Research

TREE ELEMENTS ALONG THE WESTERN SLOPE OF MT. LOBO: SPECIES COMPOSITION FROM 700 to 1, 007m ALTITUDES

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ABSTRACT

Mt. Lobo, the highest peak in the coastal province of Batangas, Luzon Island was sampled for its dendrological elements. The forest community along the western slope proved to be diverse in terms of representative tree species. Families and genera of medium altitude (700-800m.asl) such as Anacardiaceae (*Buchanania, Dracontamelon*), Combretaceae *(Terminalia*), Dipterocarpaceae (*Parashorea, Shorea*), Euphorbiaceae (*Drypetes, Glochidion, Mallotus, Neotrewia*), Meliaceae (*Aglaia, Amoora, Dysoxylum*), Moraceae (*Ficus, Artocarpus*), Sapotaceae (*Palaquium, Pouteria*) were gradually replaced by the characteristics montane families like Clethraceae *(Clethra*), Fagaceae (*Lithocarpus*), Lauraceae (*Cinnamomum, Litsea, Phoebe*), Melastomataceae (*Astronia, Astrocalyx, Medinilla, Memecylon*), Myrtaceae (*Leptospermum*), Podocarpaceae (*Podocarpus*), Rutaceae (*Melicope*) and Theaceae (*Eurya*). Ascending to 1,007m altitude, Mt. Lobo's mossy forest community appeared simple which was composed of relatively fewer families, genera and species typical of temperate distribution or the "microtherms" (cold-adapted) like conifers (*Podocarpus*), oak (Fagaceae), *Clethra* (Clethraceae), *Astronia* and *Medinilla* (Melastomataceae), and *Leptospermum* (Myrtaceae). Such speciation is typical of the oak-laurel type of forest in the montane tropics.

The endemic *Tectona philippinensis* (Verbenaceae) interestingly was not found in Mt. Lobo as the species is exclusively distributed on low-lying hills (200-300masl) characterized by Karst formation and honey-comb edaphic features where tree elements become typically deciduous during summer.

Keywords: dipterocarp, Mt. Lobo, Philippine teak, microtherms, mossy forest

INTRODUCTION

The forest vegetation of the Philippine Islands is composed of about 13,500 species representing five percent of the world's flora. Ferns and fern allies (pteridophytes), gymnosperm (cone-bearing plants) and angiosperm (flowering

plants) constitute 22.5 percent of the *Malesian* Region. and 3.88 percent of world's vascular plants. Among flowering plants, Orchidaceae, Rubiaceae, Euphorbiaceae, Myrtaceae, and Moraceae have the greatest number of indigenous and endemic species while Graminae, Liliaceae, Ulmaceae, Leguminosae and Rutaceae have lower endemism (Castillo, 1999).

In particular, Mt. Lobo in the coastal province of Batangas some 150 kilometers south of Manila, the country's capital, offers interesting field study for forest trees. Lobo differs distinctly from that of other Philippine frontiers due to the endemic concentration of endangered tree: the Philippine teak (*Tectona philippinensis*), yet it is not fully understood and a treatise on its diverse tree flora has not been worked-out (Caringal and Generoso, 2001). It is further interesting to note that Lobo houses other Philippine native hardwoods such as the molave (*Vitex parviflora*) and dungon (*Heritiera sylvatica*) which along with Philippine teak were once used in the construction of giant treasure ships or galleons that plied the Manila-Acapulco route during 1700s and 1800s (Caringal, 2007).

A study of this nature will not only provide the academe, forestry sectors and plant scientists with basic information about the forest tree species along Mt. Lobo but will certainly contribute to the reforestation activities, forest land-use management and ecotourism program for the municipality and Batangas Province as a whole. Mt. Lobo is the highest peak in this province with an altitude ranging from 972 - 1,007meters above sea level (masl) (Caringal, 2007).

The primary objective of the study is to give an initial account and/or enumeration of tree flora along three (3) altitudinal sampling sites of Mt. Lobo.

MATERIALS AND METHODS

Natural forest stands and/or forest communities encountered at different altitudes commencing from 700masl up to 1007masl along the western slope of Mt. Lobo were sampled by three (3) successive inventory plots (30m x 70m) modified depending on the slope gradient and relief. The sampling area towards and on the summit zone was reduced in size for convenience as affected by narrowing relief. There was no sampling below 700m because forests at this altitude were already interrupted by slash-and-burn agriculture. Sampling sites were also revisited in the course of the research during different seasons (2001-2003) for systematic familiarity on the tree elements.

