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The Philippine Forests

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Unlike the forests of a temperate region, where in a single locality the number of tree species usually does not exceed 10 or a score, those of the Philippine Islands, and probably of any tropical country, contain a bewildering number and variety. In one locality where an actual count was made, 80 different species were collected on a single acre. While this is likely extreme, almost any acre in a virgin stand would probably contain a score of different kinds. Altogether it is estimated that there are more than 2,500 different tree species in the Islands. Many of these, however, are not large growing sorts. As a matter of fact, probably not more than 600 or 700 reach saw timber size when mature. Of those, only something over 100 different species commonly find their way into the markets as lumber.

It is popularly supposed also among those not familiar with the situation that tropical forests are made up principally of species producing cabinet woods, such as mahogany, rosewood, etc. While such kinds occur frequently, they very seldom constitute the bulk of the stand. In fact the real timber wealth of the Islands lies not in cabinet woods but in ordinary construction timbers, the great majority of which belong to a single botanical family—*dipterocarpaceae*. The dipterocarps, as they have been called, are as important to the Philippines from a timber standpoint as are the conifers to the United States. There are many different kinds of them represented in the family, probably as many or more as there are conifers in this country. Some produce hard durable woods while others are soft and easily worked. Many of them take an excellent finish so that when stained they are splendid cabinet woods. Practically all are large growing kinds, reaching heights of 130 to 190 feet and diameters of 40 to 60 inches, frequently much more. As a class they have straight regular boles often free of limbs for 100 feet. It can thus be seen that although botanically exceedingly complex, the forests from a commercial standpoint are not quite so confusing as would at first appear. In fact, when one has learned to recognize the dipterocarps in the woods, together with a number of other principal commercial species, it is surprising to know how large a per cent of the trees in a virgin forest are familiar to him.

A better idea of the general composition of the forests in general is afforded by a concrete illustration. On the Island of Mindoro, where the writer spent over two years, there were collected 552 different species. Of these, approximately 49%

reached when mature a diameter of 12 inches and a height of 40 feet or more; 32% were smaller than the above but over eight inches in diameter and 26 feet in height. The remaining 19% were smaller than the above although still with distinct tree forms. Of the total 552 species but 13 were dipterocarps. Undoubtedly this represents less than one-half the total number of species on the Island, but probably the proportions of different sized trees that occur is representative.

Before describing the forests further the following general facts are given concerning the Islands, so as to make clearer one's understanding of the situation. The Philippines lie between 5 and 21 degrees north latitude, about directly south of the east coast of China. The group consists of 11 large and about 2,000 small islands. All of the large islands, and many of the small ones, are mountainous with ranges generally extending in northerly and southerly directions. These commonly reach elevations of 3,000 feet or more above sea level, the highest points being over 10,000 feet.

Aside from the continuous warm weather, the outstanding climatic feature so far as its effect on vegetation is concerned is rainfall. The distribution of this is governed mostly by the direction of the prevailing winds, or the monsoons as they are called. From November to May the prevailing winds are from the northeast, during which period most of the rainfall is on the eastern or Pacific side of the islands. During this time the western portion of the territory, which comprises the greater bulk of the area and supports the largest part of the population, has a dry season. During the other monsoon the moist southwest winds striking the western coasts bring the wet season. The rainfall varies greatly from place to place, depending upon the effect of mountain ranges and other factors, ranging from 36 to 160 inches. Generally the precipitation is between 60 and 90 inches, most of which falls during the wet season between June and October.

The population is confined mostly to the sea coasts and to a few of the larger valleys, there being few people back in the mountainous areas where the virgin forests occur. Those living in such regions are practically all of the non-Christian tribes, the coastal population belonging to different so-called Christian tribes. In the zone between the settlements and the virgin forests are frequently large areas of grassland or of second growth timber, practically all of which represent areas that were once in forest but which have been cleared and cultivated and then abandoned.

