

TRANSACTIONS
OF THE
NEW ZEALAND INSTITUTE,
1879.

I.—MISCELLANEOUS.

ART. I.—*The Forest Question in New Zealand.* By A. LECOY, M.A.,
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Introduction.

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INTRODUCTION.

AMONG the various systems already adopted for the purpose of turning to profit the natural resources of the public estate, stands prominently what is called the Public Works policy. This was a broad and bold enterprise, involving future rather than present advantages. Therefore, the time for us to fully appreciate the merits of that policy has not yet come, and what seems desirable to be done in the interval, would be, to avoid the locomotive crossing the path of the chariot of the State; for our attention may be called to the facts, that the incessant progress of the colony will have the effect of increasing the State expenditure, and that such increase may be required before an adequate augmentation of the revenue is available.

Parallel with the Public Works system might be initiated a new policy, tending to promote the interest of the Colonial Treasury, by improving and consolidating, instead of exhausting, the revenue derivable from the public estate, by a systematic treatment of the Crown forest lands, which revenue might be increased to such an amount as to provide at any time for the largest portion of the expenditure required for general State

purposes. Had measures in that direction been carried out ten years ago, when in the House of Representatives Mr. Potts moved, "That it is desirable Government should take steps to ascertain the present condition of the forests of the colony, with a view to their better conservation;"—had the forest question been then more practically investigated and considered in all its aspects, especially in that of the income which State forests, under systematic treatment, can afford to the public purse, without either their climatic advantages being disturbed through the fellings, nor the supply being reduced below the demand, as evidently would have been (and still would be) the case in New Zealand—we might have had by this time the same extent of railways, less a heavy indebtedness, and also fewer alienations of valuable timber lands. Furthermore, we should have now a surplus income, which fund would afford a means for a more equitable distribution of the public revenue towards municipal interests than the present allotment of lands for such purposes can allow.

The Government may yet be in time to recur to such a policy, and there are facts demanding their immediate consideration of the question. Thus, the probable duration of the financial resources at present derivable from the sales of the forest lands requires serious attention. If we compute the total area of the Crown forests, which may be accessible and available for absolute disposal, we shall find that it could hardly comprehend more than one-eighth part of the area of the whole estate, officially stated, in 1877, as 29,000,000 acres; valued at £16,000,000. Then, by selling yearly those forests to the amount of £400,000 or £500,000, with the addition, meanwhile, of the land grants, endowments, etc., and also adding the value of destruction perpetrated on the leased forests, it becomes evident that these operations, if continued, will, in the course of a few years, completely alienate the most valuable portion of the public estate. Thereby a source of State income, by nature made lasting and abundant, will be dried up for ever. The alienated forest will gradually disappear under the exigences of individual interest, which demand more immediate returns for labour or capital than the conservation of forest lands can afford, and the destruction of the forest areas will lead to disasters resulting from floods and droughts, which will be severely felt by the Colony.

However, the State expenditure must be provided for through the ways and means allowed by the Legislature; and the purport of this paper is simply a humble attempt to ascertain, so far as data and information at hand will permit, whether the material interest of the Colonial Treasury, as well as that of the country at large, may not be further promoted through the establishment of State forests than by the temporary financial resources derivable from the forest alienations.

I.—STATISTICS.

The following total quantities relating to the area and value of the Crown lands have been compiled from the Survey Department returns, dated 17th of October, 1877, entitled "Statement showing the area and approximate value of the *unsold land in each County in New Zealand, on 31st of August, 1877":—

AREA AND APPROXIMATE VALUE OF THE COLONIAL ESTATE ON 31ST AUGUST, 1877.

Situation.	Forest Land.	Open Land.	Total Area.	Approximate Value.
	Acres.	Acres.	Acres.	£
In the North Island	3,801,612	776,706	4,578,318	2,784,148
„ South Island	3,717,220	17,295,284	21,012,504	13,236,852
„ Stewart Island	393,000	22,000	415,000	58,125
Mountainous or valueless } (South Island) }	3,336,026	..
TOTALS	7,911,832	18,093,990	29,341,848	£16,079,125

The official statement does not give the area of the open land in the counties of Wairoa, Hawke Bay, Wanganui, East Taupo, Rangitikei, Manawatu, Waipawa, Hutt, Wairarapa East and West, Raglan, and West Taupo (North Island).

Forest lands inserted in the columns agricultural and pastoral, have been included in the column *forest land* in the above table.

II.—PREMISES.

A careful observation of the distinct interests which the colonial estate comprehends, points out of itself, as specially relating to the improvement of the resources derivable therefrom, the advisability of a separate management applying to the open lands and to the forest lands respectively, each kind of property, whether it be intended for sale or conservation, requiring special treatment under the supervision of officials of special aptitude in their respective departments. On the one hand, agronomists are required for the purpose of rendering the soil and climate of vast and treeless regions better adapted to settlement; whilst, on the other hand, foresters are needed to supervise the conservation of State forests, creating thereby a permanent State revenue.

