Diversity of Trees in Two Mountain Sites of Arakan Valley, North Cotabato

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Abstract

The study was conducted from April 23 to May 8, 2008 in Mt. Sinaka and Mt. Mahuson, Arakan, North Cotabato in order to assess the abundance and diversity of trees present along the two study sites using quadrat and transect methods. In Mt. Sinaka, Salasang, Arakan, North Cotabato, a total of 97 identified and 17 unidentified tree species in 69 genera and about 39 families were collected and recorded along the three sampling sites corresponding to the three elevation gradients. Across the three sampling sites, *Shorea negrosensis* Foxw. is the most dominant, followed by *Shorea contorta* Vid. Calculations using Shannon-Weiner Diversity Index (H') reveals that the tree vegetation on this site can be classified as highly diverse.

A total of 79 identified and 16 unidentified tree species in 50 genera and 34 families were recorded along the three sampling sites in Mt. Mahuson, Ganatan, Arakan, North Cotabato where *Lithocarpus apoensis* (Elm.) Rehd. is the most dominant and is of the highest value. The diversity value of trees in Mt. Mahuson is considered as moderately diverse.

Three species are classified as critically endangered species, 3 endangered, 13 tree species are vulnerable, and 1 species is under the wildlife species category based on the DAO 2007-01 List of Threatened and Wildlife Species.

Keywords: diversity, dominant, endangered, quadrat

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Introduction

The tropical rainforests of the Philippines consist of a complex ecosystem of diversified varieties of species belonging to various plant families. With 6,091 endemic plant species (out of 9,253 plant species) and 26 endemic genera, the Philippines is considered as one of the biodiversity hotspots which has only 20,803 km^2 remaining hotspot vegetation (Conservation International, 2007). The country's forests also contain a large number of trees and other plants which produce seed oils, essential oils, resins, and gums (Brown, 1920).

Trees perform vital roles in providing food and shelter for both man and animals. Mt. Sinaka and Mt. Mahuson are located within the Arakan Valley Conservation Area where presence of endemic bats was identified. Mt. Sinaka is one of the Conservation Priority Areas (CPA 138) and Important Bird Areas (IBA PH100) in the country where breeding activities of a pair of the critically-endangered Philippine eagle (*Pithecopaga jefferyi*) were documented.

Materials and Methods

A. Description of the Sampling Areas

Mt. Sinaka is located along N 07.37454° E 125.20937°of Bgy. Salasang, Arakan, North Cotabato, approximately 6 km away from Poblacion (Fig. 1). It has a top elevation of 2700 feet (Garmin Etrex GPS device model). The mountain is classified as mixed secondary evergreen dipterocarp forest in the footslope going up in the middle elevation to transitional mossy-montane forest going to top slope and possesses loam to clay-loam substrate. The area is inhabited by the *Manobos* who cultivate fruit trees and other permanent crops, utilize forest resources for food and livelihood, and practice upland farming which is often plagued by soil erosion and nutrient loss.