The following tabulated statement gives approximately the area of land by classes:

Class of vegetation	Area in square miles	Per cent
Virgin forest	40,000	33 1-3
Second growth forest	20,000	16 2-3
Grassland	48,000	40
Cultivated land	12,000	10
Total	120,000	100



Native village, showing arrangement and construction of houses. The
palm trees in center are young cocoanuts.



Native canoes or "bancas" as they are called. These are fitted with out-
riggers to prevent their upsetting.

Of the cultivated land probably not over one-half is cultivated during any single year. Of the grassland the larger percentage of area is not being utilized for any purpose.

Practically all of the timbered area of the Islands, both virgin and second growth forests, are still in public ownership and as such are under the direction and management of the Philippine Bureau of Forestry. The virgin forests are of chief interest since they contain practically all of the present stand of commercial timber. There are several more or less distinct types occurring in approximately the following proportions and containing about the quantities of timber shown in the following tabulated statement:

Type	Estimated area			Estimated volume of standing timber (million board feet)
	Per cent	Square miles	Acres	
Dipterocarp	75	30,000	19,200,000	192,000
Molave	10	4,000	2,560,000	7,680
Pine	5	2,000	1,280,000	2,560
Mangrove	2	800	512,000	1,024
Mossy	8	3,200	2,048,000	Protective
Total	100	40,000	25,600,000	203,264

As already stated, the dipterocarps are the predominating tree species. The forests in which they occur have been called the dipterocarp type. In this type are many sub-types, depending on composition which in turn is determined by the various factors of the environment. In general, however, the dipterocarp forest occupies the regions where growing conditions are most favorable. These vary topographically from moist river bottoms to hilly and mountainous country. In composition the dipterocarp type generally is very complex. First are the large dominant trees, among which various species of dipterocarps are generally most common. There are, however, a great variety of other large growing sorts which add to the complexity of the forest, but many of which kinds have never yet been utilized commercially and some of which have little apparent value. Under this upper story of dominant trees, which often does not occupy the entire area, is an understorey of small sub-dominant ones of great variety but generally of minor importance from a commercial standpoint. Still below the sub-dominant trees are the smaller kinds of tree species and a heavy growth of herbs and shrubs. Although these latter always grow in the greatest profusion as compared with forests in temperate regions, they are relatively fewer where the stand of timber is dense. Over and through the whole mass of trees, shrubs and herbs is almost invariably a tangle of vines. Always present as a major element in their composition are several species of climbing palms or rattans, some of which produce the rattans of commerce. Although the diameter of these rattans is small, varying from one-half to 2 inches, they grow to great length,

probably 300 or 400 yards or more. At any rate they reach to the tops of the highest trees and make tangles of growth in the openings that are almost impenetrable. Their long palm-like leaves are armed with strong recurved spines which if caught in one's clothing will bring you to a sudden halt. In many places also climbing bamboo occurs in the openings and forms an even more impenetrable mass than do the rattans.

The quantity of timber per acre varies, of course, with the site and the composition of the forest. The following tabulated statement, based on averages of different tracts that have been examined in different localities, will give an idea of the quantity of timber in trees over 16 inches in diameter that occur in a number of localities:

	Feet B. M. per acre
Northern Negros (Low hill forest)	
Dipterocarps (6 species)	42,900
All other species	2,300
Total	45,200
Eastern Mindoro (River Plain)	
Dipterocarps (4 species)	9,400
All other species	6,900
Total	16,300
Mindanao Island	
Dipterocarps (10 species)	13,600
All other species	15,300
Total	28,900
Bataan Province (Hilly to mountainous)	
Dipterocarps (6 species)	19,600
All other species	8,900
Total	28,500

The molave type is so called because molave (*vitex parviflora*), one of the hardest and most durable woods which the Islands produce, is a characteristic tree. This type occupies the drier sites, generally the lower hills where growing conditions are not so favorable for the development of heavy stands of dipterocarps. The forest is much more open than in the previous type and the larger trees are farther apart, shorter and more irregular in form although some of them are among the most valuable species which occur. Between the larger trees is the characteristic understory of smaller ones and through the whole a profusion of vines in which the climbing bamboos often predominate. The stand per acre in this type of timber is small as compared with the previous one, averaging not more than 3,000 feet B. M. per acre with maximum stands perhaps 3 or 4 times as large. The commercial value of this type, however, is greater than would at first appear, since many of the trees are splendid cabinet woods which bring the highest market prices and also because this type of forest is apt to grow in the more accessible regions so that the cost of exploitation is relatively low.