The adoption of a new system for the general administration of the public estate may partly depend on some preceding legislative action. Still, so far as the forest interest is concerned, it does not appear that there should be immediate need for any changes in the existing forest legislation, otherwise than by appropriating the necessary fund to the creation of the special department.

* App. to Journ. H. of R., 1877, C—9,

The State Forests Act of 1874, and likewise the Land Act of 1877 (part V.), provide for the establishment of State forests, allowing Government full power to carry their objects into operation.

The enactments of the forest law have not, however, hitherto been carried into execution, and it is still generally presumed that there is a superabundance of forest produce for the present and future requirements of the colony—such an opinion not being at all supported by any reliable data or technical statement. Thus, the whole subject being restricted to the single observation of the presumed yield of the forests taken comparatively with the amount of the present home consumption, other considerations of high importance bearing on the subject are overlooked, namely—

1. That the demand for forest produce, annually supplied out of the public estate, has already attained such proportions that a considerable State income should be actually derivable therefrom.

2. That the New Zealand timber, "*sui generis*" in the world, and generally superior in economic value and fineness to any timber indigenous or imported to Europe, commands an export trade there on a large scale, especially on account of the perfect adaptability of several of its species to various purposes of the European requirements, and that a considerable State income may also be realized through a special export duty, intended for the two-fold object of providing for the legitimate rights of the public purse, and also of maintaining the price of timber for home consumption within moderate bounds.

3. That the progress of the colony, as well as the extension of the timber exports, cannot fail, within a short period of years, to increase the demand for our forest produce to such an extent as to require the full capability, *technically determined and regulated*, of the New Zealand forests to supply the said increased demand.

Should a new organization for the administration of the public estate have the effect of restricting the disposal of the forest lands to the sale of the standing timber, in such proportion as the forest could supply annually and permanently, and should also the system of leasing the forests be amended or done away with, the material advantages expected to result from those measures may be premised as follows:—

1. The well-regulated sales of the standing timber would afford a permanent State income amounting to much above the proceeds from the forest land under the present system of alienation and forest leasing.

2. This restriction would enhance the market value or revenue of the existing freehold property, the owners, of forest lands especially, not having any longer to complain of a competition so prejudicial to the value of their property as that resulting from the disposal of the public timber lands at nominal prices,

With respect to the leasing of the forest lands it may be asked—why should not any disposition of the Crown forest lands follow the same course as that applying to any other property? that is to say—why should such public property be disposed of otherwise than at a price representing its real value, so as to obtain the legitimate profit for the public purse?

The interest that the present bush licence or leasing system affords to the State is “nil.” To the public it affords timber and wood on conditions more or less advantageous. On the other hand, the detrimental effects resulting from such leases are great:—First, the forest is generally worked indiscriminately, without any care for its regeneration, thereby effecting every year the absolute destruction of forests which had just yielded produce to the markets of enormous value.

On that score the lessee may say that it is not his business or duty to select and reserve trees which may be required for the purpose of securing the regeneration of the forest.

On the other side the public may argue that the law of the country having enacted as a principle that public forests “are to be subjected to skilled management and proper control,” the actual destruction of the property through indiscriminate working cannot be considered lawful.

The period of years for which these leases are granted at almost nominal prices, would lead to the idea of an admitted permanent stagnation in the timber trade, which is not compatible with the fact of the incessant progress of the colony, otherwise the leases would constitute a monopoly of privileges, and thereby be an injustice to the people, who all have to contribute proportionately towards the State expenditure, and who are therefore entitled to claim the “*jus omnium in omnia.*”

However, all legitimate rights must be recognized and protected, and it is obvious that a new forest administration tending to extend the timber trade to an enlarged sphere of operations, would greatly benefit the lessees of our forests, and they, no doubt, would be glad to join in just and profitable reforms.

III.—STATE FORESTS: PRELIMINARY OBSERVATION.

The establishment of State forests has for its object, not only to provide for a regular and permanent supply of timber and wood, but also to maintain the protection given by nature against the disturbance of the climatic equilibrium, the occurrence of droughts, the disastrous effects of flood-waters, etc., etc., experience having shown the preventive or modifying influence, as the case may be, of extensive forest areas. Furthermore, that the conservation of these woodlands, intended for the general interest, should not be entrusted to the management of private persons as purchasers of them, because forests, considered from a financial point of view, being almost

the least remunerative of all land cultivations (as private property), the apparent interest of the purchaser would be to realize the value of the timber, and to convert the forest land into agricultural or pastoral, thereby selfishly disregarding the beneficial effects which the existence of the forest afforded to the whole district.

