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ANNUAL REPORT
FOREST DEPARTMENT
NORTH BORNEO
1916

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STATE OF NORTH BORNEO.

ANNUAL REPORT ON THE FORESTRY DEPARTMENT FOR THE YEAR 1916.

RECONNAISSANCE.

The reconnaissance work which has been carried on by the Department during the year may be divided into five distinct classes as follows:—Preliminary examination of extensive tracts to determine whether the stand of timber and topography are such as to warrant further intensive exploration. Detailed survey and reconnaissance and the preparation of maps and working plans as a basis for future lumber operations. Detailed reconnaissance and preparation of working plans for areas already held under licence or lease, the resulting data being furnished the licensee at cost. Hasty examination of tracts applied for by timber companies to determine the value of the areas and fix the terms of the concession. Detailed examination of timbered areas to be alienated for agricultural purposes to determine the value of the timber and indicate the manner of its disposal. The results of the previous year's work has made it unnecessary to spend much time in preliminary examination of areas as the best forest tracts of the East Coast at least are now fairly well known. One such trip was made through the Tambisan Peninsula from Tambisan to a point on the coast near Sibat. It was originally intended to run the exploration through to Tunku but heavy rains came on and the jungle flooded to such an extent that we were forced out to the coast some 18 miles north of the latter point. The area examined was found to be worthless from a timber standpoint. Good patches of timber exist but they are separated one from the other by many small swamps and sloughs and logging would be entirely too costly. No further exploration will be attempted in this area. Much good agricultural land was encountered and I estimate that there is close to 100,000 acres of land suitable for coconuts and rice between Sibat and Tambisan within 10 miles of the coast.

THE SILIMPOPON-KALABAKAN RECONNAISSANCE.

This piece of work is the most intensive yet carried out by the Department. The area examined comprises 57 square miles and adjoins the Serudong-Silimpon area which was surveyed out last year. It is located between the Silimpon and Kalabakan Rivers and comprises the whole divide from the juncture of these two rivers to a point 14 miles above where the divide reaches an elevation of 1,400 feet. The survey was carried out by the usual valuation strip method and 173 strips averaging nearly one half a mile in length were cut through the forest. The total number of miles of survey line was 81.72. All the standing timber for 50 feet each side of these lines was measured with the result that 3.2% of the total area of the proposed concession was examined. This is a very high percentage for tropical work and forms a very accurate basis for commercial exploitation. Altitude observations were taken at every change of elevation on each strip and with this data as a basis a fairly accurate contour and drainage forest map has been prepared. This map in conjunction with the accompanying report makes possible the location of railways and the exploitation of the area by modern steam motor out any further preliminary survey.

The land within the area examined may be classified as follows:—

Cultivated land	...	78.40 acres	...	0.22%
Commercial forest	...	31,133.60	..	85.04%
Mangrove swamp	...	4,878.40	..	13.32%
Nipah	..	520.80	..	1.42%
Total	...	36,611.20	..	100.00%

For convenience in describing the area it has been divided into blocks as follows:—

Block	Forested area in Block Acres	Stand per acre Cubic feet	Total stand Cubic feet
I	8,428.80	1701	15,124,081
II	6,826.00	1713	11,686,112
III	10,316.00	1134	11,698,344
IV	5,562.80	1028	5,718,558
Total	31,133.60		44,227,095

Block I and II adjoin the Silimpopon-Serudong area which was surveyed last year and together with it make a most attractive logging proposition. Not only is the timber on the two tracts of a high class and good density but the bulk of it lies within 5 miles of streams navigable by launches and lighters and hence the transportation cost, one of the biggest items in logging, will be a low one. A prospectus based on these two surveys is being prepared for distribution.

SURVEYS AND WORKING PLANS FOR LUMBER COMPANIES.

It is the policy of the Department to aid in every possible way the operations of any who may be interested in the development of the natural resources of the State. Such data as are collected by the Department in its official explorations are available free of charge and special examinations of tracts in which companies are interested are undertaken, whenever such work can be done without interfering with other Departmental work, for actual out of pocket charges. Two such pieces of work were carried out during the past year, one for the China-Borneo Company and one for the North Borneo Trading Company. The reconnaissance for the China Borneo Company covered 18,000 acres in the valleys of the Manjang, Kolapis and Mnyad Rivers, District of Labuk and Sugut. The survey was carried out in a manner similar to our other surveys and 26,649,000 cubic feet of timber was located. A contour map divided into five blocks with the stand of timber for each block indicated was prepared and together with a detailed report forwarded the Company. The North Borneo Trading Company's reconnaissance covered 8,653 acres. The survey located 3,099,418 cubic feet of timber. A detailed report and contour map showing the stand of timber by blocks was furnished the Company. During the year several short reconnaissances were made by the Conservator in company with representatives of local timber concerns for the purpose of small areas suitable for the production of the higher grades of timber. The areas visited were in the valleys of the Kalabakan, Marotai, Panjong Batu and Apas Rivers and Simanadel Island in the Lowie Harbour.

MANGROVE INVESTIGATIONS.

Due to the increased activity in the production of catch it has become necessary to make a study of our mangrove areas to determine their possibilities and prepare rules that will insure their rational utilization. One such project was carried out during the year and others are in hand. The survey which has been completed covers 13,196 acres of mangrove swamp in Darvel Bay near Lahad Dato'. The area was found to contain a stand sufficient to supply 3,293,866 cubic feet of firewood and 188,439 pikuls of tanbark. This is on a basis of a utilization down to 6" in diameter breast high which is considered as close a utilization as is possible without endangering the existence of the commercial species. In connection with this work data were gathered to determine the yield in firewood and bark of the various species of mangrove trees of various sizes. This data will be of great use in future surveys. Also an experiment has been started to determine the rate of growth of mangrove species so that it may be possible to say when a cut over area will be capable of producing a second crop. The results of this work will not be available for at least a year as yet, as no accurate conclusions can be derived from annual girth measurements under two years. The data gathered as to yield of mangrove trees in firewood and bark are given in the Volume Tables below:*

FOREST LAND vs. AGRICULTURAL LAND.

Valuation of Timber on areas to be opened for Agriculture. In most new countries it is the general rule that when agricultural development begins much good forest is destroyed. This is to a certain extent necessary but nevertheless to be regretted and this Department is endeavouring to minimize this waste first by locating areas suitable for agriculture which are not valuable as commercial timber areas and secondly by encouraging the utilization of commercial timber on areas which are being opened up. During the year it has been necessary to examine and report on two such areas. Detailed reports have in each instance been furnished the Government. In the prosecution of this policy it is the aim of the Department to gather sufficient data so as to be able to indicate on maps blocks of land which are more suitable for agriculture than for the standing timber and which can therefore be immediately opened up without the destruction of valuable timber. Considerable data of this character have already been obtained in the course of forest surveys, but not nearly enough to permit of a land classification even for the East Coast. Special attention will be paid to this work during the coming year and as this Department is the best equipped for the examination of wild lands it is suggested that it might be desirable to extend our activities to include the preparation of reports on the agricultural value of lands examined. This would naturally lead to the collection of data sufficient to permit of the preparation of agricultural prospectuses which would be of use in attracting investment. Most of the inquiries which I have received as to the forest resources of the country have been accompanied by inquiries as to agricultural possibilities and if we were in a position to furnish comprehensive data together with maps showing areas which are available, it would undoubtedly lead to further investment.

PROPAGANDA.

The need of energetic propaganda work to show the possibilities open to lumber investment in British North Borneo and to acquaint lumber using centres with the value of our timber is only second to the acquisition of accurate data as to our forest resources. This falls into two lines, that of the publication and distribution of information

* Not printed.

reference to our resources and that of direct correspondence and personal interviews. During the year, Bulletins Nos. 1 and 2 both dealing with the forest resource were published. Bulletin No. 1 entitled "Timbers of British North Borneo and Minor Forest Products and Jungle Produce" is the result of the study and classification of our timbers and other forest products by Dr. F. W. Foxworthy. This Bulletin is an authoritative and concise discussion of the timbers and jungle produce of the country and shows the relation of our material to other well known and valuable timbers of the East. It is bound to be a great aid in placing our timbers on markets where they would be otherwise unknown and will, to a great extent, do away with the prejudice which always exists against new and untried timbers when they are not known to be similar to others already in use. In short, by showing that many of our timbers are identical with those of India, the Philippines, the Federated Malay States and the Dutch East Indies, it places us in a position to enter markets on the same footing with these countries. The Bulletin has been widely distributed and well received and requests for copies are being received continually. Bulletin No. 2 "British North Borneo Forests. Opportunities for Lumber Investment" was published shortly after Bulletin No. 1. It is a short statement as to the extent and stand of commercial forests already surveyed and available together with a discussion of markets and costs of production. It was put forward as a general preliminary prospectus and is to be followed by detailed prospectus for special areas.

Although the dissemination of information as to our timber resources and costs of production will do a great deal toward attracting investment this alone is not sufficient. The marketing end of any timber proposition is quite as important as the producing end and in order that we might have available as much data as possible on this subject, the Conservator was authorized to make a trip to India for the purpose of studying and getting in touch with timber markets there. I left Sandakan on November 6, 1916, returning early in February 1917. The chief timber importing points on the east coast of India are Madras and Calcutta and I spent most of my time at these two points and in the adjacent territory. The result of my investigations has been submitted to Government in the form of a report entitled "India as a Market for Borneo Timber". India is at all times a conservative market as regards timber, but less so since the beginning of the war because of the shortage of supplies. Teak is the standard timber for all manner of uses but the demand for timber is increasing whereas the production of teak is not and hence the market is beginning to look for satisfactory substitutes. As the trade has been used to a light, stiff, easily worked timber such as teak, heavy hard timbers such as our selangan batu and billian are not in demand except for special uses where great strength and durability are prime requisites. The trade in general demands timbers of a class such as our kapur, kruin, the seriabs and oba sulu, and were it not for the exceptionally high freights ruling at the present time (50 cents per cubic foot to India) it would be possible for our timber merchants to open up a very lucrative trade in these timbers at once. Exclusive of teak the chief competitors of Borneo timbers on this market will be woods of a similar grade coming forward from Burma and Siam. These countries will have the advantage of us in the matter of freights but as their forests are further in the interior than ours the initial cost of production will be greater and should more than offset that advantage. Furthermore, these countries, being chiefly exporters of teak, have paid much attention to the possibilities of what they term their "jungle" and in times of normal freights Borneo exporters should have no difficulty in capturing as much of the Indian trade as they wish. The demand for timber in India is tremendous and prices are rising steadily. The

standard timber for sleepers is sal (*Shorea robusta*) and it is undoubtedly an ideal timber for the purpose. However, the demand for sleepers exceeds the supply and other timbers are being tried. Some of the grades of our kruin will be accepted at a c. i. & f. price of approximately \$1.00 per cubic foot. Our firms in Borneo are not in a position to cope with orders for sleepers and with a freight rate of 50 cents per cubic foot it would be impossible in any case to undertake the business at the present time, but the possibilities for the future in this line are large.

ADMINISTRATION.

Ordinance No. XI of 1916 being an ordinance "To consolidate and amend the law relating to Timber and Jungle Produce" came into force on the 2nd of October and under its provisions the Department has been collecting forest revenue as from that date. This Ordinance does away with the export duty on timber and provides for one royalty payment substantially equal to the sum of the old royalty and export duty. It further provides for the collection of this royalty on a basis of the cubic contents of timber felled in the forest before removal. This system of collection does away with the privilege which Companies owning saw mills have previously enjoyed in not paying for waste in the mills. It also has the effect of cancelling the lower export rate chargeable on sawn timber and makes the former export rate applicable to timber sold locally. In normal times there can be no valid objection to such an arrangement because sawn timber being a more highly manufactured product than logs draws a higher price and the waste which occurs in its manufacture is an essential element of the increased price. There is therefore no reason why Government should forego its right to royalty on the entire amount of sound timber in a log simply because a portion of this log is wasted by the licensee in transforming it into a form in which it is more readily saleable and in which it will command a higher price. The above discussion indicates the reasons for the change in the manner of assessing forest charges under the new Ordinance and, as said above, this seems a reasonable arrangement for normal times. However, it was but natural that those interested in the purchase of Government timber should object to an upward revision of timber rates during the period of commercial stagnation and high freights incident to the war and an arrangement was accordingly made whereby, although the principle involved was maintained, its operation was temporarily suspended. This was accomplished by a system of rebates to apply at the old export rates on mill wastage and on timber sold locally, and at one third the old export rate for sawn timber exported. Under this system the timber companies pay the full rates on all timber felled by them within their licence areas and furnish this office with a statement of mill wastage, local sales and sawn timber exported. The rebates are then calculated and deducted from the next bill rendered them for timber felled. The change from the old system to the new has occasioned some confusion but matters have since straightened out and the system is now working smoothly. The rebate system is, naturally, cumbersome, but being a concession on the part of Government and not an integral part of the law it can therefore be revoked whenever market and financial conditions warrant it. The change from the system of payments made after its transshipment to Sandakan or after exporting has made it necessary for all Companies to take account of and report to this office in their own hand whether in the jungle or in yards in Sandakan or elsey

the new Ordinance these stocks are at once liable to the royalty payment as prescribed in the timber roll. However, as this would necessitate the immediate payment of considerable sums of money as opposed to a gradual payment under the old law, the amounts due have been entered on our books as a debit against the Companies concerned to be paid off gradually during the coming year as the timber is shipped.

REVENUE.