The mangrove type grows on tide flats, at the mouths of streams and on the shores of protected bays, in fact practically



Interior of virgin dipterocarp forest. The large trees are dipterocarps. Note the man in the foreground almost obscured by the mass of herbs and shrubs.

everywhere that tide water covers the land except on exposed beaches. Frequently these tide flats are a mile or more in width. In composition these forests are very simple, the majority of the stand belonging to a single family—*rhizophoraceae*. Frequently some of the different species occur in pure stands, although generally there are a half dozen or so mixed together. Nearly all of them are relatively small growing kinds in normal mature stands ranging from 6 inches to 30 inches in diameter and from 40 to 50 feet in height. There is relatively little undergrowth except near the upper limits of tidewater where this type mingles with fresh water ones. These mangrove swamp forests produce great quantities of fire wood, while the bark of many species is gathered as tan bark. In addition to the trees described above, a palm known locally as "nipa" grows along streams in many parts of the tide flats. The leaves of the nipa palm are one of the most important products of the Islands to the natives, since they are used almost exclusively for thatching roofs and sides of the native houses.

The beach type of forest grows on sandy beaches and beach flats lying above high water. The stand is very complex, containing a great many species, but the type is not especially valuable.

The pine type of forest occupies the high mountainous region of northern Luzon, nearly all of which is over 3,000 feet in elevation. Throughout this region pine (*pinus insularis*) grows in nearly pure stands. Occasionally these are dense, running up to 10,000 or 20,000 feet per acre, but more often they are very open and scattered. In the pure stands of pine there is very little undergrowth except grass and ferns. Strange to say, the common fern growing in this region belongs to the same genus as does the brake fern so common in portions of the United States. In the stream bottoms and on the moister slopes broad-leaved species occur, often forming dense jungles not unlike that in other forest types. In general appearance the open pine forests are not greatly different from the yellow pine forests in the western United States. The trees grow to large size and produce a fair grade of timber which is rather inclined to be pitchy. This type of forest is practically the only one which is liable to be killed by forest fires. The grass, which during the wet season grows in great profusion, dries out in the dry part of the year and with the needles that have accumulated, burns fiercely, doing great damage to reproduction and often to mature trees. Apparently it is the forest fires that have prevented the pine from producing dense stands. With fire protection the region would probably support a fairly uniform and heavy stand of timber, possibly 15,000 or 20,000 feet B. M. per acre. Scattered pine trees are also found in two other localities aside from the mountainous area of northern Luzon—one in

Zambales and the other on Mindoro Island. In both of these latter areas there is also another species of pine found in addition to the one growing farther north.

The mossy type of forest, or the mountain type, as it might be called, is a purely noncommercial one, occupying the higher mountain tops all over the Islands. Most of the trees are small in size, although there is still a dominant and sub-dominant story. There are, however, fewer vines although still a large amount of undergrowth. The outstanding feature of the forest is the ever present covering of moss. This grows on all the branches and trunks of trees and shrubs, so that stems an inch or 2 inches in diameter are often so covered with moss that they appear to be 5 or 6 inches in diameter or more. Sometimes the moss hangs in long tendrils from the branches and in turn is covered with ferns and orchids, so that taken as a whole this type of timber is by far the most beautiful of any on the Islands. Among the tree species which occur are species of ash, maple, yew, barberry, oaks and several other temperate zone species. In the herbaceous growth also are a great many familiar plants in which are a number of species of violets and a wild rose. Here also ferns develop into definite tree forms which are found nowhere else.