In the hands of Governments, forests represent a national interest of the highest importance, not only because of the financial resources which the annual fellings afford, as the direct revenue derivable from the property, but above all, on account of the salubrious and fertilizing effects which forests bestow on the surrounding country, thus favouring the progress of agriculture; and the general development of national wealth.

It is only under such prosperous conditions, it may be remarked, that freehold lands can well afford to contribute towards the public expenditure, and thus will spring up, (*i.e.*, by the conservation of forests,) other sources of state revenue. Again, the great mass of the ever-growing forest, notwithstanding the annual thinning out of it, is also acting as a capital devoted to insure the welfare of agriculture, maintaining thereby the security of the public revenues as well as that of private property.

The material importance of these indirect advantages, as resulting from the proper management of forests, especially when situated in mountainous regions, may be demonstrated by the observation of events of recent occurrence in France. In that country, as the result of injudicious alienations of State forests, and the further conversion of the forest land into pasturages, originated periodical inundations, and the ultimate ruin of agriculture in no less than four "*Départements*," the rural population of which are now emigrating to America.* The loss of private property has thus been enormous, and the deficiency in the land tax revenue from the same cause, *viz.*, the indiscriminate clearing of forests, may also be computed at millions of money.†

To the collateral advantages just alluded to may be ascribed the difference in character and productive value of forests, as State or freehold property respectively.

For climatic purposes, the total area of the Crown forest lands in New Zealand, taken at 5,000,000 acres, would not be more than sufficient as compared with the area of the whole colony; for the probability is, that the private forests at present adding to the climatic advantages of the public woodlands, will gradually disappear, unless the owners could be persuaded to sacrifice their own pecuniary interest to the public welfare. In France

* "*Etudes sur l'Aménagement des Forêts*," p. 489, par. L. Tassy, Conservateur des Forêts. Rothschild, publisher, Paris.

† The land tax revenue in France amounts to about £24,000,000.

and in Germany the primitive woodland areas, though much reduced, still represent in both countries a surface equal to about 24 per cent. of the total area of the country, but notwithstanding this the people there are complaining of climatic disturbances as the result of the clearing of the woodlands.

IV.—REVENUE DERIVABLE FROM STATE FORESTS.

This most interesting part of the whole question has, it seems, been altogether misunderstood in this colony. Semi-official statements relating to the forest revenue in Germany, had the effect of representing the amount of the said revenue as not being above a few shillings per acre, from which a large amount of expenditure had to be deducted. Upon the admitted value of that source of information, it was resolved, in the House of Representatives, a few years ago, that, "judging from the results attained in Germany, the conservation or regeneration of the indigenous forests in this colony would not pay." * * * *

In the said statements the forest revenue, arising from the annual acreage of fellings, has been ascribed to the whole forest area, through an erroneous analogy between the productive value of high timber State forests and those of freehold property, but the dissimilarity in the respective conditions pertaining to each kind of property does not admit of comparison; besides which, the annual acreage being calculated on only a portion of the whole arboreal stock, it cannot be taken as the revenue or produce of the whole forest area. However, the essential point to be observed is the actual result or total amount of revenue derivable from State forests, when managed under such principles as are generally adopted in Europe. The item of the amount of expenditure involved in the management of those forests also requires consideration.

All State forests in Europe have been, and many are still, encumbered with forest rights and servitudes of feudal origin, the commutation of which, necessitates expenses generally included in the expenditure of the Forest Department; which, with other causes of expense, such as the preservation of game, the collection of the forest revenue, etc., etc., are in Germany also included in the departmental expenditure. In France, the Forest Department has nothing to do with the preservation of game, nor with financial matters; besides which all forest rights and servitudes have been redeemed, and the departmental expenditure is thus confined to the salaries of the staff and forest guards, and does not exceed five per cent. of the revenue; whilst in Germany, owing to causes just stated, the average forest expenditure in the German States hereafter named is above 30 per cent. On the other hand, as may be observed in the following tables, the gross returns from the annual sales of the standing timber have hitherto been less in France than in Germany, the

cause for such a difference being mainly that a systematic treatment of State forests had been adopted in Germany long before it was introduced into France, and that the revolution or age of maturity of forest trees having been fixed so high as 100 to 200 years, according to species, climate, soil, etc., forests in Germany yield at the present time a larger number of trees, arrived at maturity and full dimensions, than those of France, thereby affording larger money returns.

V.—REVENUE OF STATE FORESTS IN EUROPE.

