68), was the most dominant, followed by *Parashorea plicata* (28). Site 4 (Table 5) had similar species with the highest importance values with Site 2, where *Swietenia macrophylla* (104) and followed by *Shorea contorta* (66.1). The highest importance value in Site 5 (Table 6) was *Vitex parviflora* (81.9), followed by *Acacia mangium* (62.9). Acacia mangium (135) and followed by *Swietenia macrophylla* (99) in Site 6 (Table 7). Last but not least, the highest importance value was that of *Schizolobium parahyba* (144), followed by *Pinus kesiya* (62) in Site 7 (Table 8).

Table 2

Importance value of plant species in Site 1

Species	Relative Density	Relative Cover	Relative Frequency	Importance Value
Lansium domesticum (Lanzones)	37.00	8.90	33.30	79.20
Nephelium lappacium (Rambutan)	10.00	11.90	16.70	38.60
Durio zibethinus (Durian)	10.00	7.50	12.50	30.00
Garcinia mangostana (Mangosteen)	3.00	1.50	4.20	8.70
Acacia mangium (Mangium)	30.00	52.20	20.80	103.00
Tectona grandis (Teak)	3.00	0.00	4.20	7.20
Cratoxylum celebicum (Pag-oringon)	3.00	11.90	4.20	19.10
Vitex parviflora (Molave)	3.00	0.00	4.20	7.20
Swietenia macrophylla (Mahogany)	3.00	5.90	4.20	13.10

Table 3

Importance value of plant species in Site 2

Species	Relative Density	Relative Cover	Relative Frequency	Importance Value
Lansium domesticum (Lanzones)	10.00	1.90	8.00	19.90
Swietenia macrophylla (Mahogany)	35.00	25.00	20.00	80.00
Cratoxylum celebicum (Dita)	5.00	4.40	8.00	17.40
Terminalia microcarpa (Kalumpit)	5.00	0.60	8.00	13.60
Garcinia mangostana (Mangosteen)	3.00	0.60	4.00	7.60
Acacia mangium (Mangium)	5.00	11.90	8.00	24.90
Gmelina arborea (Yemane)	3.00	13.10	4.00	20.10
Azadirachta indica (Neem)	5.00	0.60	8.00	13.60
Shorea contorta (White Lauan)	20.00	31.30	16.00	67.30
Areca catechu (Bunga)	2.00	0.10	4.00	6.10
Samanea saman (Raintree)	2.00	3.10	4.00	9.10
Dipterocarpus validus (Hagakhak)	5.00	7.50	8.00	20.50

Table 4

Importance value of plant species in Site 3

Species	Relative Density	Relative Cover	Relative Frequency	Importance Value
Pterocymbium tinctorium (Taluto)	7.50	11.20	3.70	22.40
Polyscias nodosa (Malapapaya)	5.00	2.70	7.40	15.10
Melia dubia (Bagalunga)	2.50	8.80	3.70	15.00
Artocarpus odoratissimus (Jackfruit)	2.50	1.20	3.70	7.40
Nephelium lappacium (Rambutan)	7.50	10.40	7.40	25.30
Swietenia macrophylla (Mahogany)	25.00	20.80	22.20	68.00
Pterocarpus indicus (Narra)	2.50	0.40	3.70	6.60
Acacia mangium (Mangium)	2.50	4.20	3.70	10.40
Chrysophyllum cainito (Caimito)	5.00	1.50	7.40	13.90
Macadamia integrifolia (Macadamia)	5.00	0.80	7.40	13.30
Eucalyptus robusta (Robusta Eucalypt)	2.50	11.50	3.70	17.70
Parashorea plicata (Bagtikan)	7.50	13.10	7.40	28.00
Shorea contorta (White Lauan)	10.00	1.20	3.70	14.90
Dipterocarpus validus (Hagakhak)	5.00	1.20	3.70	9.90
Shorea polysperma (Tangile)	5.00	2.70	3.70	11.40
Shorea almon (Almon)	2.50	1.90	3.70	8.10
Eucalyptus deglupta (Bagras)	2.50	6.50	3.70	12.10

Table 5

Importance value of plant species in Site 4

Species	Relative Density	Relative Cover	Relative Frequency	Importance Value
Artocarpus camansi (Kamansi)	5.00	11.36	6.40	22.76
Polyscias nodosa (Malapapaya)	2.50	0.60	3.20	6.30
Arenga pinnata (Sweet Palm)	2.50	0.60	3.20	6.30
Shorea contorta (White Lauan)	25.00	15.30	25.80	66.10
Swietenia macrophylla (Mahogany)	22.50	59.00	22.50	104.00
Artocarpus blancoi (Antipolo)	5.00	0.60	6.40	12.00
Falcataria moluccana (Falcata)	22.50	3.40	16.10	42.00
Maesopsis eminii (Mozisil)	5.00	6.20	6.40	17.60
Gmelina arborea (Gmelina)	2.50	0.60	3.20	6.30
Sphaeropteris glauca (Scaly Tree Fern)	7.50	2.30	6.40	16.20

Table 6

Importance value of plant species in Site 5

Species	Relative Density	Relative Cover	Relative Frequency	Importance Value
Shorea contorta (White Lauan)	22.50	12.60	13.60	48.70
Vitex parviflora (Molave)	32.50	17.60	31.80	81.90
Tabebuia heterophylla (Pink Trumpet Tree)	15.00	17.10	18.10	50.20
Acacia mangium (Mangium)	17.50	31.80	13.60	62.90
Eucalyptus deglupta (Bagras)	2.50	4.00	4.50	11.00
Swietenia macrophylla (Mahogany)	5.00	13.10	9.00	27.10
Parasponia parviflora (Hanagdong)	5.00	3.50	9.00	17.50