In the foregoing discussion little mention has been made of palm trees. There are a great many different species of these which are very numerous in some localities, especially in the dipterocarp type of timber. Usually they occur scattered with the other trees, although in a few instances in pure stands on areas of a few acres each. As a whole, however, palms constitute a minor part of the forest.

The above discussion gives a general idea of the composition of the forests themselves, and now a word regarding some of the commoner animals which are found in it. Just as favorable growing conditions produce a profusion of vegetation, so does the favorable climate often develop an abundant fauna. Among the larger animals are wild pigs, deer, wild buffalo and occasionally monkeys. The former are widely distributed and in places are very numerous. It is very usual to see them scurrying out of the way as one comes near. They are of the razor-back type, sometimes reaching 200 or 300 pounds each in weight. They live on fruit and vegetables found in the forest and afford very excellent meat. Deer are not so widely distributed as are pigs, but are numerous in the more open places and especially in grassy areas away from settlements. There are several species—all good food. Wild buffalo (*carabao*), while not widely distributed, roam in large herds in a few of the unsettled regions, especially along the flat plains of the larger rivers where quantities of natural forage is produced. These probably are not native but have developed from animals which have escaped from civiliza-



Mangrove swamp showing high stilt roots
of one of *Rhizophora*.

tion. In Mindoro Island is a native buffalo (*tamarao*) found nowhere else. These animals are said by the natives to be very ferocious and to charge a man on sight. Although the writer has known of several instances where men were injured by them, he has never seen one alive, although several months were spent in the territory in which they are found and many of their trails were followed. Probably their ferocity is greatly exaggerated by the natives. Monkeys occur in groups in some regions, generally near settlements.

Bird life is abundant, although one is rather disappointed that there are not more species with brilliant plumage. Among the different kinds are wild chickens which are found practically everywhere throughout the woods at the lower elevations. These chickens resemble the domestic game chickens that are raised in this country and are a food much prized by the natives.

Land travel throughout the Islands is slow and methods are very primitive. Most of it is done on foot, although in some places one can secure little native horses, which although not very much bigger than a man, are able to carry you along the sandy beaches or trails through the woods with apparent ease. The sandy beaches are the commonest route of travel in the less settled regions, being the main thoroughfares between the scattered villages which are all located on the seashore. Outside of Manila and a very few of the larger towns, there are no hotels whatever, so that one always stops at private houses unless in the woods. The people, however, are very hospitable and often inconvenience themselves greatly to care for visitors.

For food rice is everywhere the staple, potatoes and flour being very seldom obtainable. For meats fish is most often used, the natives drying fish and taking it with them on trips, or keeping it for a reserve supply. In villages chickens and eggs can generally be had. Bananas are found in most places during practically all seasons of the year, but other fruits are not common except for relatively short seasons. In addition to these and a few other articles which one can secure from the natives, an American traveling in the Islands generally takes with him a supply of canned goods.

These are a few of the conditions which an American forester meets in the Islands. At best life is hard. One could recount obstacles and difficulties almost without end. There is the possibility of sickness away from medical attention and in a country where disease develops rapidly. The torrential rains frequently swell small streams to the size of rivers and makes fording them dangerous. Similarly, the tides raise the water in small streams which at low tide are fordable, so that one can only sit and wait for the water to go down. Often the American forester has to spend weeks or months away from his fellow white man, sometimes away from mail communication. But with all its drawbacks,

the life is most fascinating and interesting. In few places is such an opportunity offered one to explore, map and describe unknown regions. Everywhere are strange trees, new plants and unusual surroundings. The extremely favorable growing conditions and the large variety of plant life afford one an opportunity to study ecology which is unexcelled, and the mere living among a different race and associating with them, as must a forester traveling through their country, cannot help but give him a broader grasp of their life problems and more sympathy with those who happen to be born into a less favorable environment than our own.