Forest Revenue for the first nine months of 1916 was collected under the provisions of Ordinance No. XIII of 1901 and for the last three months under the provisions of Ordinance No. XI of 1916. The revenue which will eventually be collected by this Department creditable to the last quarter, 1916, is a considerably larger amount than would have otherwise been collected, because jungle and sawn stocks are taken into account which otherwise would have paid no royalty or export duty until brought to Sandakan or shipped. As pointed out above this revenue is not all collected but will come in gradually during 1917. Figures drawn from our books, including receipts and outstanding accounts are as follows:

Royalty on timber cut during October,		
November and December	... \$22,005.00	
Royalty under the Old Ordinance but		
collected by Forest Department	.... 905.90	
Stocks in jungle on October 1st.,		
1916	... .. 12,282.56	
Stock in sawmills October 1st.,		
1916	... .. 1,996.37	
Total	... ..	\$37,190.01
Less rebates on sawn timber and local sales	... ..	3,892.28
Balance	... ..	\$33,297.73

The above figures include what would otherwise have appeared as export duty and royalty at the old rate on timber shipped. They do not include revenue collected by Officers other than those of this Department as returns have not been received from such Officers as to collection for the last quarter, 1916. Arrangements are being made to have complete returns for the coming year for all forestry revenue collections.

LICENCES AND LEASES.

Following out the policy of reducing the excessively large areas held by timber companies when it is apparent that they are not needed for immediate supplies a number of licences and leases have been cancelled or voluntarily surrendered during the year. Cancellations were as follows: Licences Nos. 15, 17, 18, 22, and 25—for non-compliance with the provisions of Ordinance No. XIII of 1901. Leases Nos. 30, 34, 46, 47, and 48—for non-compliance with Clause 2 of Part IV of the Leases. Voluntary surrenders of areas were as follows: Leases Nos. 40, 50, 51, and 52 and Licences Nos. 23 and 29. Three licences were issued under the provisions of Ordinance. Two of these are Ordinary Timber Licences Nos. 1 and 2 on the Sedungon and Kinabatangan Rivers in Sandakan on the 2nd and 1st of October, 1917, respectively, and the

other an Exclusive Timber Licence for an area on the Munday River, District of Labuk and Sugut, expiring on the 2nd of November, 1919. At the end of the year the following licences and leases were in force:

NUMBER.	OWNER.	APPROXIMATE AREA.
Ord. Timb. Lic. No. 1	Shing Kee Company	640 acres.
" " " 4	" " "	unknown
Excl. " " 1	China Borneo "	5,000 acres.
Licence No. 8	" " "	25,000 "
" " 9	North Borneo Trading Co.	45,000 "
" " 12	Koh Kim Heen	unknown
" " 13	China Borneo Co.	25,000 acres.
" " 26	North Borneo Trading Co.	25,000 "
Lease " 14	China Borneo Co.	1,000 "
" " 21	North Borneo Trading Co.	4,000 "
" " 25	China Borneo Co.	100,000 "
Approximate area under Timber Leases and Licences.		230,640 acres.

MARKET.

Whereas some industries, notably catch and rubber, have possibly been benefited by war conditions the reverse has been the case with the timber industry. Market considerations at the present time are inextricably bound up with the question of freight and this has very effectually prevented shippers from deriving any advantage from the occasional high prices offered on some markets. Prior to the war a very lucrative trade was developing with the United Kingdom. At the present time shipments can only go into the United Kingdom via Liverpool and the freight is double the c. i. & f. price at which it was profitable to place timber on the London market before the war. The imports into the United Kingdom have decreased from 11,589,811 loads in 1913 to 6,318,812 loads in 1916 while the price per load has advanced in the same period from £2/18 to £6/6. Foy, Morgan & Company in their 1916 report say "Prices to-day stand at a record hitherto undreamt of in the history of the trade, and there is seemingly no reason why they should not go higher still while the very small stock gradually become smaller." The fact that the stocks are shrinking in spite of the extraordinary prices indicates the effect that the terrific freight rates are having and whereas small shipments of Borneo timbers have gone forward during the past year it is quite probable that they will cease entirely before the end of 1917, simply on account of freights, even if import restrictions do not shut them out altogether, a contingency which is also quite probable. At the present time Borneo shipments to Liverpool are limited to 80 tons per month for products of all kinds and if any further reduction takes place timber will be the first product to be eliminated. Hongkong, which is the mainstay of the industry here, has been an unsatisfactory market during the year. The political situation in China has caused the market to fluctuate badly and the country adjacent to Canton, where a great deal of Borneo timber is sold, has been the scene of considerable fighting making the Chinese importers loth to risk shipments to that district. Floods in the West River have had a similar effect and such occasional advances as the market has shown have been purely local and not based on a sound demand from the surrounding territory. Prices on billian, which is the backbone of the Hongkong timber market, have been persistently weak and at the present time are 15% to 20% less than normal whereas freights are up 15%. It is indeed fortunate that freights to Hongkong on timber have not advanced more than 15% and the attitude Messrs. Jardine, Mathieson & Company, who operate the line to Sandakan, is very much to be appreciated. The impending re- the s. s. *Uinsang* by the Admiralty will be a serious blow to

here. The *Hinsang* is one of their largest steamers and has been especially adapted to the handling of timber. It is to be hoped that they will be able to keep two boats on the Borneo run, but it is not probable that they will be able to replace the *Hinsang* with a ship of equal carrying capacity and timber equipment. Late in the year an arrangement was made whereby ships of the Osaka Shosen Kaisha line call here once a month on their way to Australia and load a limited amount of timber for the Australian market. Firms here have been able to ship approximately 8,000 cubic feet per month. Although this amount is infinitesimal compared with what could be sent forward with more space and lower freights it has nevertheless helped out. It is especially desirable that Borneo timber should be going forward to Australia, even in small amounts, as it is thereby kept before the trade and there is less likelihood of it being replaced entirely by shipments from other tropical countries. Unsatisfactory market conditions are naturally causing firms to retrench and reduce their output. This will have a direct effect on the revenue derived from our forests and while the reduction of output is to some extent offset by an increase in the proportionate production of the higher grade timbers, nevertheless the revenue has decreased during the past year and the prospects are for a further reduction in the 1917 revenue.

TIMBER PRODUCTION.

Returns furnished this Department by the various lumber Companies show that the following amounts of timber were cut in the forest during the last quarter 1916:

CLASS.	SQUARED TIMBER.	ROUND TIMBER.
I	94,842 cubic feet,	44,290 cubic feet.
II	96,604 " "	27,685 " "
III	99,454 " "	2,985 " "
IV	84,727 " "	91,835 " "
Total	<u>375,627</u> " "	<u>166,795</u> " "
Grand total	<u>542,422</u> cubic feet.	

STAFF.

Three additions were made to the staff during the year. Mr. D. D. Wood, who has been appointed Assistant Conservator of Forests, reported his arrival on April 24th. Mariano Castillo and Agustin Collado appointed respectively Forest Ranger and Clerk, Grade I, reported their arrival on the 11th of August. I was in direct charge of the work of the Department until November 6 when I left for India, my duties being taken over by the Assistant Conservator.

D. M. MATTHEWS.

Conservator of Forests.

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STATE OF NORTH BORNEO.

ANNUAL REPORT ON THE FORESTRY DEPARTMENT, FOR 1918.

RECONNAISSANCE.

The following detailed reconnaissance surveys for which maps and reports have been prepared have been completed during the year:—

Survey.	Area reported on, Acres.	Acres in estimate.	% of area covered by estimate.	Stand of timber, cubic feet.
Brantian River Valley Cowie Harbour	12,295	367.30	2.92	19,518,000
Bambara River Valley near Tinagat Pt., Cowie Harbour	906	92.94	10.3	1,099,000
Lower Apas River Valley east of Tawau	14,000	482.41	3.4	26,670,000
Suanlamba River Valley, Sandakan Bay	16,500	414.14	2.5	33,643,000
Semawang River Valley, Labuk Bay	11,600	327.16	2.82	30,171,000
Total	55,301	1,683.95	3.04	111,101,000

The results obtained by the above surveys are very encouraging. The average stand for the total of 55,300 acres examined is just slightly over 2,000 cubic feet per acre and although all of the areas are not as accessible as some previously reported on, the bulk of the 111,000,000 cubic feet located can be logged at a cost which should leave a very satisfactory margin of profit. In addition to the above detailed surveys, the Assistant Conservator and I did a certain amount of preliminary reconnaissance work in Labuk Bay and around the Semporna Peninsula. In Labuk Bay we ran rough surveys of the Suruan River and all its branches, the Beluram, the Planduk and the Munyad Rivers. This work was all done with the aid of an Evinrude motor and results have been quite satisfactory. The rivers surveyed are all tributary to good stands of timber and the results obtained will be of use in planning future work. In the region around Semporna we examined the forest on the Segalong and Sipit Rivers and on the Peninsula to the south and west of Semporna. On the Sipit River very good timber was located about 9 miles from the mouth of the river. The river approach to this area is long and difficult but it is possible that the area can be tapped from the coast on the north. The area is certainly worthy of more detailed examination when opportunity offers. The country at the back of Semporna and to the south is apparently very well timbered and a further examination of this area is planned. One of the most attractive features of this section is the excellent deep water leading point which can be located on the Trusan Treacher.

The Brantian River Valley Reconnaissance.—This valley lies between the Kalabakang and Batu Maper Valleys at the upper or western end of Cowie Harbour. Of the 12,295 acres examined 2,100 carry but a poor stand of timber averaging only 433 cubic feet per acre. This area of non-commercial forest is found on the lower and almost level portions of the tract. Elsewhere on the gentle well-drained slopes further inland, the stand averages over 1,800 cubic feet per acre. The stand improves steadily as one goes to the west and north into the higher country around the source of the river but as the cost of extraction in the development of this interior forest would be a considerable item and as the stand on the more accessible portions of the tract is not exceptional this area is not recommended for immediate development. The area would be an exceptionally valuable one for agricultural development and has been so reported on.

The Lower Apas River Valley.—The stand in this valley had been favourably reported on previously but no careful examination had previously been made. The detailed survey completed this year covers 14,000 acres of good timber land in the lower part of the valley carrying an average stand of 1,905 cubic feet per acre. The timber in the balance of the valley further to the interior has only been roughly examined but the available timber on land which can be easily logged is conservatively estimated at between 40,000,000 and 50,000,000 cubic feet. This area is located about 13 miles due east from Tawau and would have to be developed by rail from Tawau as the Apas is a small river with a shallow foreshore extending seaward for over a mile. The cost of constructing this rail line is estimated at approximately \$200,000 and any development which takes place must be on a scale sufficiently large to warrant such an outlay for transport alone.

The Suanlamba River Valley.—The area covered by this survey adjoins the Sapagaya River Valley on the east. The latter area was examined and reported on last year. Topographical and forest conditions are very similar in the two valleys and the two areas should, if possible, be developed as one unit. The area on the Suanlamba over which detailed estimates have been made is approximately 16,500 acres carrying an average stand of 2,039 cubic feet per acre of which the seribas, krui, kapor, and bilian make up nearly 1,700 cubic feet or 83% of the stand. The uniformity of the stand and the high percentage

of species which are at present easily marketed very considerably enhances the value of the tract. The area is only two hours by launch from Sandakan. The river is navigable for launches and lighters up to a loading point and as over 70% of the timber will float transport to Sandakan will be most economical. The highest elevation in the area is only 300 feet above sea level and the major portion of the area is level to gently rolling land. Modern steam methods of logging should be most successful. A combined topographical map of the Suanlamba and Sapagaya Valleys has been prepared and a combined report on the two areas, similar to the prospectus for the Cowie Harbour areas, will shortly be completed.

The Semawang River Valley.—The Semawang River is a branch of the river system held by the China Borneo Company under Timber Licence No. 8 and the examination of the area was undertaken at their request. Approximately 11,600 acres were included in the survey and a most excellent stand, totaling over 30,000,000 cubic feet of timber, located. A detailed logging plan and a topographic map of the area were furnished to the company.

Land Classification.—Most of the land examined during the year has proved to be, as regards any immediate development of more value for forest than agricultural purposes. By this it is not meant that the areas examined should be definitely set aside as permanent forest but only that the existing stand of timber is of sufficient value to warrant Government in insisting on the utilization of the timber before the areas are opened up for agriculture. A good stand of timber, except when it is found at high elevations or on rugged country, generally indicates very fertile land and as most of the areas we have examined are quite accessible and the topography gentle their final utilization should be agricultural when the increase of population makes their development possible. Their primary value, however, lies in the heavy stand of timber which they carry. A sectional map of the whole State compiled from the Coast Charts on a scale of 2 miles to the inch has been prepared on which all data is plotted as soon as acquired. This will eventually develop into a land classification map for the State. All areas of valuable forest are shown thereon as well as areas which can at once be thrown open for agriculture.

Accessible Commercial Forest Areas.—Since the work of forest reconnaissance started in 1915 a very considerable amount of data has been acquired as to the available forest resources of the State. Reports on all work have been submitted to Government but as a resumé of such results as have been acquired up to date may be of value this has been prepared and is presented as an appendix to this report.

Propaganda.—No further bulletins or prospectus have been published during the year although, as reported above, a prospectus of the Suanlamba and Sapagaya Valleys is nearing completion. A fairly steady demand continues for Bulletin No. 1 but we still have an adequate supply in stock. In January and February I had the opportunity of visiting the Philippines and Hongkong accompanied by the Manager of the China Borneo Company. In the Philippines we visited the most modern logging operation in the Islands, that of the Cadwallader, Gibson Lumber Company. A quantity of valuable data were gathered as to the application of the more modern forms of logging machinery in the extraction of timber in the tropics. A series of photographs were taken and an illustrated report prepared. I also had the opportunity of going into recent developments in forest administration in the Islands with the Director of Forestry. In Hongkong I had the pleasure of meeting many of the biggest users of our timbers and learned a good deal about the Hongkong market. I also visited the Department of Engineering of the Hongkong University and made tentative arrangements for a series of mechanical tests of our timbers.

HERBARIUM.

Timber Samples.—The collection of botanical specimens of various Borneo timbers has been going forward steadily, some collections being made by each field party. At present 91 different families are represented in the collection which totals 630 specimens. Of these 112 are duplicates and 34 are new species. Thirteen recently collected species are now in the hands of the Botanist, Bureau of Science, Manila for identification. This work of identification is very courteously undertaken by the Bureau of Science free of charge. Specimens are forwarded to the Botanist in duplicate. After identification one specimen is kept in the Bureau of Science herbarium and the other neatly mounted, labelled and preserved is returned to us for our herbarium. These are then filed for reference in an herbarium case in our office. Progress has also been made in the acquisition of a comprehensive collection of samples of the principal Borneo timbers. The collection at present includes 841 hand samples representing 79 species, 14 log samples representing 12 species and 19 plank samples representing 9 species. The log samples have been set up with the bark intact and so cut as to show three different sections of the log. The plank samples have been polished. Late in the year 21 polished plank samples were forwarded to the Court in London.