All the trees above 10cm in diameter at breast height (dbh) were considered for field identification. The total height (ocularly estimated), *dbh* using diameter tape, location in the landscape and local names were also noted for future data utilization. Leafy twig specimens were collected and tagged accordingly for taxonomic identification. Preliminary identification of the specimens and sorting

them by families and genera prior to final listings were done. The family name, official common name and taxon were verified from Salvosa (1963), Aragones (1991) and Rojo (1999). Some of the specimens were photo-documented prior to pressing and drying. These were kept at BSU Lobo Campus for future reference.

RESULTS AND DISCUSSION

700m altitude

Tree community at 700 m altitude is complex and diverse with 26 tree species distributed to 21 genera and 14 families (Table 1). Families and genera of tree elements are represented by Anacardiaceae (*Buchanania, Dracontamelon*); Combretaceae (*Terminalia*); Dipterocarpaceae (*Parashorea, Shorea*); Euphorbiaceae (*Drypetes, Mallotus, Neotrewia*); Fagaceae (*Lithocarpus*); Guttiferae (*Garcinia*); Lecythidaceae (*Planchonia*); Linaceae (*Ctenolophon*); Meliaceae (*Aglaia, Amoora, Dysoxylum*); Moraceae (*Ficus, Paraartocarpus*); Rubiaceae (*Neonauclea*); Sapotaceae (Palaquium); Sterculiaceae (*Pterocymbium*) and Urticaceae (*Laportea*).

800 - 900m altitude

At 800 m altitude (Table 2), 30 species under 21 genera and 15 families were encountered. The forest community is visibly complex and diverse as that of lower site and is composed of the following plant groups: Bignoniaceae (*Radermarchera*); Clethraceae (*Clethra*); Datiscaceae *(Octomeles*); Dilleniaceae (*Dillenia*); Dipterocarpaceae (*Parashorea, Shorea*); Euphorbiaceae (*Drypetes, Glochidion, Neotrewia*); Fagaceae (*Lithocarpus*); Lauraceae (*Cinnamomum, Litsea, Phoebe*); Melastomataceae (*Astronia*); Meliaceae (*Aglaia*); Moraceae (*Ficus*); Sapotaceae (*Palaquium, Pouteria*); Sterculiaceae (*Pterocymbium*); Verbenaceae (*Clerodendron*) and Vitaceae (*Leea*). What provides more conspicuous character to the forest community is the abundance of large lianas (woody vines), epiphytic ferns of the genus *Asplenium* and many orchid species on tree branches. Growth of climbing *Pandanus*, *Calamus* (climbing palms), *Pinanga* (erect palms), *Cyathea* (tree ferns), and forest floor mats *Selaginella* fern further give the community a distinct physiognomy.

Table 1. Tree elements encountered at 700m altitudinal sampling site in the western slope of Mt. Lobo (locally known as Mt. Naguiling), Luzon Island, Philippines.

Official Common Name	Stand Structure/ Classification	Taxa	Family
balinghasai	Medium-sized tree	*Buchanania arborescens* (Blume) Blume	ANACARDIACEAE
lamio	Large tree	*Dracontomelon edule* (Blanco) Skeels	ANACARDIACEAE
talisai-gubat	Large tree	*Terminalia foetidissima* Griff.	COMBRETACEAE
bagtikan	Large tree	*Parashorea malaanonan* (Blanco) Merr.	DIPTEROCARPACEAE
white lauan	Large tree	*Shorea contorta* Vid.	DIPTEROCARPACEAE
-	Large tree	*Shorea* sp.	DIPTEROCARPACEAE
-	Medium-sized tree	*Drypetes* sp.	EUPHORBIACEAE
alim	Medium-sized tree	*Mallotus multiglandulosus* (Reinw. ex Blume)	EUPHORBIACEAE
apanang	Medium-sized tree	*Neotrewia cumingii* (Muell.-Arg) Pax & K.Hoffm	EUPHORBIACEAE
ulaian	Large tree	*Lithocarpus llanosii* (A.DC.) Rehd.	FAGACEAE
gatasan	Medium-sized tree	*Garcinia venulosa* (Blanco) Choisy	GUTTIFERAE
lamog	Medium-sized tree	*Planchonia spectabilis* Merr.	LECYTHIDACEAE
sudiang	Medium-sized tree	*Ctenolophon philippinense* Oliv.	LINACEAE
salamingai	Small tree	*Aglaia acuminata* Merr.	MELIACEAE
bayanti	Small tree	*Aglaia llanosiana* C.DC.	MELIACEAE
-	Medium-sized tree	*Aglaia* sp.	MELIACEAE
kato	Medium-sized tree	*Amoora aherniana* (Roxb.) Pellegr.	MELIACEAE
-	Medium-sized tree	*Dysoxylum* sp.	MELIACEAE
tibig	Small tree	*Ficus nota* (Blanco) Merr.	MORACEAE
is-is	Small tree	*Ficus ulmifolia* Lam.	MORACEAE
malanangka	Medium-sized tree	*Parartocarpus venenosus* (Zoll. & Mor.) Becc.	MORACEAE
uisak	Medium-sized tree	*Neonauclea media* (Havil.) Merr.	RUBIACEAE
nato	Large tree	*Palaquium luzoniense* (F.-Vill.) Vidal	SAPOTACEAE
malak-malak	Medium-sized tree	*Palaquium philippense* (Perr.) C.B. Rob.	SAPOTACEAE
malataluto	Medium-sized tree	*Pterocymbium macrocrater* Warb.	STERCULIACEAE
lipang-bundok	Small tree	*Laportea gracilipes* Elm.	URTICACEAE