Return, showing: Column 1, the total area of State forests in each State; column 2, the annual acreage devoted to the fellings, as the computed total surface of the separate lots of ground where trees have been felled*; column 3, State income per sales of the standing timber, as the exhaustive product per column 2; column 4, income per acre, per column 2; column 5, amount of the departmental expenditure under actual circumstances special to each State; column 6, percentage of the expenditure on the revenue:—

NAME OF STATE.	1 Area.	2 Annual Acreage.	3 State Income, per column 2.	4 Income per Acre, per column 2.	5 Amount of Expendi- ture.	6 Per centage of Expendi- ture.
	Acres.	Acres.	£	£ s. d.	£	Per cent.
Bavaria	3,000,000	24,000	1,261,279	52 11 0	494,287	39
Hanover	591,000	4,728	408,200	86 6 0	128,000	31
Saxony	3,94,000	3,152	350,000	114 6 0	101,000	29
Prussia	6,216,500	49,732	2,100,000	42 4 0	1,100,000	51
France	2,500,000	20,000	1,400,000	70 0 0	70,000	5

REMARKS.—Columns 1, 3, 5, are taken from Captain Campbell-Walker's reports on the forests of the German States, and for France the information is taken from the official returns, including ten consecutive years, up to 1870.

For all of the above State forests, the average period of the revolution is taken as 125 years.

As a rule, the upset prices at the auction sales are calculated to allow one-third of the market value of the forest product as the share of the State.

In Europe, as the demand for forest produce exceeds the supply derivable from State forests, the greatest care is taken to ascertain the capability of those forests and so to allow about equal annual returns permanently.

* The working of high timber forests by thinnings, being intended to secure the natural regeneration of the forest, prevents at the same time the existence of large open spaces or blanks in the interior of the forest, which would prove fatal to the surrounding standing timber.

The capability in high timber forests is determined by estimating the cubic volume of the ligneous material of the whole area, then assigning it in calculated quantities to sections of the forest, which are worked in rotation.

The amount of the annual fellings in those forests does not, as a rule, exceed one per cent. of the timber contained in the whole forest. Such a percentage, however, represents a money value considerably above that derivable from any other land cultivation for the same acreage; and should the amount be considered as the revenue of the whole forest, it would then show a revenue about equal to that generally expected from arable lands, after deducting from the latter the cost or value of labour and other agricultural expenses.

By subjecting our indigenous forests to such a systematic treatment as may be actually practicable, the State revenue derivable from them should, in due course of time, become superior to that afforded by State forests in Europe, especially on account of the high value of the timber we could export.

VI.—STATEMENT SHOWING THE APPROXIMATE REVENUE AVAILABLE TWO YEARS AFTER FORMATION OF THE FOREST DEPARTMENT.

1 (IN 1881.)	2 (IN 1881.)	3	4	5	6 (IN 1881.)	7 (IN 1881.)	8 (IN 1881.)	9 (IN 1881.)
Total Area of valuable Forests in the hands of the Government.	Amount of the demand, including Home Consumption and Exports, per Annum.	Average Exhaustive Yield of the Forests, per 1 acre.	Total Annual Acreage required to supply the demand, as per column 2.	Area systematically required to allow the Annual Acreage, the period of the revolution taken on an average of 100 years.	Average Market Value of the whole product of 1 acre, By 9,000 superficial feet of first-class timber, average £1 per 100 £90 " 12,000 feet of second-class timber, firewood, fencing, etc., as equal to superficial feet, averaging 10s, per per 100 £60	Receipts by annual sales of the standing timber and wood, for a quantity equal to 21,000 superficial feet, or per 1 acre yielding such a quantity.	STATE INCOME. £ By Annual sales 1,190,500 " Export duty, as averaging for a period of 3 years (up at end of 1884), per annum, say ... 309,500	Amount of the Departmental Expenditure, and its permanent percentage on the Income to be 3 per cent.
Taken as	Taken as	Taken as			21,000 Superficial feet.			
Acres. 5,000,000	Superficial Feet, 500,000,000	Superficial Feet. 21,000	Acres. 23,810	Acres. 2,381,000	£150	£50	£1,500,000	£45,000

REMARKS.—Column 1: The taken area would be nearly double that required to supply the stated amount of the demand, but the actual surplus (2,619,000 acres) includes forests not yet accessible by roads or railways, and will soon be required in order to meet the sure increase of the present demand.

Column 2: In 1876, the demand for sawn timber alone, as computed on official returns, amounted to about 150,000,000 superficial feet. The interval between that year and 1881 will give a period of five years, for which the increase is taken approximately as 100,000,000 superficial feet, the surplus quantity being ascribed to firewood, fencing, etc. The exports to Europe are included for a quantity averaging 25,000,000 or 30,000,000 superficial feet per annum, from 1881 to the end of 1884. Altogether, the stated amount of the demand may be admitted as a minimum.