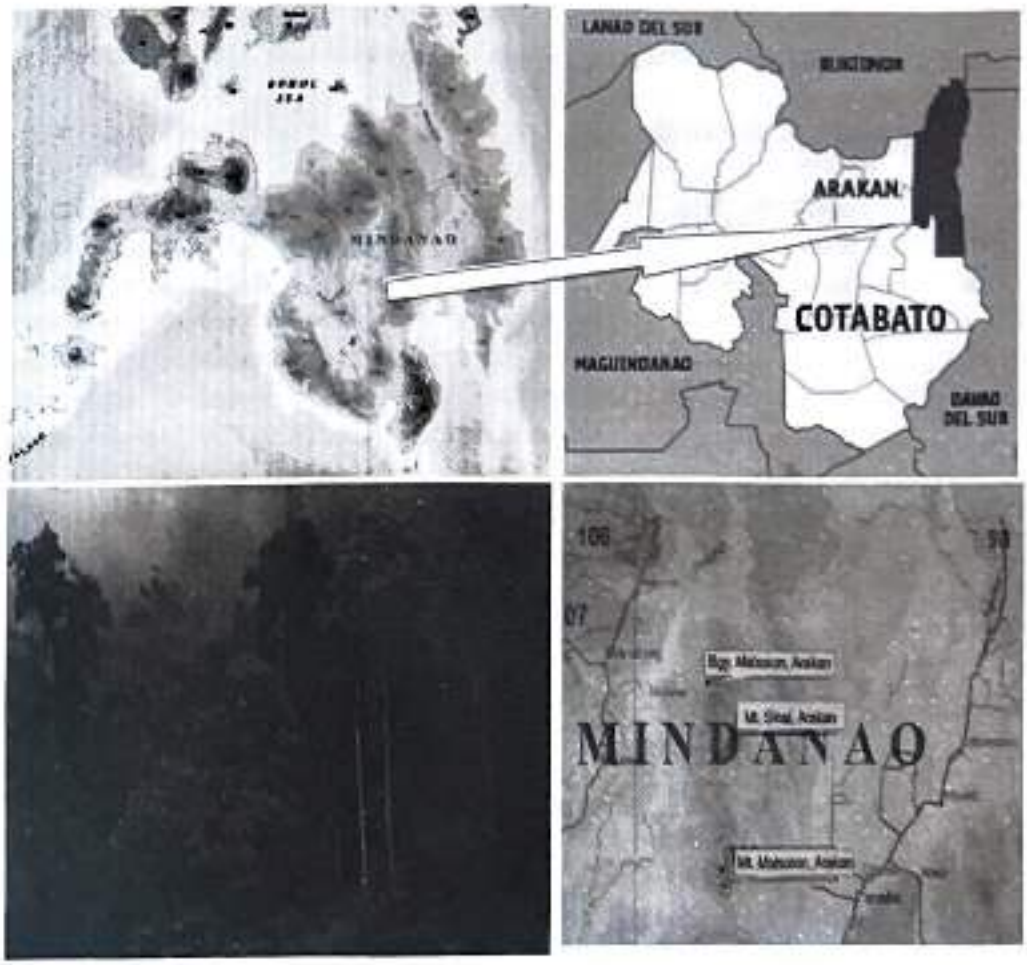

Figure 1. Foot slope of Mt. Sinaka (left) and location map of the sampling sites (right)

Mt. Mahuson is located N 07.2273° E 125.1939° of Bgy. Ganatan, Arakan, North Cotabato (Fig. 1) which is 18 kilometers away from the Poblacion via Sto. Niño and Meocan. It has an elevation of 1400 masl and possesses loam to loamy clay soil substrate. The forest is characterized as secondary dipterocarp forest from the foot slope of the mountain going across the middle elevation to transitional mossy-montane forest going to the top elevation. A trail is also found along the mountain which connects

Bgy. Ganatan to the municipality of Magpet, Cotabato. Local residents utilize forest and agricultural products from the mountain. Timber cutting is also practiced along the lower and middle elevations.

B. Establishment of Quadrat

A total of nine 20x20m nested quadrats were established in the sampling site using calibrated plastic twines. For fern sampling, a 5x5m quadrat was also established inside the left corner of each 20x20m quadrats. Three (3) nested quadrats were established in every elevation gradient, which has a horizontal distance of 200m away from each other using a calibrated rope as an improvised measuring device. With the aid of an altimeter, reference elevations ranging from 500-750 meters above sea level (masl) were determined for the foot slope, 750-900 masl for middle slope, and 900-1020 masl for the top slope. The coordinates for each respective quadrats were also recorded using the Geographic Positioning System (GPS) device. The description of habitats for each quadrat were also recorded in a habitat description form.

C. Enrichment of Floral Survey.

Transect walk method was done between and along the way to the quadrats. Different plant species found along the transect walk were recorded and collected when necessary.

D. Physico-Chemical Recordings for Each Quadrat

Soil temperature, air temperature, relative humidity, soil texture, slope and elevation gradients were determined in each quadrat to later relate the occurrence of the species to the bio-physical factors.

