which occupied the years from about 1810 to 1826. According to H. H. Bancroft's History of Central America 2,000 negro slaves were employed in these mines in 1570. The property known as Gallo Hill is said to have been one of the famous gold mines of the world at that time. There is evidence that this and other properties in what is known as the Santa Fe district were worked to some extent even as late as the gold discovery in California, after which the rush of travel across the Isthmus drew away the labor and caused a permanent shut-down.

The Remance mine in this region is another gold property with a history and is now under exploration by the Panama Corporation, Ltd., a British company, which has taken a option upon large areas in both Veraguas and Darien provinces, including numerous old workings. The Spaniards are said to have taken much gold from the mines known as "Espiritu Santo" and "Mina del Rey," in Darien, in the latter part of the Seventeenth Century and forepart of the Eighteenth Century. Indeed, these, also, are said, on the strength of historical writings, to have been in their turn "the richest gold mines of the world."

It is urged on behalf of projects to reexamine these old workings that all the gold obtained by the Spaniards must have come from free-milling ores inasmuch as no successful treatment of sulphide ores was known at that time. However, a number of attempts to work the old mines have been unsuccessful. The two mines in Darien named above were made the basis of a company known as the Darien Gold Mining Company, Ltd., incorporated in London in 1891. This company carried on mining operations, and apparently produced considerable quantities of gold, but without profits, for in 1907 it was reorganized. The prospectus of the new company stated that bullion has been produced in the seven years ended with February, 1906, in annual amounts as

follows:

Year ending February			
1900	£91,671.	3.	1
1901	43,835.	7.	5
1902	41,031.	1.	6
1903	66,970.	4.	1
1904	154,418.	8.	2
1905	52,163.	10.	3
1906	50,069.	13.	9
	£500,159.	8.	3

The prospectus adds that "for the period from February, 1906 to the last crushing in December, 1906, the mines have suffered from want of capital and have been carried on under difficulties during the reconstruction. During these months they have produced about £20,000."

The prospectus mentions among the assets of the company rubber plantations having about 250,000 trees up to the age of five years.

A report of Mr. Drouot, a French mining engineer, whose address at that time was 49 Avenue, Bosquet, Paris, made in February, 1913, placed a value on the machinery, railroad and rubber plantations of Fcs. 3,700,000, and adds that "this total is certainly valued at a very low rate, for the railway alone cost nearly 3 million francs."

According to this report the mines had not been operated profitably, and apparently the average gross yields per ton was only about 5 to 10 francs, or B 1 to B 2.

In conclusion as to gold mining possibilities, it may be said that there is proof sufficient that gold in important amounts has been obtained in years past in the two provinces named mainly it appears by the use of slave labor. The best known properties are now held under options or concessions by the Panama Corporation, Ltd., of London, which seems to be making a well financed and capably directed effort to determine what values they hold. This Company has completed a mule-trail from Santa Fe in Veraguas Province to the Atlantic Coast, a distance of about forty miles.

Prospecting is being carried on in Veraguas, Herrera and Darien Provinces, not only by tunnel and crosscut work upon the old lode properties but upon alluvial deposits which are thought to promise well for dredge operations.

An American Company, known as the Panama Gold Dredging Company, including among its stockholders and directors several well known men of the Canal Zone, has been organized to carry on prospecting and dredging operations for gold in Darien Province. The area covered by its concession extends a distance of fifty-five kilometers upstream from the mouth of the Tuyra River and fifty meters on either side of the center line thereof.

Apparently, within the next few years, the operations now under way will go far toward determining what basis exists forthe long prevalent belief that Panama possesses valuable gold deposits.

Manganese ores undoubtedly exist in several localities, but that they are rich or abundant enough to justify exploitation seems not to have been demonstrated. A mineralized area lies near the Caribbean Coast, extending from Puerto Bello eastward a distance of thirty-six miles toward Point San Blas. Several companies have been organized on the basis of holdings in this district, and a narrow gauge railway sixteen miles long was built years ago connecting the Soledad mine with tidewater at Nombre de Dios. Exports of ore were made from this property in 1918 of the declared value of $187,902, but nothing is being done there at present.

Presumably the market for the ore would be in the United States. It has been reported that the import duty imposed by the United States tariff of 1922 has prevented operations on this property, manganese ore having been previously free of duty. The duty is levied upon ore or concentrates containing in excess of thirty per cent of metalic manganese, and is at the rate of one cent per pound on such content. The import duty, however, applies to all manganese ores brought into the United States, which

in recent years have been as follows:

Imports of Manganese Ore and Concentrates into the United States, 1926, 1927 and 1928.

(Gross Tons)

	1926		1927	1928
Germany	72		37	69
Italy	2,920		-	-
Netherlands	12		-	-
Norway	1,700		-	-
Soviet Russia	122,345		133,159	79,529
United Kingdom	99		25	129
Canada	200		255	2,234
Cuba (*)	14,112	(**)	4,166	1,645
Brazil	130,698		78,902	64,290
Chile	3,942		1,574	4,026
China	--		863	--
India	30,596		48,863	42,058
Java and Madura	285		--	798
British West Africa	48,295		42,372	14,096
Union of South Africa	6,214		--	3
Totals	361,490		310,216	208,877

(*) Imports of manganese ore from Cuba enter free of duty; manganese concentrates, however, are dutiable under the tariff act of 1922 at the rate of $22.40 per ton, manganese content.