Timber Tests.—Professor C. A. Middleton Smith, Dean of the Faculty of Engineering, University of Hongkong, very courteously offered to make a series of tests of the more important of our timbers in the University Laboratory at a purely nominal charge. With the approval of Government this offer was accepted and in April, six samples each of Selangan batu, Billian, Mirabow, Greeting, Camphor, Oba Sulu, Urat Mata (white seriah) Krain, Selangan Kacha and Red Seriah cut from seasoned stock and measuring 2" x 2" x 3" were forwarded to Professor Smith. These samples were for use in obtaining the co-efficient of bending strength and later samples of the same woods cut 3" x 3" x 9" were forwarded for use in compression tests. All of the calculations in connection with these tests are not as yet complete but Professor Smith has kindly furnished me with a preliminary statement of results up to the present for inclusion in this report. The method used in the bending tests is that known as the "third point loading" in which the load is distributed over the middle third of the specimen. This method approximates conditions under which timbers are loaded in ordinary use. The co-efficient of bending strength (f) was determined from the equation.

$$f = \frac{wl^2}{4bd^2}$$

The following table gives the average results obtained:—

Name of Wood.	Mean average coefficient of Bending Strength (six specimens).
Selangan Batu	8.06 tons per square inch
Billian	7.29 " "
Mirabow	6.77 " "
Greeting	5.16 " "
Camphor	4.93 " "
Oba Sulu	4.88 " "
Urat Mata	4.57 " "
Kruen	4.45 " "
Kacha	4.24 " "
Red Serayah	3.54 " "

The results obtained for the same species in compression are as given in the following table:—

Name of Wood.	Crushing Strength average of 6 specimens (tons per sq. inch).	Highest Figure of 6 specimens (tons per sq. inch).	Lowest Figure of 6 specimens (tons per sq. inch).
Billian	4.99	5.59	4.45
Selangan Batu	3.89	4.06	3.71
Mirabow	3.57	3.72	3.40
Greeting	2.59	3.70	2.21
Camphor	2.47	2.65	1.99
Oba Sulu	2.41	2.64	2.20
White Seriah	2.28	2.54	1.94
Kruen	2.17	2.79	1.38
Selangan Kacha	1.95	2.14	1.82
Red Seriah	1.63	1.78	1.53

Professor Smith calls attention in his preliminary report to the fact that Billian, and Selangan Batu may be considered at least twice as strong as Red Seriah. He also points out that in some of the specimens the moisture content varied considerably. In conclusion he says, "On the whole the tests may be considered as satisfactory. Enough work has been done to show that Selangan batu and Billian are woods of very great value in structural work. The woods in demand in the Hongkong market for that purpose are Billian, Selangan batu, Kapor and Krain. The light Seriahs are also said to be used for light construction work. It would probably be of advantage to make tests on a number of specimens of these four woods and on similar specimens of China fir, which can be obtained locally. The results would be used for comparative purposes. The detailed report giving full figures of the tests made will be submitted later." It is to be hoped that Professor Smith will find the time to make the comparative tests mentioned above. The detailed report when available will be of great assistance to users of Borneo timbers and should aid us materially in placing our timbers on markets where their qualities are not at present known.

New Office Quarters.—Upon the transfer of the Printing Department to Jesselton the building thus vacated became available as an office and drafting room for this Department. A certain amount of alteration and repair work was necessary to put the building in condition for our occupancy and the result has been very satisfactory. Two offices were partitioned off at either end of the building for the Conservator and Asst. Conservator leaving a large well lighted drafting room in, between which it has been possible to set up our growing collection of wood samples and still leave plenty of space for drafting

Markets and Transportation.—The same restricted shipping facilities have continued throughout the year as existed during the latter part of 1917. The only regular timber carrying steamer calling at Sandakan has been the *Mausang* which has made regular monthly trips to Hongkong taking about 45,000 cubic feet each trip. Late in the year the Company operating the *Mausang* put another ship on the run, the *Yusang*, but she was not well adapted for timber carrying, did not load a large cargo and made only one trip. Small amounts of sawn timber have been shipped to Australia from time to time by the s. s. *Taiquan* and s. s. *Changshu* but as space on these steamers is very limited it has not been possible to do more than fill a small percentage of the orders from that source. It has been entirely impossible to make shipments via Singapore to India or to London. Messrs. Gillanders Arbuthnot and Company have been very anxious for us to get shipments of Kapor and Oba Sulu through to them and every effort was made by the China Borneo Company to do so but only Japanese lines would offer space from Singapore and their freight quotations were so high as to make the business absolutely impossible. In a letter from Messrs. Gillanders Arbuthnot and Company received by me in December they stated that they hoped to resume importations of Borneo timber as soon as freight reached a more normal level. From their attitude it is evident that such small consignments as went forward as a result of my trip to India have been well received on the Calcutta market. Due to the continued shortage of timber shipments from Borneo prices rose steadily on the Hongkong market throughout the year reaching higher figures than they had ever attained before. These high prices combined with the extremely favourable rate of exchange has very greatly benefited firms here. Financially timber exporters have enjoyed a very profitable year. Small firms with no large organization, which have been able to curtail their output without a corresponding increase in the cost of production, have especially benefited by the abnormal conditions. Coincident with the news of the cessation of hostilities there was a decline on the Hongkong market and although prices are still high they can be expected to drop steadily during the coming year as shipping facilities increase. The Shanghai market has already felt the effect as shipments of fir from the northwest coast of America are coming on the market and prices are practically back to pre-war rates. The local market for sawn timber has been good throughout the year and there has been a considerable amount of business done with consumers outside the State who could be reached by local steamers.

Timber Production.—The amount of timber cut from land held under timber licenses and leases shows a reduction of nearly 100,000 cubic feet as compared with the cut for 1917. This reduction in the cut is accounted for by the fact discussed above, namely, restricted shipping facilities. Firms cutting timber on Government land have only been able to dispose of 697,703 cubic feet during the year and a larger cut could not be expected as it is not good policy to cut any large amount of timber in excess of possible disposal when such timber would have to accumulate in the forest where it would be subject to deterioration through decay and insect attack. The following tables show the details of timber cut on land held under timber licences and leases during the year. It does not include timber cut by small licensees who cut for the local market or timber cut on private land on which export duty is paid.

TABLE I.

SHOWING TIMBER CUT FROM LICENSE AREAS DURING 1918.

Firms.	Class I Timber.		Class II Timber.		Class III Timber.		Class IV Timber.		Total.		Grand total for Square and round.
	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.	
A	112,900	23,674	146,803	18,682	58,722	2,765	176,148	36,616	194,573	409,737	904,310
B	38,489	13,623	30,268	2,477	30,496	—	38,554	7,493	137,807	23,593	161,400
C	33,169	14,191	22,888	—	27,336	—	8,526	1,540	91,929	15,731	107,660
D	3,624	5,044	638	57	73	—	—	—	4,335	5,101	9,436
Total	188,182	56,532	200,597	21,216	116,627	2,765	223,238	373,649	728,644	454,162	1,182,806

A comparison between timber production and disposal is given below in Table II.

TABLE II.

SHOWING RELATION BETWEEN TIMBER PRODUCTION AND DISPOSAL.

Firms.	Timber cut cubic feet.	Timber exported and sold locally.	
		cubic feet.	Shingles pieces.
A	904,310	425,479	287,200
B	161,400	177,978	—
C	107,660	94,246	—
D	9,436	164,720	—
Total	1,182,806	862,423	287,200

In the above table it will be seen that two firms cut considerably more timber than was disposed of. The excess of cut over disposal is partly accounted for by timber...

at the end of the year and partly by loss in transit and wastage resulting from manufacture into lumber. The other two firms show an excess of export over cut. This excess in one case is due to the fact that the firm in question has reduced its cut considerably during the current year and has exported material remaining in stock at the end of 1917. The other firm has cut very little from Government land during the year and has exported some old stock but the bulk of its exports have been of timber cut on private land of which this Office receives no record.

Administration and Revenue.—The following timber leases and licenses have been in force during the year:—

License No.	Approximate Area, Acres.	Period.	Holder.	Location.
Excl. Lic. 1	5,000	8-11-16—2-11-19	China Borneo Company Ltd.	Munyah River, Labuk and Sugut.
O. T. L. 2	640	9-1-17—9-1-18	Kim Eng Watt (Insolvent)	Sedungor Ketchil River, Sandakan—Renewed by O. T. L. 2/18.
" 3	640	16-1-17—15-1-18	" " " "	Bode Ketchil River, Sandakan—Renewed by O. T. L. 3/18.
" 5	640	1-7-17—30-6-18	Shing Kee Company	Kinabatangan—Sukau Rivers, Kinabatangan—Renewed by O. T. L. 5/18.
" 6	640	2-10-17—2-4-18	" " " "	Sedungor River, Sandakan.
" 1/18	10,000	2-1-18—1-1-19	China Borneo Company	Suruan River, Labuk and Sugut.
" 2/18	640	10-1-18—9-1-19	Kim Eng Watt (Insolvent)	Sedungor Ketchil River, Sandakan—Renewal of O. T. L. 2.
" 3/18	640	16-1-18—15-1-19	" " " "	Bode Ketchil River, Sandakan—Renewal of O. T. L. 3.
" 4/18	640	2-1-18—1-1-19	" " " "	Koolokook River, Sandakan.
Excl. F. L. 5/18	550	1-2-18—31-1-23	Jesselton Ice and Power Co.	Gudan and Bunkak Rivers, Jesselton, W. C.
O. T. L. 6/18	160	1-4-18—31-3-19	Shing Kee Company	Arang River, Sandakan (cancelled on 30-9-18 at request of holder).
" 7/18	640	23-7-18—22-7-19	" " " "	Tarong Lapok River, Sandakan.
" 8/18	640	1-7-18—30-6-19	" " " "	Kinabatangan-Sukau Rivers, Kinabatangan—Renewal of O. T. L. 5.
" 9/18	640	23-10-18—31-12-18	" " " "	Palau Timbang, Sandakan (Public land only).

Old Licenses still in force.

Timber L. 12	unknown	13-3-03—?	Koh Kim Heen (Kim Eng Watt)	Belaching Besar and Danit Rivers, Sandakan.
" 9	45,000	1-4-03—?	North Borneo Trading Co.	Krettan, Sandakan.
" 26	25,000	29-7-07—?	" " " "	Marotai Besar, Tawan, E. C.
" Cutting Lease 21	4,000	13-7-1894—9-7-1924	" " " "	Signalong and Sipit Rivers, Lahad Dato' E. C.
" License 8	12,000	1-10-02—?	China Borneo Company	Tindok &c. Rivers, Labuk & Sugut.
" 13	12,000	13-10-03—?	" " " "	Gun-Gun River, Labuk and Sugut.
" Cutting Lease 14	1,000	29-4-01—24-4-31	" " " "	Kolapis River, Labuk and Sugut.
" 25	100,000	1-7-1896—30-6-1926	" " " "	Kumpang River, Lahad Dato' E. C.

In the above list, Timber Licenses Nos. 8, 9, 12, 13 and 26, issued under the old Ordinance have no specified date of expiry. The areas held under them may be resumed by Government only if the holder does not comply with the terms under which the licences were issued or in case the areas are required for agriculture. The Revenue Collected from the various firms on account of the above licences and leases is as follows:—

Revenue.	Less rebates acct. local sale, wastage &c.	Balance of Revenue.
\$42,096.18	\$12,688.41	\$29,407.77

It will be noted from the above figures that we have remitted in the form of rebates practically the same proportion of revenue as last year or approximately 30%. There has however been a net reduction of revenue from this source of \$9,770.72 or 24.6% as compared with the revenue for 1917. This is out of proportion to the reduction in the total cut which amounted to only 7.3% but this somewhat unexpected fall in revenue is accounted for by the distribution of the cut throughout the various timber classes. A very much higher percentage of 4th group timber was produced during the past year as compared with 1917 and there was a corresponding reduction in the outturn of first and second group timbers. The cause of this can again be ascribed to the shortage of shipping. With very restricted shipping facilities it was desirable to export the maximum number of cubic feet of timber possible. The same proportion of the heavy first and second group timbers as exported in the past would have reduced the total cubic foot export unduly and a larger percentage of the lighter woods was shipped. The prices of all kinds of timber were well above normal, and as light woods can be produced and shipped at a much lower rate per cubic foot than heavy woods, financial considerations naturally induced firms to increase their output of the lighter woods. The revenue derived from the sale of Jungle Produce Buyer's Licences, royalty on firewood and bark and on timber cut by small local cutters and consolidated royalty on standing timber is shown for each Residency in the following table:—

TABLE V.
SHOWING FOREST REVENUE 1918, EXCLUSIVE OF ROYALTY ON TIMBER UNDER
LICENCES AND LEASES.

Class.	East Coast.	Sandakan.	Kudat.	West Coast.	Interior.	Total.
Consolidated Timber Royalty	\$24,000.00	—	—	—	—	\$24,000.00
Timber Royalty ..	3,413.34	\$662.46	\$1,253.08	\$3,948.19	\$459.58	9,736.59
Buyers of Jungle Produce ..	395.00	1,745.00	740.00	420.00	680.00	3,980.00
Mangrove Bark and Firewood Royalty ..	209.60	669.44	348.90	169.79	8.00	1,405.73
Total ..	\$28,017.94	\$3,076.84	\$2,341.98	\$4,537.98	\$1,147.58	\$39,122.32

Excluding the large item of \$24,000 on account of consolidated timber royalty collected on the East Coast the revenue from this source shows a reduction as compared with 1917 revenue of \$1,460.95. Including this item there is an increase of \$22,539.05. Recurrent revenue in the form of consolidated royalty on sales of standing timber already negotiated will be as follows; 1919, \$22,000; 1920, \$23,000; 1921, \$22,000 and 1922, \$22,000.