E. Description and Collection of Plant Specimens

Heights of trees 10cm in Diameter at Breast Height (DBH) and above were measured by rough estimation using a technique of visualizing by 1-m. segments from the ground level going up to the trunk and to the top of the canopy for total height The circumference in cms. (which were later transformed to DBH) were also recorded for trees from

10 cms. and above in diameter using a tape measure. Clinging vines and other epiphytes found in the trunk were removed in order not to affect the measured circumference of the tree. Leaf characteristics, floral characteristics, sap, smell and bark characteristics were also noted. Twigs of trees and shrubs were collected using a branch cutter. A sharp bolo was used to slash small portions of barks from the trunk of tall trees for bark samples. The collected samples were then tagged for identification and placed in a plastic bag big enough to contain the specimens. As much as possible, identification of species was done in the field before collection of the leaf specimens.

At the camp and with the use of references, identification of specimens was continued. Unidentified specimens were segregated but properly labeled.

Collected leaf samples were swigged in a plastic bag for about a minute before pressing them, with proper labels in herbarium pressers for drying and further confirmation of their identities at MSU-IIT.

G. Statistical Analysis and Biodiversity Indices

Species diversity of the area was taken using the following formula:

Shannon-Weiner index:

It is an information statistic used as a diversity index and is probably the nearest thing to a common standard. It is notoriously sample-size dependent and tended to be weighed slightly towards species richness

$$H' = \sum'(P_i \log[P_i])$$

Where P_i is the number of individuals for every species divided by the total number of individuals observed for every species.

Species Evenness:

$$E = H'/\ln R$$

Where H' is the Shannon-Weiner Index and R is the species richness.

Evenness measures how similar the abundances of different species are in one community. The values range from zero to 1. Values closer to zero indicate that most of the individuals belong to one or few species or category. Values closer to 1 indicate that species consist of the same number of individuals.

Density:

D= Number of Individuals/ Area Sampled

Relative Density:

RD= [Density of species A/ Total Density of all species] x 100

Frequency:

F= [Number of plots in which species A occurred/ total no. of plots examined]

Relative Frequency:

RF= [Frequency for species A/ total frequency for all species] x 100

Dominance:

Dom= No. of Individual Species/ Total No. of Species

Relative Dominance:

RDom= Dominance of species A/ total Dominance of all species

Species Importance Value (SIV):

It is a rough and overall estimate of the influence or importance of plant species in the community. SIV was calculated using the formula:

SIV = RD+RF+Rdom

where, RD is the relative density; RF is Relative Frequency and Rdom is the relative dominance of the species.

Relative Abundance of Species:

RA (%) = n_i/ N x 100

Where n_i is the number of individuals per species.

N is the total number of individuals of all species collected.

Species Richness:

R= S; where S is the number of species.

Results and Discussion

A. Arakan Valley, North Cotabato Sampling Areas

Assessment of the transect walks and quadrats plotted in Mt. Sinaka yielded a total of 97 identified species while 79 species of trees are identified and recorded Mt. Mahuson (Table 1). Most of these species are used as house materials, ritual plants, timber, lumber, food, firewood, and liniments for insect bites and certain diseases.

Table 1. Plant species richness in two study sites based from transect walk and sampling plots

Study Sites	Number of			
	Families	Genus	Species	Unidentified
Mt. Sinaka	39	69	97	17
Mt. Mahuson	34	50	79	16
Total	73	119	176	33