(**) This figure is gross weight and is not included in the total shown for 1926.

Mining operations on manganese ore are reported in eighteen states of the United States, but the ores are of low grade and the aggregate production is small. In 1927 it was estimated at seven per cent of the United States consumption.

Steel cannot be produced without manganese and none of the great steel-producing countries can obtain within its own borders more than a fraction of its requirements. Sir Robert Hadfield, one of the leading engineering authorities of the British iron and steel industry in a recent article upon the steel industry said:

> "Steel could not be produced in the gigantic quantities used by this and other countries -- in 1926 about 90,000,000 tons --if manganese were not available. Yet we have not a week's supply of British manganese in this country; and the Americans have only two or three years' supply of high-grade manganese ores in the whole area of the United States."

It will be seen that the chief supplies of the United States come from Russia, Brazil, India and West Africa. The Russian deposits are located about forty miles from the Black Sea port of Pati, and the Brazilian ore comes from the vicinity of Quelus, in the interior, about 175 miles from Rio de Janeiro, moving over the Central Railway of Brazil.

A bed of hematite ore is reported as located in central Veraguas, near La Mosa, about thirty miles from the coast, and a ledge of copper ore is reported about thirty miles from Chitre, the capital of the Province of Herrera. Other deposits of minerals, including silver, asbestos, aluminum and lead are said to exist, and outcroppings of coal occur in several localities. There is reason to believe that in time an important mining industry will be developed.

Oil seepages appear in several provinces and drilling operations have been carried on in the provinces of Darien, Bocas del Toro, Chiriqui, Herrera and Los Santos by a number of companies but apparently without results.

THE FOREST WEALTH

The forests of Panama cover the greater part of the country and generally speaking consist of a heavy growth of tree species similar to those found elsewhere in the Tropics. These species are of great number, few of which as yet have found any place in world markets. The exceptions are certain hard woods of great merit for texture and beauty, or soft and light woods, of merit for special uses. Mahagony has long been the choice wood for furniture and interior finish the world over, but the ~~so-called~~ mahagony of different countries varies in characteristics even when it is entitled to the name, and a number of the secondary woods of tropical origin, possessing some of the characteristics of true mahagony, such as the quality for taking a fine finish, are sold under a trade name which includes the word mahagony

with a prefix. Several varieties of cedar, light, fragrant and long-grained are in demand for cigar boxes, and other uses. Cocobolo is another hard wood well known in the United States and in demand for handles. These woods are native to Panama, but are relatively scarce, and the most accessible supplies have been taken. They have not been exhausted, but in the future must be obtained for the most part through logging operations which include other woods.

On account of the high repute of mahogany, cocobolo, lignum vitae and certain of the tropical hard woods which have been long known, the impression is general in temperate zone countries ~~have had the impression~~ that the tropical forests consist largely of hard woods, and indeed these woods have such a technical classification, because all non-coniferous species are so classified; in truth, however, the tropical woods are mainly fast-growing, light in weight and soft in texture. Many of them have merits which there are reasons for believing will eventually create a demand for them in world markets, but they also have certain peculiarities, such as susceptibility to rot, insect damage,, tendency to warp or split in drying, etc., which have created prejudice against them and resulted in disappointment where they have been improperly introduced.

Insect pests have been one of the most common causes of unfavorable comments upon the tropical soft woods, and numerous stories may be heard in the United States ports of heavy losses on this account. However, timbermen experienced in the Tropics know that the insect menace may be met by proper precaution.

The soft tropical woods when offered in the United States or other temperate zone markets must be sold in competition with oak, maple, birch, gum, redwood, pine, etc., of which there yet remain large supplies. The latter are well known while the former are not, and the tropical woods have

been injured in reputation by introductions under unfavorable conditions. Finally, as yet they are not cheap enough in comparison with the temperate zone woods to induce substitution to a general extent. They have not been produced upon a scale enabling costs to be reduced to the level reached by large operations in the competing woods.

These briefly may be taken as the reasons why up to this time, notwithstanding numerous efforts to establish a lumber or timber industry in Panama, no important success has been made. They are not, in our opinion, conclusive as to the ultimate value of the Panama forests, but it is important to understand the situation and to have an intelligent policy toward it.

At first thought the fact that the greater part of the timber, lumber and railroad ties used in Panama today is coming from the United States seems to show that the native woods are discredited at home and probably of little value. This reasoning is unsound, however, as proven by common experience elsewhere. There was a time when New Orleans, notwithstanding the great yellow pine forests around it, was an important market for white pine, rafted down the Ohio and Mississippi Rivers from the forests of Pennsylvania. Established facilities for handling business on a large scale frequently outweigh the advantage of mere proximity to a source of undeveloped supply.

Apparently an adequate explanation of the failure which usually has attended upon these enterprises is found in the fact that the woods and lumbering conditions of the Tropics are very different from those of the regions in which previous lumbering experience has been gained. Except for the search on a small scale for certain rare woods of high value, little lumbering has been done in the Tropics, and little has been known about the great body of tropical woods, their peculiarities under treatment or their possible uses. More progress has been made in the utilization

of tropical woods in the Philippine Islands than in any other part of the world, and this has been done since 1900. We find in the record of lumbering operations there the greatest encouragement as to the possibilities of the industry in Panama.