Staff.—No changes in the staff of the Department have taken place during the year. I was in charge of the work of the Department from my return from the Philippine Islands on March 2nd until the end of the year. A definite scheme for the organization of the Department and the salaries of the staff was consummated during the year and has been authorized by Government.

APPENDIX.

RESUME OF RECONNAISSANCE WORK DONE BY THE FORESTRY DEPARTMENT
UP TO THE END OF 1918.

As the results of any extended period of forest exploration are more easily grasped when summarized than when reported on as individual pieces of work it has been thought desirable to bring these results of the past four years together in one report for discussion and for comparative purposes. Excluding work which was merely preliminary in character a total of 19 highland forest surveys covering over 257,000 acres and 4 mangrove forest surveys covering over 93,000 acres have been completed, maps and detailed reports being prepared in each case. The following maps compiled for the most part from original data collected by the Department are on file in the Department Office, Sandakan:—

Maps prepared by Forestry Department.

Kind of Map.		No. of Miles of Survey.	No. of Acres Represented.
<i>East Coast Residency.</i> —			
1.	Forest Map of Teliwas, Tabanak and Bukod Basar River Valleys ..	51.74	94,694.40
2.	" " " Tawau and Ubong-bahy River Valleys ..	29.31	21,792.15
3.	" " " Proposed Addition to the Tawau Rubber Estate ..	8.30	2,363.00
4.	" " " Brantian River Valley ..	39.07	12,295.00
5.	" " " North Borneo Trading Company's cutting Area, Kalabakan ..	18.53	8,653.21
6.	" " " Proposed Addition to Tawau Kuhara Estate ..	69.57	23,409.00
7.	" " " Mangrove Swamp areas, Tanjung Batu and Umas Umas Rivers ..	80.10	11,987.40
8.	" " " Proposed Timber Concession, Cowie Harbour ..	143.33	66,967.85
9.	" " " Apas River Valley ..	40.05	16,189.00
10.	" " " " Valley Concession ..	22.23	7,000.00
11.	" " " Yoshioka Estate ..	7.64	906.00
12.	" " " Mangrove Swamp Areas, Darvel Bay ..	55.61	13,196.56
13.	" " " Proposed Kubota Estate ..	3.55	1,000.00
14.	" " " " addition to Kubota Estate ..	12.49	3,000.00
15.	" " " " Sebattik-Serudong Concession Area ..	61.61	30,356.65
16.	" " " " Sillimpopon-Kalabakan Concession area ..	81.72	36,611.20
	Total ..	744.87	350,463.42
<i>Sandakan Residency.</i> —			
1.	Forest Map of China Borneo Timber Holdings, Manjang and Kolapis Rivers ..	36.40	18,000.00
2.	" " " " " " Holdings, Labuk and Sugut District ..	97.92	29,600.00
3.	" " " " Sapagaya and Suanlamba Valleys ..	93.93	29,000.00
4.	" " " " River Valley ..	40.10	12,500.00
5.	" " " " Semawang River Valley ..	61.52	11,600.00
6.	Topographical Map of Beatrice Estate, Sandakan ..	8.50	274.00
	Total ..	338.37	100,974.00
<i>West Coast Residency.</i> —			
1.	Map of Mangrove Swamp Areas, Branci and Kimanis Bays ..	86.96	67,526.93
2.	" " " " Forests, Mengatal and Dunkak Rivers ..	12.20	981.60
	Total ..	99.16	68,508.53
	Grand total ..	1,162.40	564,527.15

Of the 19 highland forest surveys the data collected on seven for various reasons showed the areas to be not worth development at present. Either the stand per acre was too low or the logging and transport difficulties were such that we did not feel warranted in recommending them. The other 12 surveys, however, resulted in the location of valuable timber and in general a more complete knowledge of the forest resources. A summary of the stand of timber

Reconnaissance.	Area (Acres.) covered by survey.	Serial.	Kruin.	White Serran or Urat Mata.	Selangau Batu.	Kapor.	Selangau Kacha.	Billian.	Mingaris.	Other identified species not occurring in quantity.	Miscellaneous species not identified.	Total.	
Western end of Selatik Island ...	8,185	1-2	1,973,000	991,000	501,000	2,557,000	1,860,000	1,430,000	3,047,000	2,313,000	3,071,000	19,136,000	
Serudong Valley ...	30,114	2-24	10,527,230	1,463,490	7,409,360	2,036,160	4,199,580	2,340,170	1,173,620	15,914,570	11,905,880	70,700,000	
Silimpopen Valley ...	18,000	2-4	13,541,352	2,574,514	6,270,537	919,975	458,743	1,180,651	1,378,415	4,238,606	5,840,229	44,227,000	
Kodapis Valley ...	31,133	3-2	9,299,930	4,627,280	2,147,460	2,577,190	2,047,670	1,316,700	1,052,980	695,470	1,668,360	28,656,000	
Kalabakang Valley ...	5,850	3-8	1,041,263	234,572	109,531	187,315	—	395,545	268,028	205,675	609,448	3,454,000	
Marotai-Gumbalai Valleys ...	23,400	3-4	15,813,600	1,708,400	996,800	1,550,600	819,200	1,520,000	1,649,800	2,744,800	3,606,400	35,606,000	
Kinabutan Valley ...	3,000	5-0	1,683,000	183,000	195,000	12,000	30,000	135,000	198,000	186,000	369,000	3,498,000	
Sapangaya Valley ...	12,500	3-1	7,150,000	5,100,000	312,500	2,825,000	287,500	562,500	300,000	412,000	850,000	19,537,000	
Brautian Valley ...	10,154	3-11	8,634,779	2,265,648	1,003,565	466,659	674,965	809,953	1,314,236	171,710	2,553,402	18,591,000	
Lower Apas Valley ...	14,300	3-4	11,690,000	1,610,000	728,000	—	504,000	1,050,000	1,260,000	1,610,000	2,254,000	26,670,000	
Suanlamba Valley ...	16,500	2-7	9,784,000	7,392,000	759,000	4,423,000	1,287,000	1,584,000	561,000	3,808,500	2,392,500	33,643,000	
Semawang Valley ...	11,600	2-8	11,310,000	6,786,000	661,200	2,958,000	1,194,800	951,200	614,800	—	1,821,200	30,171,600	
Total ...	184,736	—	102,448,154	49,187,884	34,938,904	21,096,953	20,521,899	13,363,458	13,275,719	12,817,879	29,300,331	36,941,419	333,889,600
Per cent. of spp. ...	—	—	30.7	14.71	10.47	6.32	6.04	3.98	3.84	8.78	11.05	100.00	

The area covered by these surveys is not great as compared with the total accessible forest area of the State and although the total amount of timber located by them is quite sufficient for the needs of any probable expansion of our timber industry there can be little doubt but that adjoining areas which have not so far been examined will be found to carry equally as good timber. There need, therefore, be no anxiety as to future supplies even though a much greater expansion of the industry than we anticipate takes place. A more important consideration is that of the development and marketing of the timber which is already located. Practically all of the timber included in the above twelve surveys is accessible and the logging problems connected with its extraction need not be discussed here. I need merely point out that the development of these areas must take place along modern lines and that modern methods calling as they do for heavy initial investment in equipment necessitate complete utilization of all commercial species found on an area. Referring now to the table above it will be seen that the species in order of abundance run as follows:—red seriah, kruin, white seriah or urat mata, selangan batu, kapur, selangan kacha, billian and mengaris. Of these species which occur in quantity red and white seriah, kruin, kapur and selangan kacha are relatively softwoods and taken together make up 66% of the total stand. Billian and selangan batu which are the principal hardwoods amount to but little over 10% of the total, and other hardwoods which are marketed such as mirabau, rasak batu etc. occur in too small quantities to be worthy of consideration when dealing with the stand as a whole. The record of timber exported from the country from 1912 to 1915 inclusive shows that five woods made up nearly 92% of the total timber exports. These were seriah (red and white) 21.9%, billian 21.6%, kapur 20.6%, kruin 17.9% and selangan batu 9.8%. This was possible because only a limited market was reserved and no attempt toward complete utilization of the standing timber was made. This cannot continue if we are to expand the industry proportionally to the available supplies of timber. If this is to come we must be prepared to produce and find markets for relatively softwooded species in the proportion of something like five to one of hardwoods. This can only be accomplished gradually and must be accompanied by an increase of the milling industry thereby increasing the export of sawn products as opposed to log products. The proportion of softwoods to hardwoods in Borneo is not exceptional. Our forests are very closely related to the forests of the Philippines as is shown by the following comparative table:—

	Stand per acre in Borneo c. ft.	Per cent.	Stand per acre in Philippines.	Per cent.
Red seriah (<i>Shorea</i> spp.)	554	30.73	490	20.50
Kruin (<i>Dipterocarpus</i> spp.)	265	14.70	471	19.72
Urat (White seriah) (<i>Parasorea</i> spp.)	189	10.38	413	17.30
Selangan batu (<i>Shorea</i> , <i>Hopea</i> and <i>Isoptera</i> spp.)	114	6.38	73	3.06
Kapur (<i>Dryobalanops</i> spp.)	109	6.05	not represented	
Selangan kacha (<i>Shorea</i> spp.)	72	4.00	66	2.77
Billian (<i>Eusideroxylon Zwageri</i>)	72	4.00	not represented	
Mengaris (<i>Koompassia excelsa</i>)	70	3.89	rare	
Identified species of commercial value not occurring in large quantities	158	8.77	446	18.65
Unidentified miscellaneous species	200	11.10	430	18.00
Total	1,803	100.00	2,389	100.00

The Philippine data for the above table were compiled from the results of 4,365 acres of valuation survey and the Bornean figures from 5,420 acres. Important facts to be noted in the above table are that the softwoods, red seriah, kruin and urat mata or white seriah, are the predominant species in both countries, and occur in very similar proportions. We are slightly better off than the Philippines in having a higher percentage of valuable hardwoods and a lower percentage of miscellaneous species and species which occur in small quantities scattered through the forest. I doubt whether there is as great a difference in total stand per acre as is shown by the table because the work here has been done on a much more intensive scale than in the Philippines. Our forests are certainly more accessible than those in the

Philippines but the latter have the great advantage of a well developed local market. The Philippines is our nearest neighbour and our most dangerous competitor in the timber industry. Statistics as to the development of her timber trade are, therefore, of exceptional interest to us. In 1905 the timber production in the Philippines amounted to only 2,620,000 cubic feet but in 1917 it had risen to 12,951,000 cubic feet. During the same period the value of timber and lumber exported rose from \$10,242 to \$488,653 (U. S. Currency). The beginning of this period (1905) coincides with the advent of modern systems of logging and milling in the Philippines. During this period the production of 1st group timber only rose from 434,000 cubic feet to 1,794,000 cubic feet. During the same period the production of lower group timber, chiefly softwood, increased from 2,186,000 cubic feet to 11,157,000 cubic feet. The above facts show plainly that modern systems of logging and milling are required to make possible any large development of timber in the tropics and also that the industry in the Philippines has been built up on the intensive utilization of her softwoods. In 1917 out of a total export of timber and lumber to the value of \$488,653 (U. S. Currency) the timber export was only valued at \$41,536. The bulk of the export was dimension stock and veneer stock or more finely manufactured products such as barrel staves and box shooks. Among other things over 300,000 board feet of staves are produced monthly and exported to China. I have quoted the above statistics as indicating the line we must take in the development of our timber resources. Our market will necessarily have to be an export market and we cannot hope to capture any large share of foreign trade by the production of log timber only. We shall have to go in for intensive milling and the manufacture of staves, box shooks, veneer stock, etc. if we are to compete with the rapidly developing industry in the Philippines.

D. M. MATTHEWS,
Conservator of Forests.

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ANNUAL REPORT
FOREST DEPARTMENT
NORTH BORNEO
1920

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STATE OF NORTH BORNEO.

ANNUAL REPORT ON THE FORESTRY DEPARTMENT FOR 1920.

FOREST RECONNAISSANCE AND LAND CLASSIFICATION.

No large forest reconnaissance was done during the year on account of the small staff for field work. Several good forested areas have been located in former years so that we have sufficient data for any immediate needs. The following table gives the areas examined:

TABLE I.

FOREST RECONNAISSANCES AND LAND CLASSIFICATIONS MADE DURING 1920.

Reconnaissance.	Area, acres.	Area of estimate, acres.	Percentage of area covered by estimates.	Total stand of timber, cu. ft.	Average stand per acre, cu. ft.	Remarks.													
FOREST RECONNAISSANCE.																			
Megalong River, Sipitang	5,000 to 8,000	—	—	—	900 to 1,200	Hasty inspection for timber and agriculture.													
LAND CLASSIFICATION.																			
Gum-Gum River	5,000	187.78	3.5	5,570,000	1,114	Examined for rubber planting.													
Pitas-Mempakad Road	5,710	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td style="padding-left: 5px;">2760</td> </tr> <tr> <td></td> <td>2600</td> </tr> <tr> <td></td> <td>350</td> </tr> </table>	{	2760		2600		350	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="padding-right: 5px;">acres</td> <td>agricultural.</td> </tr> <tr> <td style="padding-right: 5px;">..</td> <td>non-agricultural.</td> </tr> <tr> <td style="padding-right: 5px;">..</td> <td>nipah and mangrove swamp.</td> </tr> </table>	acres	agricultural.	..	non-agricultural.	..	nipah and mangrove swamp.	—	—	—	Hasty examination for future work.
{	2760																		
	2600																		
	350																		
acres	agricultural.																		
..	non-agricultural.																		
..	nipah and mangrove swamp.																		
Lower Kumpong and Balung River Land at Sebatik applied for by one European.	100	—	—	—	—	Applied for agriculture.													

Megalong River, Sipitang.—This work was done with the view of opening this river for timber to be used on the West Coast but the distance, transportation facilities and nature of the land did not warrant the starting of operation at present.

Gum-Gum River, Labuk Bay.—The examination of this land was at the request of prospective investors from England who had in mind the starting of a large rubber estate. The land was found to be very rough and for the most part unsuitable for rubber.