Column 3: No accurate information on the subject can be had before the Forest service be organized. However, the matter is not, at present, of material importance, for should the above stated yield per acre be above the mark, it will be possible to go afield on marking operations for the purpose of meeting the amount of the demand, and should the stated average yield prove to be under the mark, so much the better will it be for the interest of the State. Experiments for the purpose of ascertaining the average yield of our indigenous forests will have to be made in each block.

Column 3 is the basis on which must rest the whole system. The given yield per acre being divided by the amount of the demand, the quotient will show the number of acres required to supply the demand; then by multiplying the annual acreage by 100, as the supposed admitted age at which, or above which, trees will be felled, the area per column 5 is obtained. The surplus quantity of the area per column 1 to be reserved for future requirements.

Columns 6 and 7: The quotations apply to the year 1881. No exaggeration has been found in them by competent persons, to the consideration of whom they have been submitted.

Columns 8 and 9: The matter of the departmental expenditure and that of the exports is further considered.

VII.—MANAGEMENT OF STATE FORESTS IN NEW ZEALAND ACTUALLY PRACTICABLE.

The methods generally adopted in Europe for the purpose of determining the proportion of the annual fellings which forests can afford permanently, involve lengthy and complex operations, having to be performed by a special staff of trained forest officers. For that reason, among others, those methods are not at present wholly applicable to the colony. Meanwhile, and until the department be fully organized, a system of forest conservation not particularly requiring high technical attainments on the part of foresters on executive service, may be carried out with benefit.

The fact that the supply derivable from our State forests, even under technical rules, is for the present in excess of the demand, will allow, generally, that the extent of the annual fellings may be determined by the quantity in actual demand. Therefore, the approximate quantity of the demand being given, the forest officers will have to perform the following operations:—

(1.) To select and mark, on sections to be worked, trees to be reserved as may be required for the purpose of securing the natural regeneration of the forest. (2.) To brand with a different mark all the standing timber intended for sale, calculating at the same time the cubic volume of that product, and proceeding thus so far as necessary to provide the requisite quantity. (3.) To estimate the market value of the produce to be sold, upon which valuation upset prices will be determined. Official advertisements of the auction sales specify the number, species, approximate yield in cubic feet, and locality of the trees to be sold, also the special conditions of the sale, but the money valuation is not made known to the public. The foresters will then have to verify, supervise, and enforce the execution of the by-laws and special conditions of the sales.

It is not within the scope of this paper to enter into further details on forest operations, the purport of those just mentioned being to show that no extraordinary qualifications are required for foresters on executive service, and that for practical purposes a sufficiently efficient staff may be at once formed here, while forest schools would gradually fill up any deficiencies in the service.

The importance of the whole matter does not allow of half measures, and the following tables, being the explanation of the previously stated amount of the departmental expenditure, are intended to show the requirements of the forest service at the beginning:—

CENTRAL ADMINISTRATION.				TOTAL SALARIES.
1 Director-General				£ 600
3 Administrators, acting as general inspectors				1,200
Clerks				1,025
				5,625 Inspectors
				11,800 Rangers
				24,750 Guards
				£45,000
Total Area to be divided into	EXECUTIVE SERVICE.			
	INSPECTORS.	RANGERS.	FOREST GUARDS.	
100 Ranges.	25 Inspectors.	100 Rangers.	450 Guards.	
Acres. 2,381,000	Circumscription. Four ranges. Three classes; salaries averaging £225.	Three or four classes; salaries averaging £118. Range extending over about 23,810 acres.	Salary, £55 (average); house, garden, and firewood provided for; civil pension (further mentioned).	For Forest Establishments. Say £10,000

Forest guards have to do special work on survey and demarcation operations, and likewise on selection and marking operations; they make forest roads and plantations; and besides their work of general supervision they may be called for special police or military service. In the above stated total number, 400 guards are intended for permanent residence and 50 as a flying brigade.

In reference to the item of civil pensions to be allowed to forest guards, it is necessary to explain that the suggestion as to its meaning and application is not in opposition to the principle on which civil pensions were abolished here. The institution, as it was constituted, involved the State in heavy liabilities without any actual compensation for the same, and also conferred privileges on a certain class of the people.

Civil pensions in almost all countries are constituted under the principle that the Government servants have to pay for the pension, by a percentage of say, five per cent. being deducted from the nominal salaries. Experience in some countries has proved that such a percentage allows considerable profit to the State, owing to various causes of forfeiture, such as premature death, dismissal, and voluntary resignation of functions; further, the reduction of the nominal salary may also be considered as a guarantee for the good of the service, the probability being that those who have paid for the pension will not risk their future means of subsistence, through neglect of their official duties.

The salaries of the forest guards being taken as from £50 to £60 per annum with house or barracks, firewood, garden, and paddock, will allow

of a living equal at the least to that of any other of the working classes. Still, with such earnings, it may be very hard for many of those people to save enough for the bread of old age. Forest guards, as the guardians of public property, must feel independent in the execution of their functions, and that independence would naturally arise from the fact that the fulfilment of their duty on all occasions will be the guarantee of their means of subsistence for life.