Table 2. List of initially identified Tree species in the 2 sampling sites

Family Name	Scientific Name	Common name	Local Name	Mt. Sinaka	Mt. Mahuson
Alangiaceae	*Alangium chinense* (Lour.) Harms	bagaloan		+	-
Anacardiaceae	*Koordersiodendron pinnatum* (Blco.) Merr.	amugis	sambulawan	+	-
Annonaceae	*Platymitra arborea* (Blco.) Kesler	bolon		+	-
Annonaceae	*Cananga odorata* (Lam) Hook f. & Thoms.	Ilang-ilang	Ilang-ilang	+	-
Apocynaceae	*Alstonia macrophylla* (Wall.) Batino	Batinong-mabolo	Bitak-bitak	-	+
Araliaceae	*Osmoxylon luzoniense*	malapapaya		-	+
Araucariaceae	*Agathis philippinensis* Warb.	almaciga	Almaciga/ sangguyang	+	+
Bignoniaceae	*Radermachera*	Banai-		+	-

	pinnata (Blco.) Seem	banai			
Bignoniaceae	*Spathodea campanulata* Beauv.	African tulip		+	-
Bischoffiaceae	*Bischoffia javanica*	tuai		+	-
Bombaceae	*Durio zibethinus*	durian	duryan	+	-
Boraginaceae	*Cordia dichotoma* Forst. f.	anonang		+	-
Burseraceae	*Garuga floribunda* Decne.	bogo		+	-
Burseraceae	*Canarium luzonicum* (Blumei) A. Gray	Piling-liitan		+	+
Burseraceae	*Canarium asperum* (Benth.) subsp. *asperum var. asperum*	pagsahingin		-	+
Burseraceae	*Canarium sp.1*			-	+
Burseraceae	*Canarium sp.2*	Pagsahingin-bulog		+	+
Caprifoliaceae	*Viburnum* sp.			+	+
Casuarinaceae	*Gymnostroma rumphiana* (Miq.) L. Johnson	Agoho del Monte	agoho	+	+
Chrysobalanaceae	*Macaranthes corymbosa* Bl.	liusin		+	-
Clusiaceae	*Callophyllum blancoi* Pl. & Tr.	bitanghol	balik	+	+
Clusiaceae	*Garcinia dulcis* (Roxb.) Kurz	gatasan		+	-
Clusiaceae	*Garcinia binucao* (Blco.) Choisy	batuan		+	-
Clusiaceae	*Cratoxylum cochinchinense* (Lour.) Bl.	paguringon		+	-
Clusiaceae	*Callophylum mindanaese* Elm.	Bitanghol	lanahan	-	+
Combretaceae	*Terminalia critina* (Gaertn.) Roxb. ex Flem.	binggas	bingas	+	+
Cornaceae	*Alangium meyeri* Merr.	putian		+	-
Datiscaceae	*Octomeles sumatrana* Miq.	binuang		+	-
Dilleniaceae	*Dillenia sp.*	Agusan katmon		+	-
Dilleniaceae	*Dillenia luzoniensis* (Vidal) Martelli ex Durand & Jackson	malakatmon		-	+
Dilleniaceae	*Dillenia reiffer* Scheidia	Katmon-kalabaw		+	-
Dilleniaceae	*Dillenia philippinensis* Rolfe var *philippinensis*	katmon		+	-