Variety of Species.

* Onerespect in which the forests of the Tropics differ markedly from those of the temperate zones is in the great number of species composing them. In the great white pine regions of the northern part of the United States the showing of other species of trees in the original forest was practically negligible, and the Southern pine forest was almost as exclusive. In contrast with this, approximately 2,700 species have been identified in the Philippine Islands and nearly 1,000 in Panama. The number of tree names is even greater, as different names have been applied to the same species in different localities. Most of these species are not known in the lumber markets of the world, and are unsaleable until their usefulness for particular purposes has been demonstrated. This is illustrated by an expert's report, which we have been permitted to see, upon an excellent tract in Panama which names the following varieties:

Alcavu	Cedro Amargo	Frijolillo	Quira
Almendra	Cedro Cebollo	Guararillo	Roble
Amargo	Cedro Espinoso	Guayacan	Sigua
Amarillo	Cedro Macho	Higueron	Tamarindo
Balsamo	Coco	Mora	Tangari
Bariba	Cocobolo	Nazareno	Talpalizo
Cabima	Coratu	Numo	Tuquezo
Caoba Colorado	Cutarro	Ponulo	Zorro
Cativo	Espave	Quejado	

The report states that many of these species are valuable, but that they occur in small quantities which to market profitably must be accumulated in shipping lots, and that "the rare woods, because of the extra cost of handling and holding in stock, and general scarcity do not add primarily to the value of the tract, although not of course to be over-

looked if operations were undertaken." It says that "95 per cent of mill-out would be lumber for which there is no established market."

It would seem to be obvious that the policy of making an extensive investment and starting up operations under heavy expense in the manufacture of a product which would be practically unknown in any market, is a clear case of going at an enterprise wrong-end first. The product should be thoroughly tested and the value demonstrated before large expenditures are made.

Prohibitive Costs of Small Operations. (C)

An attempt to utilize only a small percentage of the trees on a tract, frequently only mahogany, has been fatal to numerous undertakings from the beginning. It was possible in the early years of the search for the rare woods to find them readily accessible to the coast or a floatable stream, to which they could be skidded at small cost. The day of primitive logging is past. Now only enterprises prepared to utilize the timber as it comes, to the extent of at least half a dozen species, have a chance of keeping their costs low enough for successful results.

Mr. Donald M. Matthews, who had six years of experience in the Philippines, ten years in charge of forest work in North Borneo, and recently has been in charge of a forest research project in Cuba for the Tropical Plant Research Foundation, has written as follows upon this point:

> "Whereas the small logger could afford to go in and extract a tree or so per acre, hauling it a short distance, and show a handsome profit, the larger enterprise, having to resort to mechanical means of transport, could not afford to do so, and was faced with the necessity of logging species which had hitherto never found their way into the world markets. The difficulty of getting a market for these new species of timber is only now being duly appreciated by those interested in the development of the tropical forest resource, and the indifference which many lumbermen have shown to the merchantable possibilities of the less valuable tropical timbers has been responsible for many of the failures in tropical forest development. In many instances the logger starting in with up-to-date equipment tried to take hold where the small logger left off, based his profit estimates

> on the market prices of the rarer timbers, and either found himself loaded up with a great number of species which he could not market, or, if he extracted only the marketable species, found that his logging costs left him no margin of profit. In other words, he did not realize that his logging problem and his marketing problem could not be divorced one from the other." *

Furthermore, small scale enterprises frequently become impracticable when increased in size without being made large enough to handle some of the problems which are peculiar to lumbering in to Tropics, such as sanitation and labor supply, for more often than not the latter cannot be obtained locally.

Climatic effects upon out timber and the seasonable character of the streams have been elements in unfavorable results, although such conditions should be fully known in advance of operations.

Many failures in tropical American forest operations have been due to inaccurate cruising methods. The reports following such cruises have contained too many guesses as to quantities of standing timber. The first step in the development of a tropical forest is the testing of the abundant woods. As the tests bring out marketable properties, the next step is a cruise of some one property and the formulation of a preliminary working plan. In a mixed tropical forest it is necessary to list by name or number every tree above a certain diameter along strips some ten meters wide; the total area of the strips amounting to one or two per cent of the entire area. A one per cent valuation survey was found sufficiently satisfactory in the Philippines. The results as found on the first surveys have borne the test of time as noted in production during the past 25 years.

Logging methods heretofore have been primitive and wasteful. Steam logging, railroad tracks, caterpillar tractors and a full line of up-to-date

* December, 1925, issue of the Bulletin Pan American Union.

equipment are wanted for the modern lumber industry. The rough surface which is said to be a bar to lumbering in the interior of Panama is no worse than in regions of the Philippines that are being successfully logged.