For the purpose of meeting the amount of expenditure required for the formation of the Forest Department, also for the good of the service and that of those it may concern, the following outlines of a scheme are submitted :—

1st. Creation of a colonial pension fund, or deferred life annuities, to be constituted under such principles :—

(1.) That the amount of the pension should not exceed £60.

(2.) That the amount of the monthly instalments towards the pension should be calculated to the effect that neither loss nor profit would accrue to the State.

(3.) That the subscription to a pension of £60 should be compulsory for all Government servants receiving a salary under £100 per annum, but to be free, up to or under the said amount, to the working classes of the community.

(4.) That the right to the pension should be acquired by 25 years of payment of the subscription, and the pensioner not being under 55 years of age.

Cases of forfeiture : Failing to pay the monthly instalments, premature death, judicial condemnations in criminal cases, dismissal from the Government service for non-fulfilment of duty, etc.

2nd. The creation of a civil pension fund applying to all Government servants receiving a salary of or above £100 per annum.—The subscriptions to be compulsory, five per cent. reduction on the salary, causes of forfeiture as above, adding the case of voluntary resignation of functions, amount of the pension half that of the salary, reversion of half the pension to the widow of the pensioner, 30 years of service and 60 years of age giving right to the pension.

The enactment of such institutions would create means more than sufficient to meet the expenditure of the forest department.

As regards a systematic treatment of our indigenous forests, some technical points of importance might be reserved without prejudice until the service had attained sufficient experience to decide upon such questions, as for instance that of determining the age of maturity of the various species of trees. Meanwhile an average age of 100 years may be fixed, so that no valuable timber under that age should be felled. On this subject it may be

remarked that the financial interest of States is not governed by the same principles as those of private individuals. Private individuals may derive interest or profit from the investment of capital, which as a rule States do not. Thus, private individuals are able to find their own pecuniary interest by selling trees on their estate as soon as they attain marketable dimensions even before maturity, because the cash realized by the sale is expected to increase, through interest or profit, to such an amount as to be far above the value of the trees at the time of their maturity. States, as a rule, have no capital to invest at interest or otherwise; their receipts go to pay their expenditure, and so far as the revenue is derivable from State forests the larger amount of money the standing timber will reach at the auction sales the better it will be for the public purse. The fact that a full-grown tree is worth more money than one of less dimensions, need not be mentioned (particularly old trees of high value for the manufacture of furniture, etc).

Therefore, whilst the State is in possession of a stock of old trees more than sufficient to supply the demand, the present as well as the future interest of the Treasury will be found in the application of the rule, that trees should not be felled before full maturity. "*Arbores magna diu crescunt.*"

VIII.—ECONOMIC AND COMMERCIAL VALUES OF NEW ZEALAND TIMBERS.

Experiments for ascertaining the intrinsic value of New Zealand timbers were most carefully and skilfully made eighteen years ago, in Dunedin, under the direction of the late Mr. Balfour, C.E.; also, as a means for comparison, tables showing the values of European timbers, experimented on by Mr. Barlow, were prepared by the same talented engineer.

Preparatory to the consideration of the value of New Zealand timbers in European markets, the following statements, abstracted from Mr. Balfour's reports, are submitted, and will render it unnecessary to state the results of personal investigations, leading, as they do, to the same opinion as expressed by the late Mr. Balfour, viz., "That the New Zealand woods compared very fairly with those we have been accustomed to consider as standards, the absolute strength of very many being above that of the British oak."

COMPARATIVE TABLES OF THE INTRINSIC VALUES OF EUROPEAN AND NEW ZEALAND TIMBERS.