Dilleniaceae	*Dillenia* sp.	Katmon-like	Kaambog/ kantimon	-	+
Dipterocarpaceae	*Shorea virescens* Parijs.	Mindanao white lauan	danganlag	+	+
Dipterocarpaceae	*Parashorea malaanonan* (Blco) Merr.	bagtikan	bagtikan	+	-
Dipterocarpaceae	*Shorea polysperma* (Blanco) Merr.	tangile	Baorong/ bakbakan	+	+
Dipterocarpaceae	*Shorea almon* Foxw.	almon	balakbakan	+	+
Dipterocarpaceae	*Shorea negrosensis* Foxw.	Red lauan	Lawaan pula	+	+
Dipterocarpaceae	*Shorea contorta* Vidal	White lauan	Lawaan puti	+	+
Dipterocarpaceae	*Shorea guiso* (Blco.) Bl.	guijo	balakbakan	-	+
Dipterocarpaceae	*Dipterocarpus sp.*	apitong	apitong	+	-
Diterocarpaceae	*Shorea palosapis* (Blco.) Merr.	mayapis	kaliyaan	+	+
Euphorbiaceae	*Macaranga tanarius*	binunga		+	-
Euphorbiaceae	*Bridelia penangiana* Hook f.	subiang		+	-
Euphorbiaceae	*Acalypha amentacea* Roxb.	malasapsap		+	-
Euphorbiaceae	*Homalanthus megaphyllus* Merr.	balanti		+	-
Euphorbiaceae	*Macaranga grandifolia* (Blco.) Merr.	Takip-asim		+	+
Euphorbiaceae	Unidentified sp. 40		mandapulan	-	+
Euphorbiaceae	*Trigostemon longipes* (Merr.) Merr.	katap		-	+
Euphorbiaceae	*Neotrewia cumingii* (Muell.-Arg.) Pax & K. Hoffm.	burilis	apanang	-	+
Fabaceae	*Leucaena leucocephala* (Lam) de Wit	Ipil-ipil		+	-
Fabaceae	*Acacia mangium*	Acacia	acasia	+	-
Fabaceae	*Indigofera tinctoria*	Indigo plant		-	+
Fabaceae	*Sindora supa* Merr.	supa		-	+
Fabaceae	*Pterocarpus indicus* (Willd.) forma *echinatus* (Rojo)	narra	Prickly narra	+	-
Fagaceae	*Lithocarpus apoensis* (Elm.) Rehd.	ulayan	ulayan	+	+
Fabaceae	*Gliceridia sepium*	kakawati		+	-

Myrtaceae	*Syzygium manangquil* (Blanco) Merr.	manangkil		+	+
Myrtaceae	*Syzygium nitidum* Benth.	makaasim		+	-
Myrtaceae	*Syzygium sp.1*	Curran's lipote		+	-
Myrtaceae	*Eucalyptus pelleta*	hublas		+	-
Myrtaceae	*Eucalyptus deglupta* Bl.	bagras	bagras	+	-
Myrtaceae	*Syzygium sp.2*		wakan	-	+
Myrtaceae	*Leptospermum flavescens* J. Sm.		tinikaran	-	+
Myrtaceae	*Decaspermum fruticosum* J.R. & G. Forst.		labog	-	+
Myrtaceae	*Syzygium* sp. 3			-	+
Myrtaceae	*Syzygium* sp. 4			-	+
Myrtaceae	*Tristaniopsis decorticada* (Merr.) Wils. & Waterh.	malabayabas		+	-
Myrtaceae	*Syzygium subrotundifolium* (C.B. Robb.) Merr.	kalubkob		-	+
Myrtaceae	Unidentified sp. 24		kato	-	+
Myrtaceae	*Syzygium toppingii* (Elm.) Merr.		lahawisan	-	+
Nyctaginaceae	*Pisonia umbellifera* (J.R. & G. Forst) Seem.	anuling		-	+
Polygonaceae	*Triplaris cumingiana* Fisco. & Mey	nilo	ngilo	-	+
Rosaceae	*Prunus grisea* (C. Muell.) Kolkm.	lago		-	+
Rubiaceae	*Morinda bracteata* Roxb.		sikarig	-	+
Rutaceae	*Micromelium compressum* (Blco.) Merr.	Tulibastilos		-	+
Rutaceae	*Melicope triphylla* (Lam.) Merr.	Matangaraw		+	+
Sapindaceae	*Cubilia cubili* (Blanco) Adelb.			+	+
Sapindaceae	*Pometia pinnata* Forst.	malugai		+	-
Sapindaceae	*Nephelium lappaecum* L.	rambutan		+	-
Sapotaceae	*Pouteria macranthe* (Merr.) Rachni.	White nato	Nato-puti	+	-
Sapotaceae	*Palaquium philipense* (Perr.) C.B. Robinson	Red nato	Malak-malak	-	+
Sapotaceae	*Palaquium sp.*		nato	+	-