The necessity for large scale operations, however, with the increase of investment and permanent staff required, makes more imperative the establishment of a market demand which will take the production continuously. Here is one of the problems in introducing new woods, for before consumers will commit themselves by important orders they will want to know that they can be served regularly and in quantities with a uniform quality. "If a wood in all respects the equivalent of the high grade hickory or ash required in the manufacture of handles were offered to the industry today, it would, regardless of price, receive little attention unless steady supplies could be guaranteed. Price would then be a secondary consideration. Modern manufacturing and marketing methods absolutely preclude frequent shifts in even the external appearance of material sold." *

Since there is a manifest want of understanding of the necessity for preparatory work in introducing the tropical woods, we quote another authority on the subject, Mr. W. N. Sparhawk, Forest Economist, United States Forest Service, as follows:(**)

> "Before the common tropical woods can take an important place in the markets of this country or of Europe thorough studies must be made to determine what kinds are available in sufficient quantity to insure a steady supply over a fairly long period, and what their physical properties are, and the peculiarities that must be considered in manufacture, seasoning, and utilization, for the methods commonly used with most of the temperate hardwoods may not always apply. Much time and effort will also be required to educate consumers and create a demand for the woods that will justify heavy investment of capital in large-scale, long-term lumber operations

* Major George P. Ahern, Tropical Plant Research Foundation, Washington, D.C.

** From an article "Why the United States is interested in Latin American Forest Development," published in Pan American Bulletin.

in the Tropics, for such operations will be necessary if the product is to be well manufactured and reasonably low in price. Transportation facilities must be built, special machinery developed and employed on a wide scale, towns and industries will have to be organized to insure adequate sources of competent labor, and local manufactures may have to be established to utilize the low-grade material and by-products which can notbe marketed profitably in a raw state. It is highly desirable, also, that studies be carried on to determine the best methods of renewing, perpetuating, and improving the tropical forests, so that they may not only afford permanent supplies of materials required by the world's industries but also remain as continuous sources of wealth to the countries within which they lie.

All these things can not be accomplished in one year, or even in ten. It is hardly probable, even with intensive effort, that the tropical woods can come into our markets in billions of feet in much less than twenty years. By that time it is certain that we shall need all we can get.

The points to be emphasized are: First, if our hardwood manufacturing industries are to survive, they must eventually utilize large quantities of timber from the Tropics; and, second, the present is none too soon to commence laying the necessary foundations for such utilization in the future."

Extent and Character of the Forests. (C)

Major George P. Ahern, former Director of Forestry for the Philippine Islands, on the strength of numerous reports by foresters of repute has estimated that the Panama forest represents a total of 50 billion bd. ft. of lumber of merchantable size, of which some fifteen tree species constitute approximately 75 per cent of the entire stand. This 37 billion feet, does not include the less abundant woods, such as mahagony, cedar, etc.

At present many of the fifteen woods, although used locally, are unknown in the markets of the world. To illustrate, probably one of the most important species is Espave, for it is the most abundant. It is said to be the only species sufficiently plentiful to enable a modern mill to operate upon it exclusively. It is of rapid growth, takes a high finish, and is believed to be suitable for many purposes. It has been used for railroad car interiors and house finishing. Examples of interior trim are as handsome as mahogany, but working it developes difficulties, and as yet no market for it has been established. Another important species is batteo, or cedro macho, which occurs abundantly. In Costa Rica thousands of feet of this very species are being cut and sold under the name of Costa Rica mahogany. It has been exported profitably in other countries under the name of crabwood, and should be a very valuable tree if properly developed. Along the coasts of Panama are found enormous quantities of mangle, or mangrove, which has proved to be a profitable source of forest revenue in Porto Rico and the Philippines. Cocobolo is a wood of stable demand, perhaps the best known Panama wood in the United States. Nispero is one of the most valuable, fairly numerous woods in the country: like rosewood, hard, heavy, dense, durable. Caoba Blanca, and Caoba Colorado are suited to interior finish and cabinet work. Cedro Amargo is cigar box cedar. Santa Maria is a common species, well regarded, and illustrates the class of woods in which, because of their abundance, the greatest possibilities lie when their uses are fully developed.

The idea has prevailed commonly that only the very hard tropical woods have any value. The fact that soft woods, with a comparatively high water content, drying rapidly under the tropical sun or in a kiln, will check and warp, that some of them will stain or change color and that many have given unsatisfactory results in certain uses, have been too readily

accepted as proving that they are not amenable to treatment and have no uses.

Competent Testimony to the Value of Tropical Woods.

Against this hasty judgment it is interesting to read the opinions of experienced observers. For example, take the following extract from an article by Mr. Hugh M. Curran, a specialist in Forestry at the North Carolina State College of Agriculture. Mr. Curran has been making a tour of the countries of the Caribbean region and frankly expressed himself amazed at the wonderful forests he had seen. Mr. Curran touches upon several points of practical interest, not usually included in a technical discussion and for this reason we quote from his article in the Pan American Bulletin/at some length: of November 1925,