Table 7

Importance value of plant species in Site 6

Species	Relative Density	Relative Cover	Relative Frequency	Importance Value
Swietenia macrophylla (Mahogany)	60.00	21.21	17.65	99.00
Acacia mangium (Mangium)	25.00	69.02	41.18	135.00
Pterocarpus indicus (Narra)	5.00	3.97	17.65	27.00
Mangifera indica (Mango)	2.50	0.20	17.65	20.00
Gmelina arborea (Gmelina)	7.50	5.59	5.88	19.00

Table 8

Importance value of plant species in Site 7

Species	Relative Density	Relative Cover	Relative Frequency	Importance Value
Araucaria heterophylla (Norfolk Pine)	25.71	22.54	11.76	60.00
Schizolobium parahyba (Brazilian Fire Tree)	37.14	71.61	35.29	144.00
Pinus kesiya (Benguet Pine)	17.14	3.81	41.17	62.62
Cynometra ramiflora (Balitbitan)	20.00	2.04	11.76	34.34

Species Diversity

The Shannon-Weiner diversity index from Sites 1 to 7 is shown in Table 9. Among all sites, Site 3 had high diversity (H' = 3.27; λ = 0.904), while Site 6 had low diversity. The rest had very low diversity (0.76-1.90). The index value is higher than compared to the index values of agroforestry systems in Luzon (Baliton et al., 2020), ranging from 2.21-2.71. The index values were considered low to moderate in three study sites. It is even higher than index values obtained in the home garden (1.57-1.75), parkland (0.36-0.49), and live fence (0.84-1.00) agroforestry system (Legesse and Negash, 2021). This means that Site 3 had more diverse species than other sites. One of the contributors to the diversity of Site 3 is the presence of the Dipterocarp Hedge garden. The hedge garden was planted with 11 dipterocarp species taken from different sites in the islands of Visayas and Mindanao in 2006. Purposely, as a source of cuttings for the macro-somatic propagation using a non-mist system in 2006. However, the project was discontinued (AECI transferred to the CARAGA Region). The Faculty of the Agroforestry Department and In-Charge of the AFL find this development important for instruction, research, and development, thus painstakingly protecting and managing the site as the future source of seeds, dendrology, and others. So far, only Hagakhak produced seeds. Another important development in Site 3 was the establishment of the AFL nursery. Several indigenous and exotic plant species were raised, paving the way for introducing some species in the area adjacent to the nursery.

The diversity of plants at other important sites that have already been studied such as La Mesa Watershed (Malabrigao et al., 2015), Mt. Tago Range (Coritico et al., 2020), Rajah Sikatuna Protected Landscape (Aureo et al., 2020), and Sipit Watershed (Castillo, 2020) was higher than the number obtained in this study at 38 species. However, it is comparable to that of the southern part of Mt. Malindang (Pito et al., 2020) where they recorded 46 tree species. The differences could be attributed to the habitat type, method used, and site condition. It is noteworthy to mention that the AFL was once a cogon-coffee-dominated area with few trees. It was only during the period between 2000-2010 that most of the species were planted. Other pioneering species were spread either by birds, strong winds, or water.

As revealed by Legesse and Negash (2021), agroforestry plays an important role in biodiversity conservation. An ideal pathway to biodiversity maintenance and restoration in a socioeconomically sustainable manner (Gomez et al., 2015).

Table 9

Diversity indices of the USTP Claveria campus

Diversity Indices	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Species Richness	9	11	17	10	7	5	4
Shannon-Weiner's diversity index (H)	1.64	1.90	3.27	2.29	0.99	0.76	1.44
Simpson's Index (λ)	0.750	0.746	0.904	0.909	0.650	0.561	0.720
Similarity Indices		0.35	0.35	0.16	0.27	0.50	0.20

In terms of conservation status, they are critically endangered, endangered, vulnerable, and rare. Based on DENR Administrative Order 2017-11 dated May 2, 2017 (National Lists of Threatened Plants), the following categories were identified: 1) Critically Endangered – Bagtikan, Hagakhak, Tangile; 2) Endangered – Molave, Teak; 3) Vulnerable – White Lauan, Almon, Prickly Narra, Antipolo; and 4) Rare – Taluto.

CONCLUSIONS

Considering the results obtained from the study, i.e., the high diversity of Site 3 (3.27) as manifested by the value of Shannon-Wiener and the Shannon diversity index scale of Fernando, high importance value of Molave, Lanzones, and some dipterocarp species (an Indigenous species), and the presence of three critically endangered, two endangered, four vulnerable, and 1 rare species – it can be inferred that USTP Claveria campus biodiversity needs to be protected and enhanced. USTP Claveria Campus is one of the biodiverse campuses in the region and a potential site for eco-tourism destinations. Notably, the 25 ha AFL is an excellent example of a successful academe-government-non-government organization with collaborative efforts in its protection and enhancement through agroforestry.

The findings provide insights for necessary future research studies like, study on long-term monitoring of species dynamics in the context of agroforestry, experimental study on ecological interactions, valuation of ecological services of agroforestry systems forest component.

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