Sapotaceae	Unidentified sp. 3			+	-
Saurauiaceae	*Saurauia elegans*	Brown alstonia	galontudu k	-	+
Saurauiaceae	*Saurauia sp.*	Balanog pula		-	+
Sonneratiaceae	*Duabanga moluccana* Bl.		lamod	-	+
Symplocaceae	Unidentified sp. 2		hawhasin	+	-
Tiliaceae	*Displodicus paniculatus* Turcz.	balobo	marobo	+	+
Ulmaceae	*Trema orientalis* (L.) Bl.	anahiong		+	-
Urticaceae	*Dendrocnide meyeniana* (Walp.) chef forma *meyeniana*	Lipang kalabaw		+	+
Urticaceae	*Dendrocnide luzonensis* (Wedd.) Chew	lipa		+	-
Urticaceae	*Dendrocnide laportes* var. *interrupta* (L.) Chew	Lipang-aso		+	-
Urticaceae	*Dendrocnide rigidifolia* (C.B. Rob.) Chew	Lipang pula		+	-
Verbenaceae	*Vitex parviflora* Juss.	molave	tugas	+	+
Verbenaceae	*Teijsmanniodendron ahernianum* (Merr.) Bakh.	Dangula		+	-

Note: (+) means present while (–) for absent. Scientific names are based from (1) A Dictionary of Plant Names Vol.1 Dr. D. Madulid, (2) Flowering Plants and Ferns in Mt. Makiling. Dr.E. Fernando (3) Checklist in Dendrology. Dr. E. Fernando

Figure 2 reveals that Elevation 1 (760-800 masl) of Mt. Sinaka is the most species-rich (37 species) and highly-diverse with Shannon index (H') value of 3.429 (Fig. 3). White lauan (*Shorea contorta* Vid.) and red lauan (*Shorea negrosensis* Foxw.) are the most frequent species in the sampling sites with relative frequency value of 5.172, having 21.285 and 32.656 species importance values (SIV) respectively.

Mt. Mahuson has the most number of unique tree species in Elevation 1 (660-720 masl) which is moderately-diverse with H' value of 2.351 (Fig. 3). Ulayan

(*Lithocarpus apoensis* (Elm.) Rehd.) has the most number of species with relative dominance value of 38.975 and species importance value of 68.629