> "The bulk of the species in these stands were unknown except to the local population, and the qualities for manufacture I found to be identical with those of the common woods of commerce. Not only are there substitutes for our harder woods represented by oak, birch, beech, and maple, but a tremendous amount of soft woods which are not conifers, but similar to the liden, yellow poplar, and cottonwood of northern forests, and occurring in sufficient quantify and of such large size and excellent quality that it will be possible to cut these and place them on the world's markets in competition with coniferous timber.
>
> "The wood-using industries and the professional foresters and the artizans employed in the fabrication of wood are all trained to believe that there is no possible substitute for the various coniferous timbers -- that once these are exhausted we must replant, as no substitute can be found.
>
> "Recent research covering the last 25 years of forest reconnaissance, laboratory investigations, and fabrication tests by the industries prove conclusively that tropical softwoods from broad-leaved trees are successful competitors with the pine, spruce, and cedar, and that in many cases they are more suitable for the uses to which our modern soft woods are put than the common timbers now used.
>
> "As agricultural containers, forms for concrete, pattern wood, framing material, flooring, trim and panel stock, and for construction where durability is a feature they easily distance competition; and where finish, color, and grain are desired, or lightness, they are equally as serviceable.
>
> "Professor Record's recent monumental work on the timbers of tropical America has done much to clear the atmosphere of doubt and misinformation with reference to these timbers. The work of Whitford, Matthews, and Foxworthy in the east, of Gambel and Brandeis in India, with many other trained specialists, proves the existence and suitability of tropical timber for

temperate uses.

"There are other features which today handicap utilization of tropical forest products which can only be removed by the joint action of interested governments. Brazil ruined her rubber trade and forced its development on the opposite side of the world by an unwise policy of export dues. All exploitation of forest products is subject to a similar injustice. North America and Eruope have tariff laws which permit them to discriminate against tropical products and make it impossible to assure capital that after a hugh investment in tropical timber lands, logging and milling machinery they will not be shut out from competition by the hardwood interests of their own country.

"Commercial treaties must be negotiated between the countries of Latin America and the great importing countries in the north which will eliminate these dangers.

"To recapitulate, South America has an unlimited supply of commercial woods to replace both hard and soft woods of the temperate regions. To prevent the destruction of this resource and to make it available to commerce, they must be surveyed, put under technical management, the timbers tested for manufacturing qualities, and the handicaps to commercial exploitation now existing in the form of unwise tariff laws must be removed.

"The great bugbear of the American wood-using industry that tropical competition will ruin their business is without foundation. These interests will naturally acquire tropical holdings, logs will be exported, manufactured by American plants, and flow through the existing channels to the ultimate consumer." *

Scientific Investigation and Management.

The competent testimony which has been given indicates that for the proper development of the forests of Panama scientific investigation is necessary, followed by management under a trained personnel. There is no doubt in the minds of foresters that a number of species now considered useless could be made profitable sources of revenue and at the same time decrease the unit costs of logging. Indeed in many cases the same identical species that occur in Panama are, under different names, being profitably exploited in other Central and South American countries and the islands of the West Indies. Scientific investigation should determine first what species occur sufficiently and in accessible regions. This examination constitutes in a word an inventory of the accessible forests of Panama. Following this, tests of the physical properties of the species themselves should be made to

* From an article entitled "A Tropical Forester Visits Latin America", published by the Pan American Union, November, 1925.

determine to what uses these species could be put.

These tests can be made upon application and at small expense at any of the numerous forestry schools and experimental schools in the United States, or at the British experimental station in British Guiana. The University of Michigan has an excellent forestry school, and the location, near to Grand Rapids, the leading center of the furniture manufacture in the United States, suggests that an exhibit there of the woods of Panama, with their qualities duly attested, would be very convenient to a large consuming market.

To sum up, the forests of Panama represent potentially a possible source of large revenues to the Government, if not the greatest single source. That they are today failing to be economically or profitably utilized can be laid to a lack of knowledge concerning their extent, composition, and utility. Their story is almost the story of the forests of the Philippines before the advent of the Philippine Forest Service in 1900, as we receive the latter from authoritative sources.

The Lumber Industry of the Philippine Islands. (C)

The American occupation of the Philippine Islands brought about an active construction program, and for the first five or six years more than 90 per cent of the woods used both for public and private construction was brought from the Pacific Coast of the United States, some 6,000 miles distant. The local engineers, contractors, and Army Quartermasters, were much impressed by a few local cabinet and construction woods that had long been used, but which like mahogany, cedar, and other popular tropical American woods, were scarce. The local abundant woods in the islands were unpopular in the market, and the Quartermasters and other buyers did not want them at any price.

Investigation of the most promising accessible forests in the Islands brought out the fact that some twenty-tree species constituted 80 per cent

of the stand of timber, but a majority of these abundant species were unpopular in the market. The Philippine Bureau of Forestry gave these woods an elaborate series of laboratory and factory tests, which brought out their valuable properties and uses not appreciated up to that time. Reconnaissance maps and reports indicated large stands of these woods per acre. The amount of timber taken per acre by timber licensees averaged from one to two thousand feet, but after the investigation the first lumber company operating with modern equipment actually cut and marketed in 1904 forty thousand feet per acre. That same company after 25 years of operation on the same forest tract is cutting and manufacturing more timber today than the entire Island's cut in 1904. The operation mentioned is a permanent one and affording annually to the Government a substantial net profit over cost of the Forest Service.

The forests of the Philippines are mainly Government property, and the Government has been interested primarily in their development to demonstrate the value of the woods, support an adequate forest service, preserve the forests and create a permanent industry for the country.