Pitas-Mempakad Road.—The land adjoining this proposed road was gone over and only about 3,000 acres were found in the immediate neighbourhood suitable for agriculture.

Lower Kumpong and Balung Rivers.—These rivers are located on the East Coast between Simporna and Tawau. Both have very shallow water over the bar and at certain times of the monsoon would be difficult if not impossible to approach. Some very excellent land was located but for the above reason and the necessity of long and expensive transport this land will not be attractive until the more accessible areas have been opened.

Besides the above there were, also several small areas applied for by several Japanese, Chinese, and Natives ranging from 2 acres to 95 acres inspected during the year to determine whether they were more valuable for agriculture than forestry purposes. All of these areas were released for agriculture and were located on the East Coast. There were also several small areas in the remaining part of the State released for agriculture by this Department or District Officers.

TIMBER MARKET.

There is little to report on this subject as conditions have remained about the same as during 1919. The s. s. "Hinsang" has made regular monthly runs between Sandakan and Hongkong during the year. The Hongkong market is still very good although the exchange has shown a tendency to return to normal. This still continues to be our principal market although shipments to Australia and England are on the increase. With the exception of

one or two boats calling at Sandakan there are none properly equipped for the timber trade. The contemplated increase in our output of timber should be an inducement that will attract ships fitted for the timber trade. As soon as the production is increased to any considerable amount, regular large shipments will be going to Australia and China. Although the demand for certain commodities has been rather dull this cannot be said of timber and the prospects for 1921 seem as good as 1920.

TIMBER PRODUCTION.

The production of logs and sawn timber has shown a healthy increase and is likely to do so for some time with the enlargement of one of the timber companies and the contemplated improvement of the logging methods of at least one other firm. In January of this year there was formed in London a new timber company, the British Borneo Timber Co., which have taken over the business of the China Borneo Co. and increased the capital to £1,000,000. Steps were immediately taken to enlarge the old plant with the addition of a modern band saw-mill and logging equipment. The latter consists of steel log trucks, heavy rails, a locomotive and several logging engines. The logging operations are to be concentrated on Sandakan Bay which will insure a regular supply of logs to the mill and not a more or less uncertain supply as in the past. The North Borneo Trading Co. have purchased logging engines and are installing electric motors to run their saw mill. They too, have concentrated, to a certain extent, their logging operations on Sandakan Bay. The Shing Kee Co. built and launched a lighter capable of carrying eight to ten thousand cubic feet of logs. It is used exclusively in bringing logs from their cutting areas to Sandakan. All of their timber is sold in the form of square or round logs. Their increase in production of timber is nearly two times as large as their 1919 output. The total amount of timber removed from Government land by the larger operators amounted to 1,843,755 cubic feet. Local consumption has increased beyond all expectations and it has been difficult for many to buy sufficient timber for buildings purposes. The shortage of shingles was badly felt and many buildings were covered with temporary nipah roofs or remained uncovered awaiting the arrival of shingles.

The following table gives in detail the timber cut from licence areas during the year:

TABLE II.

Firm.	TIMBER CUT FROM LICENCE AREAS DURING 1920.										Grand total.	Increase over 1919.
	Class I Timber.		Class II Timber.		Class III Timber.		Class IV Timber.		Total.			
	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.		
A. British Borneo Timber Co.	108,827	52,239	123,483	35,963	112,391	27,771	191,696	467,510	536,167	983,023	1,119,190	14,540
B. North Borneo Trading Co.	12,711	4,470	10,442	—	4,819	—	175	8,100	28,177	12,579	40,747	23,273
C. Kim Eng Watt and Co.	66,898	38,171	44,482	7,895	58,981	21,129	100,361	31,597	279,728	38,692	378,420	148,136
D. Shing Kee Company	30,229	42,068	52,347	279	33,403	—	16,988	2,141	192,068	44,469	237,427	93,709
E. Yong Soon and Co.	—	2,266	16,237	737	—	1,388	—	2,006	15,249	6,446	29,486	35,932
F. T. Ah Chong	—	454	16,946	—	—	1,688	—	3,370	—	454	29,409	29,409
G. Ah Wong (for P.W.D.) ^a	—	2,630	—	—	—	—	—	—	—	2,630	2,630	2,630
Total, cubic feet	283,906	170,121	231,511	45,256	210,985	53,651	320,258	529,167	1,046,560	797,103	1,843,755	347,629

^a Under pass.

The increase of timber cut from Government land in 1920 over 1919 is 347,629 cubic feet or 23%.

TABLE III.

TIMBER PRODUCTION AND DISPOSAL.

Firms.	Timber cut, cubic feet.	Timber exported and sold locally.	
		Cubic feet.	Increase over 1919, cubic feet.
A. British Borneo Timber Co. ...	1,119,190	* 514,578	3,704
B. North Borneo Trading Co. ...	40,747	315,727	34,870
C. Kim Eng Watt and Co. ...	378,420	327,893	91,059
D. Shing Kee Company ...	237,427	222,678	75,992
E. Yong Soon and Co. ...	35,932	31,080	31,080
F. T. Ah Chong ...	29,409	22,186	22,186
G. Ah Wong (for the P. W. D.)...	2,630	† 2,630	2,630
	1,843,755	1,436,772	261,521

* Exclusive of sale in Sandakan town.

† Used locally.

TABLE IV.
LICENCES IN FORCE DURING 1920.

Licence No.	Approximate area in acres.	Period.	Holder.	Location.
Lease 25	100,000	1-7-96—30-6-26	China Borneo Co (B.B.T.Co.)	Kumpang River, Lahad Dato'.
" 14	1,000	29-4-01—24-4-31	do.	Kolapis River, Labuk and Sugut.
Licence 8	12,000	1-10-02—?	do.	Tindok etc. River, Labuk and Sugut.
Lease 21	4,000	13-7-04—0-7-24	North Borneo Trading Co.	Segalong and Sipit Rivers, Lahad Datu
Licence 9	45,000	1-4-03—?	do.	Krotam River, Sandakan.
" 26	25,000	29-7-07—?	do.	Marotai Besar River, Tawau
" 12	—	13-3-03—?	Koh Kim Ilin (Kim Eng Watt)	Belacking Besar and Damit Rivers, Sandakan.
Excl. Firewood Licence 5/18	550	1-2-18—31-1-23	Jesselton Ice and Power Co.	Gudan and Bunkak Rivers, Jesselton
Excl. Timber Licence 11/19	—	1-11-19—31-12-22	Peng Hong, Peng Tio & Lee Tso	Western side of Railway, between 48 and 50.
Excl. bark & firewood Lic. 10/19	—	20-10-19—31-12-21	The Island Trading Co.	Klias River, extending as far south as Berabak River, West Coast.
O. T. Lic. 1/20	—	1-1-20—13-12-20	Yong Soon and Co.	Kinabatangan River, between Balat and Malabok Rivers.
O. T. Lic. 2/20	—	do.	China Borneo Co. (B.B.T. Co.)	True left bank of Munyad River between its mouth and Cooper's road
O. T. Lic. 3/20	640	do.	Kim Eng Watt and Co.	Sedongor Ketchil River, Sandakan.
O. T. Lic. 4/20	—	do.	do.	Koolookook River, Sandakan.
O. T. Lic. 5/20	640	do.	do.	Bode Ketchil River, Sandakan.
O. T. Lic. 6/20	—	do.	do.	Sillah River, Sandakan
O. T. Lic. 7/20	—	do.	do.	Masang River, Sandakan.
O. T. Lic. 8/20	—	do.	Shing Kee Company	Kinabatangan-Sukau Rivers as far south as Monungal River.
O. T. Lic. 9/20	—	do.	do.	Bulu and Torong Lupok River, Sandakan Bay.
O. T. Lic. 10/20	—	do.	China Borneo Co. (B.B.T. Co.)	All State lands on both banks of Suruar River and its branches.
Ord. Tengah bark & Firewood Lic. 11/20	—	1-2-20—31-12-20	Bakau Company	Mangrove forest, Cowie Harbour, East Coast.
O. T. Lic. 12/20	—	19-2-20—31-12-20	Mr. T. Ah Chong	Seguntor River, Sandakan.
Excl. Mangrove bark & Firewood Lic. 13/20	—	20-4-20—31-12-21	The Island Trading Co.	True right bank and Bengkulit River, West Coast.
Excl. T. Lic. 14/20	9,000	1-5-20—31-12-25	North Borneo Trading Co.	Kalabakan River, Tawau, East Coast.

On January 28, 1920, an agreement was entered into between the North Borneo Government and the British Borneo Timber Co., granting to the latter exclusive timber rights over all unalienated State lands. The agreement cancels all of the China Borneo Co.'s licences and leases appearing above as from the date of granting the concession.

REVENUE.

The revenue collected from the principal timber firms shows a satisfactory increase over 1919. The revenue for 1919 and 1920 was \$45,560.30 and \$67,016.64 respectively or 47% increase.

TABLE V.

Firms.	TIMBER.	Revenue.
The British Borneo Timber Co.	..	\$33,475.00
The North Borneo Trading Co.	...	3,288.85
Kim Eng Watt and Co.	..	14,693.66
Shing Kee	...	12,493.66
Yong Soon and Co.	...	1,341.76
T. Ah Chong	...	1,216.11
Ah Wong (for P. W. D.)	...	52.60
	BARK AND FIREWOOD.	
Bakau Company	...	330.00
Yong Soon and Co.	...	75.00
Kim Kian Heen	...	50.00
Total	...	\$67,016.64

TABLE VI.

SHOWING FOREST REVENUE, 1920, EXCLUSIVE OF ROYALTY ON TIMBER CUT UNDER LICENCES AND LEASES.

Classes.	East Coast.	Sandakan.	Kudat.	West Coast.	Interior.	Total.
Consolidated Timber Royalty	\$6,485.00	—	—	—	—	\$6,485.00
Timber Royalty	1,128.34	\$1,062.90	\$1,132.52	\$7,513.27	\$498.79	11,335.82
Buyers of jungle produce	840.00	1,460.00	820.00	1,990.00	1,420.00	6,530.00
Mangrove bark and Firewood Rbyalty	1,157.50	1,470.55	325.75	962.27	—	3,916.07
Total	\$9,610.84	\$3,993.45	\$2,278.27	\$10,465.54	\$1,918.79	\$28,266.89

After deducting \$6,485 consolidated royalty the increase over 1919 amounts to \$96 91 or over four times the former year. The largest increase is on timber royalty the West Coast due to the establishment of a small saw mill at Jesselton for the manufacture of rubber cases and timber for the local market. Mangrove bark and firewood royalty more than doubled in Sandakan due to closer supervision and demand for cutch. Royalty from Jungle Produce Buyers increased but with the poor prices during the latter part of the year this royalty will probably be lower for 1921.

HERBARIUM.

Through the kindness of Mr. E. D. Merrill, Director of the Bureau of Science, Manila, were given the services of a trained collector who remained about three months and collected specimens to the total of 1,256 species. These have not been identified but it is certain that several new species and species new to Borneo will be in the collection. The flora of Borneo not well known and on each field trip several new species are always collected, although the work must be carried on in conjunction with our regular field work and not as a separate project. A professional collector has indicated his intention of coming to Borneo during 1921. There are now 813 mounted specimens in the herbarium representing 98 families and 25 species. A complete list of our collections for 1920 will be found in the appendix.

NIPAH SWAMPS.

It is gratifying that very recently inquiries have been received as to the possibilities of establishing a nipah alcohol industry in the State. This is a potential wealth that will become a considerable source of revenue within a few years. We need more data on the area and stand, which work it is planned to start in 1921. The nipah plant, with care, will perpetuate itself and when concessions are granted this should be taken into consideration to avoid granting areas several times too large for the proposed plant. This is not an unknown industry as the production in the Philippines is nearly 10,000,000 litres per year. There are reliable books on the manufacture of alcohol, vinegar and sugar which give all necessary data as to yield and method of cultivation. With the threatened shortage of fuel for oil burning and internal combustion engines it is probable that our nipah swamps will be called upon to supply a substitute.

GENERAL.

The most important event during the year was the granting of a timber concession to the British Borneo Timber Company. The concession is for 25 years. The effect which this concession will have on the future timber industry of the State has been discussed in a memorandum and will not be touched upon here. Another concession was granted to the Bakau Co. Ltd., extending their former areas. Four student rangers have been appointed and are now studying forestry at the Philippine Forest School. It has been very difficult to keep our staff up to normal for lack of trained men. The Department of Forestry of the Federated Malay States have in mind the establishment of a school at Kuala Lumpur to train men for the surrounding countries and if it is established we will be very fortunate to have a source from which to draw our men. Trips of inspection were made to all important logging operations. Visits were made to the firewood and bark operations in Sandakan Bay, Simporna, Lahad Dato' and Mempakul. The growth measurements of mangrove forest species at Lahad Dato' are still being carried on although a large part of the tengah trees were felled by mistake.

STAFF.

Mr. D. M. Matthews, Conservator of Forests, and Mr. P. Natividad, Senior Ranger, resigned. The undersigned was appointed as Conservator of Forests and Mr. James Logan, District Forester for Mindanao and Sulu, P. I., has accepted the position as Assistant Conservator of Forests and is expected to arrive early in 1921.

D. D. WOOD,
Conservator of Forests.

APPENDIX.

LIST OF BOTANICAL SPECIMENS COLLECTED AND IDENTIFIED DURING 1920.

SCIENTIFIC NAME.	SCIENTIFIC NAME.	
ACANTHACEAE.		
1. <i>Asystasia coromandelica</i> (L.)	6. <i>Griffithianthus merrilli</i> H. B. R.	
2. <i>Barleria prionitis</i> L.	7. <i>Popowia</i> sp.	
3. <i>Thunbergia alata</i> L.		
ANACARDIACEAE.		
4. <i>Buchanania arborescens</i> Bl.	APOCYNACEAE.	
5. <i>Mangifera indica</i> L.	8. <i>Alyxia lucida</i> Wall.	
	9. <i>Uresola philippinensis</i> Merr.	