EUROPEAN TIMBERS.				
NAME.	Strength or Strain the Wood can bear without Fracture.	Elasticity.	Weight, per cubic foot.	Remarks.
	lbs.		lbs.	
Oak (Great Britain) ..	128·55	127·01	55·96	General mean of all experiments. Special case.
" Beach " ..	178·66	111·03	46·87	
Ash " ..	129·66	195·83	43·37	
Elm " ..	169·2	180·07	46·195	
Memel Deal ..	87·92	82·22	34·21	
Riga Fir ..	144·25	116	36·77	
	89·96	167·77	46·46	
NEW ZEALAND TIMBERS.				
NAME.	Strength or Strain the Wood can bear without Fracture.	Elasticity.	Weight, per cubic foot.	
			lbs.	
Black Maire	<i>Olea apetala</i>	314·2	273	72·29
Titoki	<i>Alectryon excelsum</i>	248	229	57·10
Black Mapau	<i>Myrsine australis</i>	243	215·2	60·14
Manuka	<i>Leptospermum ericoides</i>	239	239	59
Kowai	<i>Sophora tetraptera</i>	207·5	198·5	55·11
Tawa	<i>Nesodaphne tawa</i>	224	204·5	49·85
Towai (Black Birch, Otago)	<i>Fagus fusca</i>	232	(214·05	(44·42
Towai (Black Birch, Wellington)	"	199	(209·3	(50·96
Miro	<i>Podocarpus spicata</i>	197·2	230·24	49·07
Rata	<i>Metrosideros robusta</i>	217	214·02	60·10
Matai	<i>Podocarpus ferruginea</i>	190	156·22	42·74
Maire	<i>Eugenia maire</i>	179·7	177·2	49·24
White Mapoui	<i>Carpodetus serratus</i>	177·6	166·80	51·24
Kauri	<i>Dammara australis</i>	180·96	194·41	38·96
Rewarewa	<i>Knightia excelsa</i>	161	199·29	48·92
Red Birch	<i>Fagus menziesii</i>	158·2	116	39
Rimu (Wellington)	<i>Dacrydium cupressinum</i>	168	174·4	38
" (Hawke Bay)	" "	163	136·7	37·63
" (Dunedin)	" "	108	124·3	36·28
" (Canterbury)	" "	66	89·16	47·34
Totara (Hawke Bay)	<i>Podocarpus totara</i>	148	113·99	34·13
" (Wellington)	" "	140	163·8	33·83
" (Canterbury)	" "	121	94·74	36·16
Hinau	<i>Elaeocarpus dentatus</i>	125	200·7	35·03
White Pine	<i>Podocarpus dacrydioides</i>	136	155	31·55

Several species of New Zealand timbers were not tested at the Dunedin experiments, such as puriri and manua, or Westland pine, which are the strongest and most durable timbers in the colony.

Irrespective of the economic values just stated, many descriptions of New Zealand indigenous trees possess remarkable beauty in grain, mark-

ings, and varied tints, which would prove of high commercial value in Europe. For the purpose of exportation to Europe, New Zealand timbers may be divided into three classes:—

The first class to include timbers well adapted for the manufacture of furniture, cabinet work, etc., such as rewarewa, which, by lapse of time, assumes an extreme beauty, and the appearance of tortoise-shell. Then maire comes in for a more serious style of furniture, superior in beauty to old oak. Next we have all the varieties of waved and mottled kauri, rimu, totara, etc., all of exquisite beauty, far exceeding that of any wood known in Europe.

The second class to include timbers well adapted for ornamental works, where the adequate strength of the wood is required, such as inlaid floorings, when they are intended for ornamentation, panels, etc., for which rimu is prominently a suitable timber.

The third class to include timbers intended to supply the place of oak in its special uses, the scarcity and high commercial value of that timber being much felt in all European markets at the present time. The cause of the diminishing supply of oak and other hardwoods in Europe may be partly ascribed to the extension of railways, but principally to the progressive exhaustion of the product in countries where forest conservation is not carried out. Thus, from scarcity of those timbers, and high prices for the same, originated the introduction of iron ship-building, and also, so far as practicable, the more general adaptation of light woods to various building purposes. Oak however, cannot be replaced by iron or light wood in its essential uses; and in the many descriptions of New Zealand strong timbers will be found the requisite qualities to supply the place of that standard timber in Europe, in each of its special uses.

The principal outlets for the exchange of our forest produce should be England and France.

England is anxiously looking to her colonies for the supply of her enormous consumption of timber and wood, which, according to a recent statement taken from *The Economist*, represents a yearly value of £170,000,000. Canada contributes, for a value of about £5,000,000 per annum, towards these excessive requirements.* But forests in the Dominion are given up to waste and devastation, no effectual steps being taken to prevent their ultimate destruction, and hardwood is fast disappearing in all its provinces.

* During five years ending 1876, Canada exported to the United Kingdom—

Timber and wood, to a total value of	£24,633,226
Corn and grain	16,536,983

(Colonial Timbers, Colonial Office, England.)

An analysis of returns relating to colonial timber, issued by the English Colonial Office, and presented to both Houses of Parliament, August, 1878, affords important information. In the prefatory observations of the official document it is stated that "*The returns exhibit, in a striking manner, the urgent need for some prompt and comprehensive action to stay the influences at work to destroy the indigenous forests which constitute, in many instances, the principal natural riches of the colonies.—Looking * * * above all, to the intrinsic importance of the question itself, this may be regarded as a matter of Imperial concern, calling for well-considered action on the part of the Government.*"

In the chapter devoted to New Zealand, the provisions of the State Forests Act of 1874 are recited, and the following remarks occur:—"As a practical and comprehensive experiment in the direction of forest conservancy, the results will be looked forward to with interest." * * *

Besides the supply derivable from her dependencies, England imports immense quantities of timber from the north of Europe. But there, also, forests are becoming exhausted, and protective duties on the Baltic timbers are imminent.