There are now fifteen such timber concessions, operating over large tracts, with modern equipment, on 20 year license agreements, (*) and in addition there are more than2,000 similar timber operations authorized by licenses granted for one year. The titles to the forest lands remain in the Philippine Government. In addition to supplying local markets with 98 per cent of their wood needs, an ever increasing export trade has been developed with some 18 foreign countries.

(*) Note. All lumber companies in the Philippines are operating under an identical license, copy of which appears as Appendix of this Report.

Value of the Lumber Industry to the Country. (C)

Mr. Arthur F. Fischer, present Director of Forestry, Philippine Islands, in an article which appeared in the Pan American Union, has given such an interesting account of what the development of the lumber industry has done for outlying districts of the Islands, that we reproduce a couple of paragraphs, herewith, offering them as a picture of what that industry may do for Panama:

> "It is a well-known fact that in practically all instances, with the exceptions of a very few sawmills, the industry has been started in virgin timber and as a result has developed small communities in and around sawmills. The agricultural land available if cleared have been taken up by inhabitants and employees of the sawmills and developed gradually into towns and large municipalities, good citizens with small land holdings developed, and thereby civilization and good government enhanced by sawmills located among non-Christian tribes. Nomadic non-Christians gradually began to obtain employment in the sawmill and have become as a result settled indefinite incorporated communities which have, as stated above, attained the status of full-fledged municipalities. The payrolls of some of the companies are very large, and a considerable portion of this money has been invested by employees in the surrounding lands which, as a consequence, have been developed. Small, well managed and money-making haciendas are today owned by ex-employees of sawmills who 8 or 10 years ago came into an unsettled and uninhabited place. This has been the history in every instance where sawmills have been founded in virgin territory. Countries of Central and South America with similar conditions can learn from this development.
>
> After harvesting of the wood crop on agricultural lands, the disposition of these agricultural lands should be regulated so that the employees of the sawmills have the opportunity of acquiring parcels, thereby establishing and settling a new community and at the same time producing a more permanent labor force for the sawmill. This phase of country development, apart from the amount of money gained in the manufacture of lumber for export and local sale, is the outstanding economic feature of Philippine sawmill development. The same can, by proper regulation through a government entity, be performed in any tropical country." (*)

Growth of the Philippine Industry. (C)

The growth of the lumber industry of the Philippines seems to us to teach so important a lesson that we take space to set forth certain unimpeachable evidence supporting this view.

(*) January, 1926, issue of the Bulletin of the Pan American Union.

"Economic Geography," a quarterly publication issued by Clark University, Worcester Massachusetts, U.S.A., in its April, 1929, number, carried an article by Luis J. Borja, entitled "The Philippine Lumber Industry," which bears all the marks of authenticity and is amply corroborated. We make the following extract from it;

> "at the time of the American occupation of the Philippines, the lumber industry was confined very largely to the cutting of the highest grade cabinet and construction woods. Logging was practically confined to hand and animal methods and, with the exception of five or six mills in Manila and in the provinces, the sawing of lumber was largely done by hand. The large amount of construction work following the American occupation and the reestablishment of peace conditions, however, created a big demand for lumber with the result that by 1903 fourteen sawmills were installed in the Philippines. The total cut of these mills amounted to about 15,000,000 to 20,000,000 board feet per annum. Since then, the lumber industry has grown, and today there are about sixty-seven modern mills in active operation, some of which are using modern steam logging machinery. These mills prpduce about 200,000,000 board feet annually, of which about 50,000,000 are exported.
>
> The Insular Lumber Company, whose capacity is 50,000,000 board feet per annum, is now the world's largest producer of hardwood lumber. It was organized in 1904 with small capital. The company enlarged its mill in the years 1906, 1912, and 1918, but it was not until 1922 that the whole plant was completely rebuilt and enlarged to its present capacity. This company has its head office in Philadelphia, and has several sales agencies in the United States. The plant is located at Fabrica, in the province of Negros Occidental.
>
> The present lumber industry offers a permanent employment to about 20,000 native laborers. While other industries generally complain of lack of labor, the lumber industry has a sufficient supply. In some cases, however, it is necessary to import laborers from the thickly settled regions to the remote places where logging operations are carried on."

The following tables show exports of Philippine lumber to the several importing countries in 1924 and 1925, and give various figures showing the continuous growth of the timber and lumber industry, also the revenues of the Philippine Government from the forests and costs of the forest service:

Exports of Lumber from the Philippines.

1924 and 1925

Country to which Exported.	Board Feet	
	1924	1925
United States	23,036,768	25,185,600
Guan	---	3,810
United Kingdom	5,001,080	2,482,944
Canada	89,888	424,848
Australia	4,041,568	9,136,776
British East Indies	---	60,208
Hongkong	184,016	214,968
China	6,276,472	7,013,384
Japan	12,053,896	6,735,240
France	---	2,120
Hawaii	7,208	---
Spain	8,480	848
Italy	848	31,800
Belgium	46,640	11,624
Netherlands	---	256,096
Egypt	---	636,424
Germany	---	20,776
	50,746,864	52,217,476

Table showing Important Timber, by species cut and invoiced in the Philippine Islands, from Annual Report of Philippine Bureau of Forestry, 1927.