APPENDIX.—(Continued.)

LIST OF BOTANICAL SPECIMENS COLLECTED AND IDENTIFIED DURING 1920.—(Continued.)

SCIENTIFIC NAME.	REMARKS.	SCIENTIFIC NAME.	REMARKS.
AQUIFOLIACEAE.		LEGUMINOSAE.	
10. <i>Hex cymosa</i> Bl.		53. <i>Albizzia lebeck</i> Benth.	
11. " sp.		54. <i>Bauhinia semibifida</i> Roxb.	
BIGNONIACEAE.		55. " sp.	
12. <i>Dolichandrone spathacea</i> K. Sch.		56. " <i>acuminata</i> Linn.	
BIXACEAE.		57. <i>Cassia alata</i> Linn.	
13. <i>Bixa orellana</i> L.		58. " <i>fistula</i> L.	
COMPOSITAE.		59. " <i>occidentalis</i> Linn.	
14. <i>Elephantopus mollis</i> H. B. R.		60. <i>Caesalpina nuga</i> Ait.	
15. <i>Tithonia diversifolia</i> A. Gray.		61. <i>Clitorea ternatea</i> L.	
16. <i>Vernonia cinerea</i> Less.		62. <i>Crotalaria saltiana</i> Andr.	
CONNARACEAE.		63. <i>Dalbergia</i> sp.	
17. <i>Agelaea aganinae</i> Merr.	... New species.	64. <i>Mezconcurum sumatranum</i> W. and A.	
CONVULVULACEAE.		65. <i>Pterocarpus indicus</i> Willd.	
18. <i>Morremia nymphaeifolia</i> Hall. f.		66. <i>Spatholebus</i> sp.	
CYPERACEAE.		LILIACEAE.	
19. <i>Cyperus pilosus</i> Vahl.		67. <i>Pleomele</i> sp.	
20. <i>Mariscus stuppeus</i> Merr.		68. " sp.	... Collected also in 1918. New species? Flowers needed.
21. <i>Scleria sumatrensis</i> Vahl?		LOGANIACEAE.	
DILLENIACEAE.		69. <i>Fagraea</i> sp.	
22. <i>Dillenia suffruticosa</i> Griff.		LORANTHACEAE.	
DIPTEROCARPACEAE.		70. <i>Loranthus ferrugineus</i> Roxb.	
23. <i>Dipterocarpus</i> sp.		MALVACEAE.	
24. <i>Dryobalanops beccarii</i> Dyer?		71. <i>Sida acuta</i> Burn	
25. <i>Shorea leprosula</i> Miq.		72. " <i>rhombifolia</i> L.	
26. <i>Vatica oblongifolia</i> Ilk. f.?		MALPIGHIACEAE.	
27. " sp.		73. <i>Ryssopterys</i> sp.	... New species?
EBENACEAE.		74. "	
28. <i>Diospyrus juppii</i> Merr.	... New species.	MELASTOMACEAE.	
ELAEOCARPACEAE.		75. <i>Marumia pachygonia</i> Korth.	
29. <i>Elaeocarpus longipetiolatus</i> Merr.		76. <i>Pternandra</i> sp.	
30. <i>Endospermum</i> sp.		77. " <i>cuerulescens</i> Jack	
31. <i>Euphorbia hirta</i> Lin.		MENISPERMACAE.	
32. <i>Glochidion leiostylum</i> Kurz.		78. <i>Hypserpa cuspidata</i> Miers.	
33. " sp.		MORACEAE.	
34. " sp.		79. <i>Ficus inaequipetiolata</i> Merr.	
35. " <i>littorale</i> Bl.		80. " <i>annulata</i> Bl.	
36. " <i>superbum</i> Baill		81. " <i>leucoptera</i> Miq.	
37. <i>Jatropha gossypifolia</i> L.		82. " <i>motleyana</i> Miq.	
38. <i>Sauropus androgynus</i> (L.) Merr.		83. " <i>retusa</i> L.	
FAGACEAE.		MYRSINACEAE.	
39. <i>Quercus spicata</i> Sm?		84. <i>Maesa ramentacea</i> Wall.	
40. " sp.		MYRTACEAE.	
FLACOURTIACEAE.		85. <i>Eugenia</i> sp.	
41. <i>Ryparosa acuminata</i> Merr.		86. " <i>javanica</i> Lam.	
FLAGELLARIACEAE.		87. " <i>spicata</i> Sm.	
42. <i>Flagellaria indica</i> L.		OCHNACEAE.	
GNETACEAE.		88. <i>Ouratea angustifolia</i> (Vahl) Baill	
43. <i>Gnetum neglectum</i> Bl.		OLEACEAE.	
GRAMINAE.		89. <i>Linociera verruculosa</i> Merr.	
44. <i>Sporobolus elongatus</i> R.Br.		ORCHIDACEAE.	
GUTTIFERAE.		90. <i>Bromheadia</i> sp.	
45. <i>Calophyllum inophyllum</i> L.		ONAGRACEAE.	
LABIATACEAE.		91. <i>Jussiaea linifolia</i> Vahl.	
46. <i>Dysophylla auriculata</i> L.		OXALIDACEAE.	
47. <i>Hyptis capitata</i> Jacq.		92. <i>Averrhoa carambola</i> L.	
48. " <i>suaveolens</i> Jacq.		93. <i>Sarcotheca glauca</i> H. K. F.	
49. <i>Lucas zeylanica</i> L.		PASSIFLORACEAE.	
50. <i>Dysophylla auriculata</i> Bl.		94. <i>Passiflora laurifolia</i> Linn.	
51. <i>Orthosiphon stamineus</i> Benth.			
LAURACEAE.			
52. <i>Neolitsea</i> sp.			

APPENDIX.—(Continued.)

LIST OF BOTANICAL SPECIMENS COLLECTED AND IDENTIFIED DURING 1920.—(Continued.)

SCIENTIFIC NAME.	SCIENTIFIC NAME.					
RHAMNACEAE.						
95. <i>Alphitonia excelsa</i> Reiss.	SOLANACEAE.					
RHIZOPHORACEAE.		117. <i>Solanum torvum</i> Sw.				
96. <i>Carallia</i> sp.	STERCULIACEAE.					
ROSACEAE.		118. <i>Sterculia ferruginea</i> R. Br.				
97. <i>Angelisia splendens</i> Korth.	SYMPLOCACEAE.					
RUBIACEAE.		119. <i>Symplocos</i> sp.				
98. <i>Gaertneria</i> sp.	120. " <i>iteophylla</i> Miq.	THEACEAE.				
99. " <i>vaginans</i> DC.	121. <i>Adinandra dumosa</i> Jack.	THYMELACEAE.				
100. <i>Gardenia merrilli</i> Ehn.	122. <i>Wikstroemia acuminata</i> Merr.	TILIACEAE.				
101. <i>Hedyotis rigida</i> Miq.	123. <i>Brownlowia cardiophylla</i> Merr.	ULMACEAE.				
102. <i>Morinda celebica</i> Miq.	124. <i>Trema amboinensis</i> Bl.	VERBENACEAE.				
103. " <i>citrifolia</i> Lian.	125. " <i>orientalis</i> Blume.	126. <i>Callicarpa longifolia</i> Lam.	VITACEAE.			
104. <i>Psychotria sarmentosa</i> Bl.	TILIACEAE.		127. <i>Clerodendron paniculatum</i> Linn.	ZINGERACEAE.		
105. <i>Randia</i> sp.	128. <i>Lantana camara</i> Linn.	VITACEAE.		130. <i>Leca indica</i> (Burn) Merr.		
106. " sp.	129. <i>Vitex trifolia</i> L.	VITACEAE.		131. <i>Alpinia fraseriana</i> Oliv.		
107. " sp.	ULMACEAE.		ZINGERACEAE.			
108. " <i>anosopylla</i> Jack	VERBENACEAE.		VITACEAE.			
109. " <i>spinosa</i> (Thumb) Poir.	126. <i>Callicarpa longifolia</i> Lam.	VITACEAE.		ZINGERACEAE.		
110. <i>Timonius</i> sp.	127. <i>Clerodendron paniculatum</i> Linn.	VITACEAE.		ZINGERACEAE.		
111. <i>Uncaria insignis</i> DC.	128. <i>Lantana camara</i> Linn.	VITACEAE.		ZINGERACEAE.		
112. " sp.	129. <i>Vitex trifolia</i> L.	VITACEAE.		ZINGERACEAE.		
SAPINDACEAE.		VITACEAE.		ZINGERACEAE.		
113. <i>Guioa regularis</i> Radlk?	VITACEAE.		ZINGERACEAE.		ZINGERACEAE.	
114. <i>Ortophora</i> sp.	VITACEAE.		ZINGERACEAE.		ZINGERACEAE.	
SCROPHYLARIACEAE.		VITACEAE.		ZINGERACEAE.		
115. <i>Scoparia dulcis</i> L.	VITACEAE.		ZINGERACEAE.		ZINGERACEAE.	
SIMARUBACEAE.		VITACEAE.		ZINGERACEAE.		
116. <i>Brucea amara</i> Lour Merr.	VITACEAE.		ZINGERACEAE.		ZINGERACEAE.	

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ANNUAL REPORT
FOREST DEPARTMENT
NORTH BORNEO
1921

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STATE OF NORTH BORNEO.

ANNUAL REPORT ON THE FORESTRY DEPARTMENT FOR 1921.

FOREST RECONNAISSANCE AND LAND CLASSIFICATION.

Reconnaissance and land classification work during the past year were confined to the examination of two large projects and several cursory examinations of smaller and less important areas on which the expense of detailed examinations and reports were obviously not justified. It was necessary to defer one important reconnaissance project until 1922 owing to the illness of one of our staff.

TABLE No. 1.

FOREST RECONNAISSANCE AND LAND CLASSIFICATION COMPLETED DURING 1921.

Location.	Area, acres.	% of area covered by estimates.	Total stand, cubic feet.	Average per acre, cubic feet.	Remarks.
FOREST RECONNAISSANCE.					
Segaliud River	18,500	5.5	34,317,500	1,855	Trading Company's grants examined for timber.
Henderson Block	550	30.0			Government Experimental Gardens.
Total	19,050				
LAND CLASSIFICATION.					
Between Gum Gum & Munday Rivers	87,334	—	—	—	Land applied for proposed rubber company.
Mesapul	2,000	—	—	—	Hasty inspection.
Total	89,334				

Segaliud River Reconnaissance.—This work was done on request of the North Borneo Trading Company and covers their holdings in the Segaliud River valley designated as Grants Numbers 44, 45, 60, 62, 71, and 72, the total area of which is 18,500 acres. The total cost of this work was \$1,127.73 or \$.0607 per acre.

Henderson Tract.—This tract covers an area of 550 acres, located eight miles from Sandakan on the new Sandakan-Labuk Road. One hundred acres have been reserved for an Experimental garden, and it is proposed to allot the remainder in small holdings to Chinese settlers. The topographic work and the valuation survey was done with the aim of securing as much detail as possible. Strips 100 feet wide were run at intervals of five chains and the map was prepared on a scale of 16 inches to the mile.

Mesapul.—This area was applied for by Messrs. Hap Seng & Company. A detailed examination was deemed unnecessary as it was obviously suitable for agricultural purposes and contained very little timber of commercial importance.

Lahad Dato'.—Only a cursory examination of two small areas applied for by Meng Leon Kongsu and Peng Watt was necessary. The land is covered with second growth timber of no commercial value, and is excellent for agricultural purposes.

Api Api River.—The inspection of this area, which lies between the Api Api River and the Beaufort-Weston line of the railroad, was made for the purpose of determining whether or not it would be advisable to drain the remainder of the uncultivated land between the river and the railroad, for cultivation by small holders. Approximately nine miles of survey lines were run, and it was the opinion of the examiner that it would not be profitable to attempt to drain more than 300 acres. The total area between the river and the railroad is less than one-half of what it was formerly estimated to be.

Gum Gum and Munday.—This land, which covers an area of 87,334 acres, was examined on request of a rubber company, organized in London. It is understood that the project has been temporarily abandoned owing to the present condition of the rubber market.

TIMBER MARKET.

The s. s. *Hinsang* (capacity 100,000 cu. ft.) and the s. s. *Mausang* (capacity 82,000 cu. ft.) have made regular monthly trips between Sandakan and Hongkong. Eighty four per cent. (84%) of all the timber exported in 1921 went to Hongkong. This timber was all in the form of round and squared logs. As the amount of sawn lumber increases, the regular passenger ships will be able to carry more timber than in the past, and for the same reason,

it is expected that there will be substantial increase in the shipments to Europe and Australia. Although the average price of timber is considerably lower than during the previous year, the timber market has not been affected by the universal depression to the extent to which nearly all of the other more important commodities have been subject.

PRODUCTION.

The new mill of the British Borneo Timber Company was completed and began operations in October. Their new logging railroad and locomotive also began operations in the Bettotan River valley about the same time. The Shing Kee Company added a large steam launch and two miles of logging railroad to their equipment, and plan to further increase their equipment by purchasing 1-1/2 miles of railroad and one large lighter. During the past year the North Borneo Trading Company have purchased three new logging engines and have added two experienced loggers to their staff. Excluding the British Borneo Timber Company and the North Borneo Trading Company, the average royalty per cubic foot collected by the Department was \$0.045034. The British Borneo Timber Company, according to the terms of the agreement, pay the Government $\frac{1}{2}$ d. (\$0.026775) per cubic foot collected 7 cents per cubic foot from its sub-licensees during the past year. Eleven thousand five hundred forty three dollars and sixty-three cents (\$11,543.63) was refunded by the Government to the British Borneo Timber Company as the difference between the royalty collected from licensees by this Department and $\frac{1}{2}$ d. per cubic foot paid by the British Borneo Timber Company. Eight hundred nineteen thousand and sixty (819,060) pieces of hardwood were exported during the year, practically all of which went to Hongkong.

Table showing timber cut from licence areas during 1921 indicating that the 1921 cut exceeded that of 1920 by 64,007 cubic feet:

TABLE No. II.