Table 2. Tree elements encountered at 800-900m altitudinal sampling site in the western slope of Mt. Lobo (locally known as Mt. Naguiling), Luzon Island, Philippines.

Official Common Name	Stand Structure/ Classification	Taxa	Family
-	Medium-sized tree	*Radermachera* sp.	BIGNONIACEAE
ayusan	Small tree	*Clethra tomentella* Rolfe	CLETHRACEAE
-	Small tree	*Clethra* sp.	CLETHRACEAE
binuang	Medium-sized tree	*Octomeles sumatrana* Miq. Dat.	DATISCACEAE
katmon	Medium-sized tree	*Dillenia philippinensis* Rolfe	DILLINIACEAE
bagtikan	Large tree	*Parashorea malaanonan* (Blanco) Merr.	DIPTEROCARPACEAE
white lauan	Large tree	*Shorea contorta* Vid.	DIPTEROCARPACEAE
-	Medium-sized tree	*Drypetes* sp.	EUPHORBIACEAE
-	Medium-sized tree	*Glochidion* sp.	EUPHORBIACEAE
apanang	Small tree	*Neotrewia cumingii* (Muell.-Arg.) Pax. & K.Hoffm.	EUPHORBIACEAE
ulaian	Large tree	*Lithocarpus llanosii* (A.DC.) Rehd.	FAGACEAE
manggasiriki	Large tree	*Lithocarpus ovalis* (Blanco) Rehd.	FAGACEAE
-	Medium-sized tree	*Lithocarpus* sp.	FAGACEAE
kalingag-liitan	Medium-sized tree	*Cinnamomum microphyllum* Quis. & Merr.	LAURACEAE
sablot	Small tree	*Litsea glutinosa* (Lour.) C.B.Rob.	LAURACEAE
kaburo	Medium-sized tree	*Phoebe sterculioides* (Elmer) Merr.	LAURACEAE
dungau	Medium-sized tree	*Astronia williamsii* ___ ex C.B.Rob.	MELASTOMATACEAE
-	Small tree	*Astronia* sp.	MELASTOMATACEAE
-	Medium-sized tree	*Aglaia* sp.	MELIACEAE
upling-gubat	Small tree	*Ficus ampelas* Burm.	MORACEAE
malatibig	Small tree	*Ficus congesta* Roxb.	MORACEAE
tibig	Small tree	*Ficus nota* (Blanco) Merr.	MORACEAE
hauili	Small tree	*Ficus septica* Burm f.	MORACEAE
tangisang-bayauak	Medium-sized tree	*Ficus variegate* Blume	MORACEAE
palak-palak	Large tree	*Palaquium lanceolatum* Blanco	SAPATOCEAE
malak-malak	Large tree	*Palaquium philippense* (Perr.) C.B. Rob.	SAPATOCEAE
duklitan	Large tree	*Pouteria duclitan* (Blume) Dub.	SAPATOCEAE
malataluto	Large tree	*Pterocymbium macrocrater* Warb.	STERCULIACEAE
bagauak	Medium-sized tree	*Clerodendrum minahassae* Teijsm. & Binn.	VERBENACEAE
-	Small tree	*Leea* sp.	VITACEAE

Summit zone

At 972 - 1007m altitude summit zone, the forest showed much lesser representation of 17 species by 13 genera and nine families attesting to the tree community's simpler structure and homogeneity (Table 3). Families and genera are represented by Clethraceae (*Clethra*); Lauraceae (*Cryptocarya, Litsea*); Melastomataceae (*Astrocalyx, Astronia, Memecylon, Medinilla*); Moraceae (*Ficus*); Myrsinaceae (*Ardisia*); Myrtaceae (*Leptospermum*); Podocarpaceae (*Podocarpus*); Rutaceae (*Melicope*) and Theaceae (*Eurya*). An appealing shrub of the genus *Medinilla* (Melastomataceae) and pitcher-plant *Nepenthes* (Nepenthaceae) give the plant community unique physiognomy.