(Cubic Meters)
Fiscal Year

Species	1923	1924	1925	1926	1927	Total 1910 to 1927
*Red Lawan	43,104	90,706	165,420	171,282	186,404	826,573
*White Lawan	213,020	284,375	234,669	261,647	300,297	2,650,884
*Apitong	101,747	147,103	152,241	148,524	184,189	1,479,415
*Tangile	52,584	65,000	87,664	98,104	127,164	724,286
Guijo	26,921	27,681	26,549	33,542	28,669	412,710
Yakal	25,540	24,214	24,791	31,067	34,003	360,257
Ipil	26,159	24,604	22,608	25,069	21,934	369,738
Molave	30,195	44,793	33,114	29,304	22,214	385,887
Narra	12,414	11,649	10,456	27,767	14,532	187,966
Kalantas	8,267	6,169	7,174	7,581	6,394	89,399
*Palosapis	6,397	6,165	7,664	9,956	9,888	93,832
Manggachapui	3,902	3,541	3,236	4,186	4,779	45,172
Dugon	2,875	4,258	3,116	3,223	2,265	39,330
Tindalo	1,743	1,654	1,544	1,517	876	23,482
Akle	3,101	1,467	1,115	1,423	701	24,716
*Lumbayao	8,350	7,944	8,595	12,982	17,586	95,016
Pagatpat	1,854	1,026	1,065	1,503	1,679	25,381
Other Species						
First group	5,805	12,175	7,888	4,226	1,265	80,473
Second group	15,665	23,720	16,431	17,574	34,284	252,586
Third group	40,616	34,370	26,914	39,853	89,017	414,624
Fourth Group	30,242	44,938	28,202	33,114	52,524	870,356
Total - -	660,399	868,452	870,456	953,444	1,140,664	9,452,183

Total for 1927 - - - - - - - - - - - - 1,140,664
Total for 1926 - - - - - - - - - - - - 953,444

Difference - - - - - - - - - - - - - - - - 187,220

Per cent of Increase - - - - - - - - - 19.6

* Woods unpopular in Philippine market and unexportable in period to about 1906. Bureau organized 1900, by Major George P. Ahern. Note that the four species now leading were of this class.

Table from Annual Report of Philippine Bureau of Forestry, 1927

No. of Mills.	Log Scale. Cu. M.	Forest Charges. Pesos	Mill Tally! Bd. Ft.	Mills Sales. Bd. Ft.	Export. Bd. Ft.	Total cut from public forest. Bd. Ft.
16	241,302.28	182,022.60	70,960,712	65,752,110	7,080,376	105,296,000
19	288,340.17	245,524.11	86,165,806	82,025,106	6,813,256	136,485,000
21	314,538.17	270,692.01	94,828,897	94,262,607	13,862,256	150,957,000
28	369,624,80	336,624.80	99,594,337	86,434,571	11,790,168	180,227,000
28	372,842.39	349,767.77	111,120,864	114,860,911	18,285,000	173,615,000
32	483,803.22	416,259.41	136,318,870	136,676,619	36,949,904	182,006,000
37	652,104,63	566,448.62	168,399,997	155,911,782	50,746,864	260,536,000
41	663,061.57	597,253.18	170,360,000	166,983,492	52,216,872	281,139,000
44	794,415,38	722,358.64	177,437,958	186,722,772	62,709,600	336,832,000
50	955,114.72	867,579.75	189,102,893	206,872,590	72,034,632	404,969,000

Negligible amount cut from privately owned forests.

- - - - - - - - - - - - - - - - -

Table from Annual Report of Philippine Bureau of Forestry, 1927

Revenue derived from the sale of forest products, and expenditures of the Bureau of Forestry since its organization, April, 14, 1900.

Fiscal Year	Revenue	Expenses	Surplus	Expenses Per cent
1901 to 1906*	P2,268,591	P1,118,887	P1,149,704	49
1907	191,080	105,050	86,030	55
1908	211,471	107,242	104,329	51
1909	251,380	115,049	136,331	45
1910	271,582	152,161	119,421	56
1911	334,763	160,476	174,287	48
1912	354,685	200,840	153,845	57
1913	390,664	227,048	163,616	59
1913 July 1 to Dec.31)	160,913	141,131	19,782	88
1914	442,661	256,990	185,671	58
1915	425,817	274,176	151,641	64
1916	494,447	285,708	208,739	58
1917	536,328	281,126	255,202	53
1918	650,692	334,254	316,438	51
1919	805,229	473,242	331,987	58
1920	1,009,879	541,488	468,391	54
1921	1,013,151	524,921	488,230	51
1922	949,279	486,846	462,433	51
1923	1,062,437	515,211	547,226	48
1924	1,277,799	544,045	733,354	42
1925	1,260,369	591,220	669,149	47
1926	1,354,850	637,911	716,939	47
1927	1,459,032	674,829	784,203	46
Total - -	17,177,199	8,749,851	8,427,348	51

*Up to 1913, the fiscal year was from July to June 30.

The Future Market for Tropical Lumber.