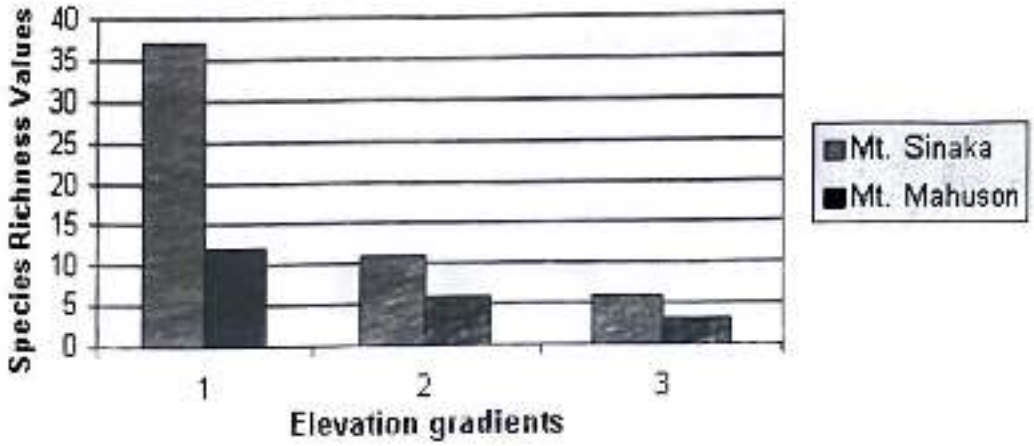

Figure 2. Species Richness of the 2 sampling sites

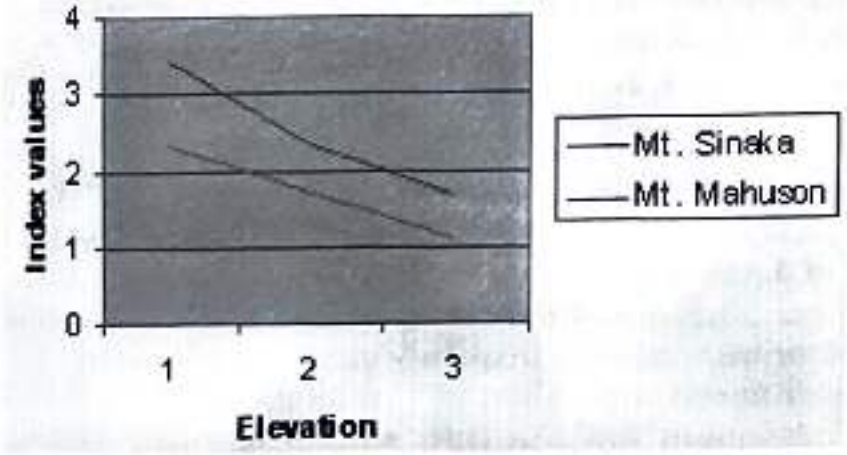

Figure 3. Diversity indices of the two sampling sites

In Mt. Sinaka sampling site, red lauan (*Shorea negrosensis* Foxw.) has the highest importance value of 36.66%, followed by bagras (*Eucalyptus deglupta* Bl.) with 9.84%. The *Eucalyptus deglupta* Bl. species in the sampling site are huge per diameter, making it relatively dominant in Mt. Sinaka (Table 3).

Table 3. Species Importance Values of Dominant Trees found in Mt. Sinaka

Family Name	*Common Name*	*Scientific Name*	*ni*	*RF*	*Dom.*	*Rel. Dom.*	*Rel. Dty.*	*SIV*	*Impt. %*
Dipterocarp.	Red lauan	*Shorea negrosensis* Foxw.	4	5.17	45.13	22.72	4.76	32.66	10.89
Myrtaceae	bagras	*Eucalyptus deglupta* Bl.	3	1.72	48.11	24.22	3.57	29.52	9.84
Dipterocarp.	White lauan	*Shorea contorta* Vid.	5	5.17	20.18	10.16	5.95	21.29	7.10
Tiliaceae	Marubo/ balobo	*Displodiscus paniculatus* Turcz.	6	1.72	8.29	4.17	7.14	13.04	4.35

Table 4 shows the species importance values of dominant trees found in Mt. Mahuson, where ulayan (*Lithocarpus apoensis* (Elm.) Rehd.) is the most dominant (relative dominance of 38.98) and has the highest relative frequency of 31.39, followed by white lauan (*Shorea contorta* Vid.) with 11.36% importance value. Both of these species are categorized as vulnerable for its conservation status.

Table 4. Species Importance Values of Dominant Trees found in Mt. Mahuson

Family Name	Common Name	Scientific Name	ni	RF	Dom.	Rel. Dom.	Rel. Dty.	SIV	Impt. %
Fagaceae	ulayan	*Lithocarpus apoensis* (Elm.) Rebd.	6	9.65	31.39	**38.98**	20	68.63	22.88
Dipterocarp.	White Lauan	*Shorea contorta* Vid.	2	4.76	18.25	**22.67**	6.67	34.09	11.36
Lauraceae	kalinga g	*Cinnamomum mercadoi* Vid.	1	4.76	6.54	**8.13**	3.33	16.21	5.40
Dipterocarp.	kaliyaa n	*Shorea Palosapis* (Blco.) Merr.	2	4.76	3.58	**4.45**	6.67	15.87	5.29

There are 3 critically endangered, 3 endangered and 13 vulnerable tree species found in the sampling sites (Table 5) classified based on the DENR DAO 2007-01 List of Philippine Threatened Plant Species. Narra and red lauan trees are among those illegally-logged high quality trees that are used for timber.