The interior of this cloud drift forest community is covered with mosses, orchids and other epiphytes which are prominent on tree trunks and branches. Also, most of the trees are gnarled and twisted probably due to regular exposure to harsh wind at this particular altitude. The much cooler temperature and relatively shallow infertile condition of the soils at this elevation may, therefore, harshly influence the development of shorter and smaller tree individuals as also pointed out by Aragones (1991) at similar altitudes near the summit of Mt. Banahaw in Quezon Province.

CONCLUSIONS

Changes in tree elements with rise in altitude

Mt. Lobo's forest community along the western slope proved to be diverse in terms of representative tree elements. Along altitudinal sampling sites, changes in species components or plant groups can be noticed. Families and genera of medium altitude (700-800 masl) such as Anacardiaceae (*Buchanania, Dracontamelon*), Combretaceae (*Terminalia*), Dipterocarpaceae (*Parashorea, Shorea*), Euphorbiaceae (*Drypetes, Glochidion, Mallotus*, *Neotrewia*), Meliaceae (*Aglaia, Amoora, Dysoxylum*), Moraceae (*Ficus, Artocarpus*), Sapotaceae (*Palaquium, Pouteria*) were gradually replaced by the characteristic montane families like Clethraceae (*Clethra*), Fagaceae (*Lithocarpus*), Lauraceae (*Cinnamomum, Litsea, Phoebe*), Melastomataceae (*Astronia, Astrocalyx, Medinilla, Memecylon*), Myrtaceae (*Leptospermum*), Podocarpaceae (*Podocarpus*), Rutaceae (*Melicope*) and Theaceae (*Eurya*).

Ascending to 1,007m altitude, Mt. Lobo's mossy forest community appeared simple which was composed of relatively fewer families, genera and species typical of temperate distribution or the "microtherms" (cold-adapted) like conifers (*Podocarpus*), oak (Fagaceae), *Clethra* (Clethraceae), *Astronia* and *Medinilla* (Melastomataceae), and *Leptospermum* (Myrtaceae). Such speciation is typical of the oak-laurel type of forest in the montane tropics.

The endemic *Tectona philippinensis* (Verbenaceae) interestingly was not found in Mt. Lobo as this species concentrate on low-lying altitudes and hills (200-300 masl) characterized by karst and honey-comb edaphic features where tree elements become typically deciduous during summer as reported by Caringal (2004). Mt. Lobo, however, represents that of evergreen broad-leaf type vegetation.

The findings of this study seem to validate Van Steenis' (1962) and Aragones (1991) concept that in lower and upper contours of a mountain range, depending on the mountains' size, the permanent establishment of a particular plant group changes correspondingly with a change in climate, soil and other habitat factors including altitude.

Table 3. Tree elements encountered at 972-1007m altitude mossy summit zone of Mt. Lobo (locally known as Mt. Naguiling), Luzon Island, Philippines.

Official Common Name	Stand Structure/ Classification	Taxa	Family
ayusan	Small tree	*Clethra tomentella* Rolfe ex Dunn	CLETHRACEAE
dugkatan	Small tree	*Cryptocarya bicolor* Merr.	LAURACEAE
batsan	Small tree	*Litsea microphylla* (Elm.) Merr.	LAURACEAE
-	Small tree	*Litsea* sp.	LAURACEAE
tanghau	Small tree	*Astrocalyx calycina* (Vid.) Merr.	MELASTOMATACEAE
-	Small tree	*Astrocalyx* sp.	MELASTOMATACEAE
undayai	Small tree	*Astronia acuminatissima* Merr.	MELASTOMATACEAE
-	Small tree	*Astronia* sp.	MELASTOMATACEAE
kapa-kapa	Small tree	*Medinilla magnifica* Merr.	MELASTOMATACEAE
kulis	Small tree	*Memecylon ovatum* Sm.	MELASTOMATACEAE
hauili	Small tree	*Ficus septica* Burm.f.	MORACEAE
tagpong-kitid	Small tree	*Ardisia angustifolia* A.DC.	MYRSINACEAE

malasulasi	Small tree	*Leptospermum flavescens* J.Sm.	MYRTACEAE
igem	Small tree	*Podocarpus rotundus* de Laub.	PODOCARPACEAE
matang-araw	Small tree	*Melicope triphylla* (Lam.) Merr.	RUTACEAE
bakig	Small tree	*Eurya coriacea* Merr.	THEACEAE
-	Small tree	*Eurya* sp.	THEACEAE

Note: Shrub or small tree (diam. 3 to 30 cm; ht. 2 to 5 m); Medium-sized tree (diam. 30 to 40 cm; ht. 5 to 15 m.); Large tree (diam. over 40 cm; ht. over 15 m). Stand structure of species may vary elsewhere depending on site influences.

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