Class.	British Borneo Timber Co.		North Borneo Trading Co.		Shing Kee Company.		Kim Eng Watt & Co.		B. B. Timber Co.'s Sub-Licensees.		Other Licensees.		Total cubic feet.
	Square & Round.	Square. Round.	Square. Round.	Square. Round.	Square. Round.	Square. Round.	Square. Round.	Square. Round.					
I ...	106,311	55,438	10,093	118,151	55,757	30,857	35,816	8,898	48,502	—	—	—	617,976
II ...	141,725	30,660	1,352	40,094	1,165	26,778	7,987	1,174	5,815	—	—	—	262,557
III ...	119,152	14,919	1,555	32,475	1,971	37,249	13,077	4,289	10,604	—	—	—	231,293
IV ...	495,189	872	3,892	9,241	12,799	24,785	37,057	43,200	67,798	—	—	—	759,974
Total, 1921	968,377	92,882	22,896	200,194	75,802	255,496	96,947	63,621	135,628	—	—	—	1,907,762
Total, 1920	1,119,190	28,177	12,679	195,958	44,045	274,728	98,692	—	—	—	9,536	58,441	1,643,733
Increase	—	74,941	—	33,069	—	—	—	135,628	—	—	—	—	64,007
Decrease	150,813	—	—	—	—	20,232	—	—	—	—	—	67,971	—

* The North Borneo Trading Co. inadvertently cut 53,882 cubic feet in 1920, and 52,100 cubic feet in 1921 on Government land which they reported as having been cut on their private holdings. These amounts are not included in Table II for the reason that they have already been reported by the Customs Department as timber cut on alienated lands for which export duty only is collected. The difference between export duty and royalty was collected from the North Borneo Trading Co. by the Forestry Department.

TABLE No. III.

TIMBER PRODUCTION AND DISPOSAL.

Name.	Timber cut, cu. ft.	Timber Exported.	Timber sold locally.	Increase. Export and local, over 1920.	Decrease over 1920.
British Borneo Timber Co.	968,277	435,507	186,686	107,615	—
North Borneo Trading Co.	115,688	324,721	—	8,994	—
Shing Kee Company	276,096	237,672	3,000	17,994	—
Kim Eng Watt & Company	352,043	363,572	—	35,679	—
British Borneo Timber Co.'s Sub-Licensees	195,658	208,376	—	208,376	—
Other Licensees	—	5,192	—	—	62,779
Total	1,907,762	1,575,040	189,686	378,658	62,779

TABLE No. IV.

DISTRIBUTION OF TIMBER EXPORTED.

Exported by British Borneo Timber Company to:	Per cent.	Total exported from British North Borneo to:	Per cent.
Hongkong	63	Hongkong	54.0
England	21	England	5.7
Australia	5	Australia	4.7
Miri	4	Japan	1.5
Remainder to Jesselton, Jolo, Kudat and Labuan	7	Dutch Borneo	2.0
		Various	2.1
Total	100	Total	100.00

TABLE No. V.
LICENSES ISSUED DURING 1921.

License	Holder.	Period.	Area, acres.	Location.
T.C. License 24	N.B. Trading Co.	18-7-04—9-7-24	4,000	Segalong and Sipi Rivers.
T.C. License 9	do.	1-4-03— ?	45,000	Kretam River.
" 25	do.	29-7-07— ?	25,000	Marotai Besar R.
" 12	Kim Eng Watt & Co.	13-3-03— ?	—	Belacking Damit and Besar Rivers.
Excl. F. Lic. 5/18	Jessolton Ice & Power Co.	1- 2-18—31- 1-23	550	Gudan and Bunkak Rivers.
Excl. B. & F. Lic. 10/19	The Island Trading Co.	20-10-19— 31-12-21	—	Klias River, extending as far south as to Berabak River.
Excl. B. & F. Lic. 13/20	do.	29-4-20—31-12-21	—	True right bank of Benkulit R.
Excl. T. Lic. 14/20	N.B. Trading Co.	1-5-20—31-12-25	9,000	Kalabakan River.
Ord. T. Lic. 1/21	Kim Eng Watt & Co.	1-1-21—31-12-21	640	Sedungr Ketchil River.
Ord. T. Lic. 2/21	do.	do.	—	Koclockook River.
Ord. T. Lic. 3/21	do.	do.	640	Bode Ketchil R.
Ord. T. Lic. 4/21	do.	do.	—	Sillah River.
Ord. T. Lic. 5/21	do.	do.	—	Masang River.
Ord. T. Lic. 6/21	do.	do.	—	Bulu Trusan, Pulau Timbang.
Ord. T. Lic. 7/21	do.	do.	—	Tamba and Saling, Pulau Timbang.
Ord. T. Lic. 8/21	Shing Kee Company	do.	—	Kinabatangan-Sukau Rivers.
Ord. T. Lic. 9/21	do.	do.	—	Bulu and Torong Lupok Rivers.
	British Borneo Timber Co.	1-1-20—31-12-45	—	All State timber land.

B. B. TIMBER CO'S SUB-LICENSES. (ISSUED BY B. B. T. Co.)

Sub-Lic. No. 1	Yong Soon & Co.	25-4-21—31-12-21	—	Kinabatangan R.
Sub-Lic. No. 2	do.	do.	—	Suanlamba Ketchil R.
Sub-Lic. No. 3	do.	15- 7-21—31-12-21	—	Kinabatangan R. Bilit-Gomanton.
Sub-Lic. No. 4	The Tawau Trading Co.	25- 7-21—30- 9-22	—	Umas Umas R., Tawau.
Sub-Lic. No. 5	Siew Hing & Co.	5-10-21—31-12-21	—	Sewng Piow-Dumondong River.
Sub-Lic. No. 7	Yong Soon & Co.	12-11-21—31-12-21	—	Mumiang, Manila and Sekong Rivers.
Sub-Lic. No. 8	Ko Kee & Company	12-11-21—31-12-21	—	Trusan Langan Langan Manok.
Sub-Lic. No. 9	Tawau (Bo.) Trading Co.	21-11-21—31-12-21	—	Between Apas and Balong Rivers

REVENUE.

The revenue collected from the licensees cutting timber for export show a decrease over 1920 of \$2,178.04.

TABLE No. VI.

FOREST REVENUE COLLECTED FOR TIMBER CUT UNDER LICENSE.

Name.	1921.	1920.	Increase.	Decrease.
(A) British Borneo Timber Company Ltd. ...	\$91,174.85 ^o 9,001.74 [†]	\$83,475.00	\$6,701.59	—
(B) North Borneo Trading Co. ...	7,937.90	8,288.85	4,649.14	—
(C) Kim Eng Watt & Co. ...	14,380.32	14,093.66	—	\$913.34
(D) Shing Kee Company ...	14,107.99	12,493.66	1,614.33	—
Yong Soon & Co. ...	—	1,341.76	—	1,341.76
T. Ah Chong, Mr. ...	—	1,216.11	—	1,216.11
Al. Wong, Mr. ...	—	52.60	—	52.60
Total revenue for timber cut under license ...	\$76,602.89	\$66,561.64	\$12,965.00	\$2,982.81

OTHER REVENUES.

(E) Bakau Company ...	7,925.49	330.00	7,595.49	—
Various fines on timber cut without license ...	638.64	—	638.64	—
(F) Timber Passes ...	8,004.20	11,395.82	—	3,391.62
Jungle Produce Buyers ...	5,422.20	6,530.00	—	1,107.80
Mangrove Bark and Firewood	6,055.61	4,041.07	2,014.54	—
Consolidated Royalty ...	—	6,485.00	—	6,485.00
Total other revenues ...	28,046.23	28,721.89	10,248.67	10,248.67
Grand total ...	104,649.12	95,283.53	23,213.73	13,848.14
Refunded to B.B.T. Co. (Note C. & D.) ...	11,543.63	—	—	—
Total net Revenue collected (by Government) ...	\$93,105.49	\$95,283.53	—	—
Total net decrease over 1920	—	—	—	\$2,178.04

(A)—Includes Sub-licenses.

^o Royalty on timber actually cut by the B.B.T. Co. and its sub-licensees.

[†] Royalty on deficit as per Agreement.

(B)—Does not include revenue for timber cut on alienated land.

(C)—Kim Eng Watt & Co. paid royalty to this Department to the amount of \$14,380.32 of which \$4,825.80 was refunded to the B.B.T. Co. in accordance with arrangements referred to in a previous paragraph.

(D)—Shing Kee Company paid royalty to this Department to the amount of \$14,107.99 of which \$6,517.83 was refunded to the B.B.T. Co. See "Production" in a previous page.

(E)—Export duty on ensok collected by Forestry Department since April 1st, 1921.

(F)—Revenues for Timber Passes issued in Sandakan Town are included in returns for mangrove bark and firewood.

COLLECTION BY RESIDENCIES:

Residencies.	Timber Penses,	Jungle Products,	Mangrove Bark and Firewood.	Total.
Sandakan ...	\$280.65 ^a	\$2,110.00	\$2,748.58	\$5,139.23
East Coast ...	\$1,235.75	750.00	1,691.55	3,677.30
Kudat ...	640.62	781.00	—	1,421.62
West Coast ...	5,500.31	820.00	1,385.53	7,705.84
Interior ...	390.93	962.20	—	1,353.13
Total ...	\$8,004.29	\$5,423.20	\$6,065.61	\$26,016.20

^a Labuk and Sagat district only. see (F) previous page.

^b \$7,925.49 from the Bakau Company for catch exported, and \$638.64 for various fines.

The decrease of \$2,178.04 over 1920 indicated in Table VI is due principally to the fact that \$6,485 was collected in 1920 for consolidated royalty while none was collected in 1921, to the decline in the market value of jungle products, and to the refund of \$11,543.63 to the British Borneo Timber Company referred to in a previous paragraph.

HERBARIUM.

During the year 991 botanical specimens which were sent to the Bureau of Science, Manila, were identified and returned. In this collection were 95 new species and 14 species new to Borneo. Among which were 2 specimens, the seeds of which produce the Chaulmoogra oil used in the treatment of leprosy. It is reported that several trees of one of these species, *Hydnocarpus woodii*, is found in the neighbourhood of mile 10 near the Sandakan-Labuk Road. Plans have been made to secure a quantity of their seeds to plant in the Experimental Garden. There are now 1,857 mounted specimens in the herbarium representing 121 families and 1,123 species.

Dr. Elmer, a professional collector, spent two months collecting specimens between Sandakan and Labuk Bay. His collection, when identified, will add considerably to our knowledge of Borneo flora.

PUBLICATION.

No new bulletins have been published by this Department during the year.

Among the more important publications received during the year were: The Malay Science Bulletin, by Dr. E. W. Foxworthy, and the Journal of the Straits Branch of the Royal Asiatic Society entitled "A Bibliographic Enumeration of Bornean Plants", also Administrative Report of the Federated Malay States Forestry Department and the Forestry Department of Western Australia, and the following bulletins published by the Forestry Department of the Philippine Islands.

- Number 15.—Philippine Bamboo.
- " 16.—Forest Products as Sources of Paper Pulp.
- " 17.—Mangrove Swamps.
- " 18.—Palms and Palm Products.
- " 19.—Philippine Fibre Plants.
- " 20.—Resins, Gums, Seed Oils and Essential Oils.
- " 21.—Wild Food Plants of the Philippines.
- " 22.—Minor Products of the Philippine Forests.

NIPAH SWAMPS.

Several inquiries have been received during the past year relative to the utilization of nipah swamps for the manufacture of alcohol and sugar, and it is expected that an application for a concession will be received during the coming year.

GENERAL.

The most important event of the year in connection with the lumber industry was the opening of the new sawmill and logging railroads.

Work in the Experimental Garden at Batu Lapan began on September 1st. The under-brush and trees on 27 acres have been felled. Five acres are cleared and burned and will be planted with the different varieties of oil palm which are in the nursery and will be ready for transplanting about June, 1922. One and one-quarter acres of cleared land have been planted with teak, and kamirih or buah krass (tung oil tree,) and buildings erected for a nursery house and storeroom.

I have been informed by the Forest Laboratory of the United States Government that timber of the Dipterocarp family and similar woods are suitable for the manufacture of paper pulp, and as the supply of this class of timber is practically unlimited, it is hoped that a pulp mill may ultimately be established in North Borneo.

With the return of Mr. D. D. Wood, who has been appointed Director of Agriculture and the addition of two new rangers who are expected to arrive in June, a reorganization of

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the previous year. If the political unrest in China continues it will be necessary to find other outlets for our timber. China is our largest consumer at present. The British Borneo Timber Co. exported 220,753 cubic feet of sawn timber, 45 per cent. was shipped to Miri; 28 per cent. to the British Isles and 22 per cent. to Australia.

PRODUCTION.

The British Borneo Timber Co. together with their sub-licensees cut a surplus of 304,938 cubic feet over the 1 $\frac{3}{4}$ million cubic feet required by the terms of their agreement with Government. This surplus was credited against the deficit of 436,318 cubic feet for years 1920 and 1921. The revenue from timber passes issued for local use show an increase of \$3,105.51 over 1921. This increase is due to closer supervision and more local building operations. The British Borneo Timber Co. have 6 $\frac{3}{4}$ miles of logging railway, 3 locomotives and 7 logging engines operating at the present time. Messrs. Kim Eng Watt Bros. Co. have seven miles of rail and are constructing another large lighter. Messrs. Yong Song and Company have also added a new lighter to their equipment. Messrs. Shing Kee Company have 5 $\frac{1}{2}$ miles. In July the Kubota Estate of Tawau began operations on an area of 7,000 acres on the Apsa River. The application for this area was approved in 1917 but owing to scarcity of shipping and high cost of equipment it was necessary to delay operations until this year. The North Borneo Trading Co. are operating 5 logging engines and two miles of logging railway. Messrs. Shum Hing Timber Co. were granted a sub-licence by the British Borneo Timber Company on the Simporna peninsula for a period of 20 years. The company have about 100,000 cubic feet of timber cut and lying in the water at Simporna. The timber has been at Simporna for several months and will be of little value if exported. If this timber is allowed to leave the State it will only tend to bring our timbers into bad odour.