The population of the world is increasing and there are few, if any, countries that are not consuming more timber than they are producing. The greatest consumer of woods is the United States, the population of which is increasing at the rate of about 1,500,000 persons per year, and its consumption of the woods keeps much ahead of production. Although the consumption of wood for some purposes is declining, notably for fuel and some kinds of construction work, other demands are increasing. In construction work it has given place to some extent to steel, brick and cement in the larger buildingsand in railroad cars, but in rural and suburban construction wood still holds first place, and is preferred for household furniture and most kinds of office furniture. It is still preferred for railroad ties, which by treatment against decay are made to last longer than formerly.

Sixty years ago the Northeastern States of the United States supplied 26 per cent, which in 1925 had decreased to 4 per cent, and during this period the production of the lake states rose to 35 per cent, then decreased to 6 per cent; Central States decreased from 18 to 5 per cent, while the Southern States increased from 10 to 38 per cent, and the North Pacific States increased from 2 to 29 per cent. The path of exploitation started from New England, ran west to the Great Lakes, then South, then West and Northwest. Of the present reserves, the New England territory contains only 2 per cent, the Middle Atlantic, Lake, and Central States contain 13 per cent together,, and the South Atlantic, East Gulf, and Lower Mississippi States 23 per cent, and the

Rocky Mountain and Pacific States 62 per cent. The greater part of the remaining timber is on the Pacific Coast; and the supply from this to the Eastern States mainly passed through the Panama Canal.

The United States always will be a large producer of lumber, for as prices rise with the depletion of the supply an inducement to reforestation is offered. High prices will afford an opportunity for foreign woods, and they are coming now from the Philippines, the products of which enter the United States duty free.

It is probable that the chief demand for tropical woods will be for furniture and inside trim, uses now satisfied mainly by the domestic oak, maple, gum, birch poplar and walnut. These woods are being cut much faster than they are replaced by growth and the next twenty years probably will see most of them comparatively scarce and selling at higher prices. Of the Philippine woods imported into the United States the greater part come to Los Angeles, and we are advised that partly by reason of these Philippine supplies Los Angeles is building up an important furniture industry, shipping its product throughout the country.

A Foresty Policy for Panama.

Panama, in much the same situation as the Philippines in 1900, may profit by the latter's experience. Briefly, the logical procedure suggested by that experience is as follows: Assemble all the data concerning Panama's woods and forests, as well as the laws and customs under which present forest operations are conducted; then under a competent forester conduct a rapid reconnaissance of the more promising and accessible forest tracts, followed by a more detailed study of some one tract, including botanical and log collections of the abundant woods, this to be followed by laboratory and factory tests. All of the information thus obtained should be arranged in attractive form and given to the world's hardwood trade. The problem of

Panama is to sell its forests and in order to do this it should follow the course that a business man or firm would follow, viz: First, know precisely what it has for sale, and then inform the buying public upon the quality of its goods.

It will be very desirable to have this program developed under the direction of a competent person or forestry organization, equipped by experience in tropical forestry and in the development of forestry service. In our opinion it should be made a part of a general Survey of the natural resources of the country, such as we understand is contemplated by recent legislation.

Such a Survey, by making available information about the forests, and also about the conditions attending lumbering operations, might prevent the continued repetition of unsuccessful enterprises which are very detrimental not only to the parties engaged in them but to the reputation of Panama's timber resources.

The forests contain important products other than the timber. There are oil palms and other palm products, tanning materials, wood oils and resins; edible nuts and other nuts of value, latex-bearing plants, such as rubber, balata and chicle; dye woods, medicinal plants, such as sarsaparilla, ipecac, etc; gums, woods and other plants suitable for pulp. The forests of Panama are as rich in variety of products as any forest in the Tropics, and the Government should take scientific account of all of these resources, with a view to making the most of them.

The Republic of Panama not only want to sell its woods, but to sell them under such conditions that the forests will be renewed in perpetuity, never exhausted, but growing more valuable as time passes, and furnishing the basis of an ever-growing industry from which in time tens of thousands of its people will derive a livelihood.

Government Care of Forests. (B)

All expert opinion on the subject is agreed that a nation owning extensive forests should have a skilled staff of foresters to care for them, and a School of Forestry in connection with its system of higher education. Although it may be necessary at the beginning to bring in a Director of Forestry from abroad, in order to obtain the desired training and experience, he should have a staff of young Panamans as soon as this purpose can be accomplished, always of course with regard to the available income resulting from the Service. It may be added that the chief pioneers in forestry in the United States either were of European birth and training or received their training in Europe. They established the first fofestry schools in the United States.

One of the important reasons for an expert survey of the country is to give information for guidance of the Government in the disposal of the public lands. Before it disposes of public lands it should know whether they will be most valuable for agricultural purposes or for permanent forests, and govern its policy regarding them accordingly. The experience of other countries indicates that it is wise policy for a Government to retain ownership of lands which are suitable only for forests, the reason being that the timber crop grows too slowly to induce the necessary care and expenditure on the part of private enterprise. The question of taxation is a serious one confronting timber lands in private hands. It is difficult to formulate or maintain a policy regarding taxation of growing timber which over a long term of years will be fair both to the public and to private owners. The Government has a permanent concern in the forests, not only on account of the present generation, but for future generations, and can afford to take the long time view of values. Forests on the highlands at the stream sources render an important service controlling stream flow and preventing soil erosion. The permanent character of Government control as compared to