Table 5. Conservation Status of Trees Found in the Sampling Sites

Family Name	Scientific Name	Common name	Conservation Status
Fabaceae	*Pterocarpus indicus* (Willd.) forma *echinatus* (Rojo)	narra	Critically Endangered
Meliaceae	*Toona calantas* Merr. & Rolfe	Kalantas/ malakalantas	Critically Endangered
Myrtaceae	*Syzygium nitidum* Benth.	makaasim	Critically Endangered
Melastomataceae	*Medinella magnifica* Lindl.	Kapa-kapa	Endangered
Sapindaceae	*Cubilia cubili* (Blanco) Adelb.		Endangered
Verbenaceae	*Vitex parviflora* Juss.	molave	Endangered
Anacardiaceae	*Koordersiodendron pinnatum* (Blco.) Merr.	amugis	Vulnerable
Araucariaceae	*Agathis philippinensis* Warb.	almaciga	Vulnerable
Dilleniaceae	*Dillenia reifferschedia* Villar	Katmon-kalabaw	Vulnerable
Dipterocarpaceae	*Shorea polysperma* (Blanco) Merr.	tangile	Vulnerable
Dipterocarpaceae	*Shorea almon* Foxw.	almon	Vulnerable
Dipterocarpaceae	*Shorea negrosensis* Foxw.	Red lauan	Vulnerable
Dipterocarpaceae	*Shorea contorta* Vidal	White lauan	Vulnerable
Fagaceae	*Lithocarpus apoensis* (Elm.) Rehd.	ulayan	Vulnerable
Guttiferae	*Callophyllum laticostatum* PF Stevens	Thick-veined bitanghol	Vulnerable

Lauraceae	*Cinnamomum mercadoi* Vid.	Mindanao cinnamomum	Vulnerable
Lauraceae	*Cryptocarya ampla* Merr.	bagarilau	Vulnerable
Meliaceae	*Aglaia edulis* (Roxb.) Wall	malasaging	Vulnerable
Sapotaceae	*Palaquium philipense* (Perr.) C.B. Robinson	Red nato	Vulnerable
Burseraceae	*Canarium luzonicum* (Blumei) A. Gray	Piling-liitan	Threatened
Dilleniaceae	*Dillenia luzoniensis* (Vidal) Martelli ex Durand & Jackson	malakatmon	Threatened
Dilleniaceae	*Dillenia philippinensis* Rolfe var *philippinensis*	katmon	Wildlife species

Summary and Conclusion

About 114 species (97 identified, 17 unidentified) were recorded in Mt. Sinaka while 95 species (79 identified, 16 unidentified) were found in Mt. Mahuson. 3 critically endangered, 3 endangered, 13 vulnerable, 2 threatened, and 1 is classified as wildlife species based on DAO 2007-01. Elevation 1 (760 masl) of Mt. Sinaka has the most diverse tree species. Mt Sinaka is more species-rich and highly-diverse compared to Mt. Mahuson, but Mt. Mahuson has more potential to re-grow to a climax stage.

Threats to Tree and Biodiversity Conservation

Several threats to biodiversity conservation were identified in the two sites. Foremost among these is the seeming unrestricted conversion of forestland and forested areas to plantation crops. The plantations are going up the mountains especially in the CADC and CADT areas which seem to be the way by which the plantations really expand. Second, after areal expansion is the use of insecticides and chemicals necessary for the plantation crops management which ultimately not only adversely affect the rich biodiversity of the sites, but maybe contamination of water resource. Third, is the unregulated wild pig hunting, specially in the Mt.

Mahuson site, with ready markets with the plantation workers at the lower slopes.

Recommendations

The local communities must know the conservation status of the plants they utilize. The indigenous people (IPs) and also the migrants must refrain from over-harvesting certain resources. Illegal logging/timber poaching should be prohibited. The people must know how to integrate the growing of agricultural crops with perennial or tree crops. Trees and plants which are preferred by birds and other fauna must be protected by the local inhabitants.

The proliferation of plantations (banana, palm oil, rubber) must be regulated and rationalized in the revision of the Comprehensive Land Use Plan (CLUP) of the municipality.

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