TABLE No. II.

TIMBER CUT FROM LICENSED AREAS.

Class.	British Borneo Timber Co.		B. B. T. Co.'s Sub-licensees.		North Borneo Trading Co.		Shing Kee Co.		Kim Eng Watt Bros. Co.		Kubota Estate.		Other Licensees.		Total. Square & Round.
	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.	Square.	Round.	
I	59,791	118,774	23,886	78,173	59,229	2,898	133,669	47,585	103,858	28,094	230	585	58	150	677,119
II	203,335	166,236	64,374	81,983	29,156	40	74,493	3,529	46,861	3,645	1,859	10,959	—	34	938,918
III	165,169	89,827	137,601	12,502	22,503	—	39,219	2,686	53,089	18,749	1,914	459	55	172	469,166
IV	126,068	675,795	49,149	166,422	4,263	4,340	5,387	4,659	69,988	16,004	16,959	18,478	2	70	1,194,161
Total 1922	1,509,348	274,719	393,860	135,160	7,170	292,763	57,909	304,866	69,683	20,338	27,491	90	408	2,969,321	
Total 1921	968,277	63,681	192,027	92,883	22,893	509,134	76,062	255,406	96,647	—	—	—	—	1,807,769	
Increase	536,071	211,079	203,833	42,277	—	82,629	—	49,460	—	20,338	27,491	90	408	Total Inc. 1,681,550.	
Decrease	—	—	—	—	15,623	—	18,053	—	24,464	—	—	—	—	—	

TABLE No. III.

TIMBER PRODUCTION AND DISPOSAL.

Firms.	Timber cut. cu. ft.	Timber Exported.	Timber Sold locally.	Increase Export and local over 1921.	Decrease over 1921.
British Borneo Timber Co.	1,504,348	653,567	168,323	109,697	—
B. B. Timber Co.'s, sub-licensees	610,590	400,978	—	192,602	—
North Borneo Trading Co.	142,339	244,540	—	—	80,181
Shing Kee Company	310,672	282,102	—	44,430	—
Kim Eng Watt Bros. Company	372,979	331,403	—	—	33,169
Kubota Estate	47,829	6,569	—	6,569	—
Other Licensees	564	—	564	—	4,628
Total.	2,989,321	1,919,159	168,887	443,298	116,978

TABLE No. IV.

DISTRIBUTION OF TIMBER EXPORTED.

Exported by British Borneo Timber Company to:		Per cent.	Total export from British North Borneo to:		Per cent.
Hongkong	...	66.52	Hongkong	...	79.91
Australia	...	7.50	Australia	...	8.58
Miri	...	15.00	Miri	...	7.57
British Isles	...	9.42	British Isles	...	1.95
Various	...	1.13	Various	...	1.59
local ports	...	.44			
Total	...	100.00	Total	...	100.00

LICENCES IN FORCE DURING 1922.

License No.	Holder.	Period.	Area, acres.	Location.
T.C. License 21	N.B. Trading Co.	13-7-24—9-7-24	4,000	Sagalong and Siga Rivers, Lahad Dato'
T.C. License 9	do.	1-4-03— ?	45,000	Krettam River, Sandakan.
" 28	do.	29-7-07— ?	25,000	Marotal Besar River.
" 13	Kim Eng Watt Co.	13-3-03— ?	—	Belacking Besar and Lantak Rivers, Sandakan.
Excl. F. Lic. 5/18	Jesselton Ice & Power Co.	1- 2-16—31- 1-23	550	Gadun and Bunkak Rivers.
Excl. T. Lic. 10/19	Peng Hong Peng Tio & Lee Tse	1-11-19—31-12-22	—	Western side of Railway, between miles 48 and 50.
Excl. T. Lic. 14/20	N.B. Trading Co.	1- 5-20—31-12-25	9,000	Kalabakang River.
Excl. B. & F. Lic. 1/22	The Island Trading Co.	1- 1-22—31-12-22	—	True right bank of Bengkulit River W. C.
Excl. B. & F. Lic. 2/22	do.	1- 1-22—31-12-22	—	Klias River extending as far south as to Berubak River.
Ord. T. Lic. 3/22	Shing Kee Company	1- 1-22—31-12-22	—	Kinabatangan-Sulau.
Ord. T. Lic. 4/22	do.	do.	—	Bulu and Turong Lupek.
Ord. T. Lic. 5/22	Kim Eng Watt Company	do.	640	Sedungor Ketchil River.
Ord. T. Lic. 6/22	do.	do.	—	Kolokook River.
Ord. T. Lic. 7/22	do.	do.	640	Bode Ketchil River.
Ord. T. Lic. 8/22	do.	do.	—	Silliah River.
Ord. T. Lic. 9/22	do.	do.	—	Masang River.
Ord. T. Lic. 10/22	do.	do.	—	Buli Trusan, Pulau Timbang.
Ord. T. Lic. 11/22	do.	do.	—	Tambak and Saling Rivers, Pulau Timbang.
Ord. T. Lic. 12/22	U. Kubota Estate	1- 7-22—31-12-22	7,000	Apas River Valley.
	British Borneo Timber Co.	1- 1-21—31-12-45	—	All State timber land.

B.B.T. TIMBER Co's SUB-LICENCES (ISSUED BY B. B. T. Co.)

Sub-Lic. 4/21	Tawau (B) Trading Co.	28-9-21—30- 9-22	—	Umas Umas River, Tawau.
Sub-Lic. 1/22	Yong Soon and Co.	1-1-22—31-12-22	—	Kinabatangan River.
Sub-Lic. 2/22	do.	do. do.	—	" "
Sub-Lic. 3/22	Siew Hin and Co.*	do. do.	—	Swang Piow-Dumondong Rivers.
Sub-Lic. 4/22	Tio Seng Company	do. do.	—	Mumiang-Sekong Rivers.
Sub-Lic. 5/22	Ko Kee Company	do. do.	—	Trusan Langan Langan Manuk.
Sub-Lic. 6/22	Shun Heng Timber Co.	25-4-22—24- 4-1922	—	Simporna Peninsula.

TABLE No. VI.

FOREST REVENUE COLLECTED FOR TIMBER CUT UNDER LICENCES

Firms.	1922.	1921.	Increase.	Decrease.
British Borneo Timber Co. and its sub-licensees	\$46,875.01	\$40,176.59	\$6,698.42	—
(a) North Borneo Trading Co.	9,148.05	7,937.99	1,210.06	—
Shing Kee Company	16,265.81	14,107.99	2,157.82	—
(c) Kim Eng Watt	16,247.67	14,380.32	1,867.35	—
(d) U. Kubota Estate	1,366.85	—	1,366.85	—
Other licences	37.67	—	37.67	—
Total revenue for timber cut under licences	\$89,941.06	\$76,602.89	\$13,338.17	—
OTHER REVENUES.				
(e) Bakau Co.	10,563.11	7,925.49	2,577.62	—
Fines	510.79	698.64	—	\$127.85
Timber (Passes) Royalty	11,109.80	8,004.29	3,105.51	—
Jungle Produce Buyers	5,620.00	5,422.20	197.80	—
Bark & Firewood	6,136.66	6,035.61	81.05	—
Total (other revenues)	33,880.36	28,046.23	5,834.13	127.85
Grand total	123,821.42	104,649.12	19,172.30	127.85
Less amount refunded to B.B.T. Co. Notes (A.B.C.D.)	13,710.70	11,543.63	—	—
Total net revenue collected by Government	\$110,110.72	\$93,105.49	—	—
Total net increase over 1921	—	—	—	\$17,005.23

(a)—Does not include revenue for timber cut on alienated land.

(b)—Shing Kee Co. paid Royalty to this Department amounting to \$16,265.81 of which \$7,938.96 was refunded to B. B. T. Co. in accordance with arrangements made between the Chartered Co. and the B. B. T. Co.

(c)—Kim Eng Watt & Co. paid Royalty to this Department amounting to \$16,247.67 of which \$5,086.02 was refunded to the B. B. T. Co. in accordance with arrangements.

(d)—The U. Kubota Estate paid Royalty to this Department to the amount of \$1,366.85 of which \$85.72 was refunded to the B. B. T. Co. in accordance with arrangements.

(e)—Export duty on cutch collected by Forestry Department.

Table seven shows the distribution, by Residencies, of revenue under table VI (other revenue).

Residencies.	Timber Pass.	Buyers of Jungle Produce.	Mangrove Bark and Firewood.	Total.
Sandakan ...	\$ 847.39	\$1,850.00	\$3,404.75	\$5,102.14
East Coast ...	2,835.31	680.00	1,467.00	4,982.91
Kudat ...	1,203.03	860.00	262.20	2,325.23
West Coast ...	5,555.83	910.00	1,002.11	7,467.94
Interior ...	668.24	1,320.00	—	1,988.24
Total ...	\$11,109.80	\$5,620.00	\$6,136.66	\$22,866.46

HERBARIUM.

During the year 31 botanical specimens were sent to the Bureau of Science, Manila, which were identified, mounted and returned. Among these specimens were two new species making a total of 142 formerly unknown species which the Department have collected. There are now 2,914 mounted specimens in the herbarium representing 117 families and 1,600 species. In 1921, 300 specimens were collected by a professional collector who reports that he found 23 new species. The same collector is at present working in the vicinity of Tawau.

NIPAH SWAMPS.

Nipah Palm.—Funds have been made available for the manufacture of fuel alcohol from nipah sap. Owing to the immense areas and their accessibility and other favourable conditions it will be possible to produce motor fuel at a cost which can easily compete with the present price of gasoline. Motor fuel made from sap of the nipah palm has been thoroughly tested as a fuel for internal combustion and the tests have been entirely satisfactory. Some of the points in its favour and which are making it popular are (1) lower cost, (2) consumption of lubricating oil is cut in half, (3) absence of carbon and (4) engine does not heat. The Kuhara Estate has been granted an exclusive licence to cut nipah leaves for the manufacture of shingles on the Marotai River near Tawau.

GENERAL.

A ranger has been stationed permanently on the West Coast with headquarters at Beaufort and another will be stationed in Tawau. It has been found that the presence of a forest officer has the effect of increasing the revenue in any particular district. Inspections have been made of the more important timber license areas and of all of the firewood, bark and charcoal licenses. The Forestry Department sent an exhibit to the Malay-Borneo Exhibition in Singapore of timber, furniture and jungle produce.

STAFF.

The undersigned returned from leave on 24th April. Chief Clerk A. Collado, who was granted three months and fourteen days' leave of absence returned on the 4th April. Junior Rangers L. Apostol and N. Mendoza, who have completed a two years course at the forestry school, Los Banos, P. I., were appointed on June 3rd and May 18th respectively. Three more Junior Rangers are expected in May or June, 1923. Ranger Simplicio Aguilar resigned from the Department on 22nd August, 1922. The Assistant Conservator of Forests was acting until the return of the Conservator of Forests in April, 1922.

D. D. WOOD,
Conservator of Forests.

LIST OF SPECIMENS COLLECTED DURING 1922.

ACANTHACEAE. <i>Thunbergia fragrans</i> Roxb.	MELIACEAE. <i>Dysoxylum cauliflorum</i> Hiern.
ARALIACEAE. <i>Schefflera insularum</i> (Seem) Harms.	MYRTACEAE. <i>Decaspermum frolicosum</i> Forst. " <i>paniculatum</i> .
ARACEAE. <i>Amorphophallus rivieri</i> var. <i>Kenjac</i> , Eng.	MORACEAE. <i>Antiaris toxicaria</i> Desch.
ANONACEAE. <i>Goniothalamus woodii</i> Merr. <i>Uvaria purpurea</i> Blume " <i>mierantha</i> HK. f. & Th.	MYRSINACEAE. <i>Embelia philippinensis</i> A. DC. var. <i>Discocalyx palawanensis</i> Elm.
EUPHORBACEAE. <i>Antidesma banguayense</i> Merr. n. sp. <i>Wetria macrophylla</i> (Bl) J. J. Sm.	PALMAE. <i>Calamus woodii</i> Merr. n. sp.
FLACOURTEACEAE. <i>Pongium edule</i> Reinw.	ORCHIDACEAE. <i>Geodorum nutans</i> (Presl) Ames. <i>Habenaria hystria</i> Ames.
LEGUMINOSAE. <i>Albizzia litoralis</i> Teysm. & Binn. <i>Entanda phaseoloides</i> (L) Merr. <i>Saraca hullettii</i> Prain.	RUBIACEAE. <i>Ixora grandiflora</i> Z. & M. <i>Tarenna cumingiana</i> (vid) Elm. <i>Costus sericens</i> Blume. <i>Mussaenda villosa</i> Wall. <i>Petunga racemosa</i> (Roxb) DC. <i>Ixora</i> <i>Uncaria insignis</i> DC.
LILIACEAE. <i>Pleomele borneensis</i> Merr.	VITACEAE. <i>Tetorstigama loheri</i> Gagnep.
LYTHRACEAE. <i>Lagerstremias speciosa</i> (L) Pers.	

(N.B.—There are two new species in this list.)

REMARKS BY HIS EXCELLENCY ON THE ANNUAL REPORT FOR THE YEAR 1922
ON THE FORESTRY DEPARTMENT.

Since the new year, difficulties have arisen in connection with both the Hongkong and Australian (New South Wales) markets. The political situation in South China is responsible for the former while the fact that some timber affected with borers was sent to Sydney combined with hostility on the part of the New South Wales timber merchants accounts for the latter.

The Governor of Hongkong is doing everything possible to assist us as regards China, and I am taking action which it is hoped may assist in the case of Sydney. The Honourable Mr. W. D. Jupp has also just left for Australia to seek markets.

Steps have been taken to start a distilling plant near the mouth of the Labuk river for the manufacture of motor spirit from the Nipah Palm. It will be managed by the Director of Agriculture, but I recommend that, when inaugurated, it be handed over to some commercial firm, as in my opinion, it cannot be successfully run by Government.

I am taking steps to legislate in order to prevent timber, where necessary, from being exported without inspection.