The demand for staves and hardwood intended for various purposes, is considerable in the English markets, and should New Zealand timbers be better known there, they would soon be in demand to any amount that could be supplied. The same remarks apply to those of our woods which are so well adapted for the manufacture of furniture, cabinet work, etc. However, for ordinary house-building purposes New Zealand timbers could not compete in price with the lighter woods generally used in England.

In France, the use of hardwoods for house-building purposes is more general than in England, and it may be there a matter of necessity, to which, in some cases, ornamentation is added. Houses in Paris being five stories high (each house affording habitation to ten families), have to be constructed with the strongest materials. Oak, as a rule, is used in the construction of stairs, inlaid floorings, doors, and panels, the work being finished off by the application of a special encaustic, which produces a varnish-like appearance. Thus, in France, oak is found to be both useful and ornamental; and floorings of polished oak are almost universal, carpets being but seldom used, and then only in winter. Another characteristic of French custom is extreme luxury in furniture, all classes of the people in towns seeking to possess themselves of the best furniture that their means will admit of. It may therefore be confidently asserted that New Zealand timbers, for all purposes indicated in the above classification, will find a ready market in France.

In addition to the annual product of her 23,000,000 acres of forests (including State, communal, and private forests, all of which are subjected

to the prohibitions against clearing), France has annually to import hardwoods to the value of £8,000,000, mostly intended for the navy, wine-cask staves, and furniture. The merchant navy has not, as yet, any iron ships.

Prices for oak, in the Paris market, were quoted by the *Revue des Eaux et Forêts*, of the 5th October, 1878, as follows:—

In log.—Logs of 2 mètres in circumference or above, 160 francs = £6 8s. 0d. *per cubic mètre* = 1 cubic yard + 10 per cent.; the logs to be measured at the quarter girth if not squared. Logs from 1 to 2 mètres in circumference—80 francs = £3 4s. 0d.

Planks.—Lots of all lengths, breadths and depths, being piled, 150 francs = £6 *per cubic mètre*.

Planks called "*Entrevoux*."—Breadth 10 inches, depth 1 inch, 5 francs = 4s. *per 1 superficial mètre* = 10 superficial feet nearly = 40s. *per 100 superficial feet*.

All other dimensions in the breadth and depth of planks are charged proportionately to the cubic volume of the "*Entrevoux*." Oak planks are to be free from sap-wood. The cost of freight from New Zealand to England or France, may be computed at about 6s. *per 100 superficial feet*, on a regular trade being established.

The above quotations are those of the forest contractor for newly-cut wood, the timber merchant regulating the price of his goods according to the length of time he has kept them seasoning. It is not uncommon in France to see oak splitting and warping in its various uses, as may be particularly observed at the fourth and fifth floors of houses where a comparatively low rent necessitates the use of cheap wood. Also, in the first and second floors of the same houses, oak from the same forest may be seen perfectly sound, the difference arising from the more perfect seasoning.

The above given quotations for oak in the Paris market, relate to the variety of the species which is the most abundant in the forests of France, viz., the "*Quercus cerris*," which is not so strong a timber as the "*Quercus pedunculata*," or British oak. Therefore, Mr. Balfour's tables, taken as a means for comparison between New Zealand and England's indigenous timbers, may certainly also stand good in reference to the standard timber of France. Prices for oak and other hardwoods in England are about the same as, if not higher than, they are in the Paris market.

It may also be a matter of interest to observe that the most abundant species of New Zealand timbers are precisely those which will best suit the French markets. Such are rimu, birch, tawa, totara, etc.; not that rimu, for instance, could be expected to supply the place of oak in all its various uses but, that, for purposes such as those mentioned in the second section

of the above classification, this timber, it may be confidently asserted, would attain a commercial value above that of oak. Birch, tawa, etc., could also advantageously replace oak in many of its special and essential uses on the same level as to prices.

The market value of New Zealand timbers in the colony, as compared with that which they should reach in the European markets, can only be given as the result of personal observation, inquiries, etc.

HOME PRICES.		PRICES ABROAD.	
	Per 100 superficial feet.		Per 100 superficial feet.
1st class timbers, from ..	12s. to 21s.	1st class timbers, from ..	£3 10s. to £8 0s.
2nd " " " ..	7s. " 15s.	2nd " " " ..	£2 10s. " £3 10s.
3rd " " " ..	7s. " 15s.	3rd " " " ..	£2 0s. " £2 10s.

The prompt success of our timber export trade in Europe will mainly depend on proper discrimination as to the individual adaptability of the wood, and when its reputation is well established, there would be no fear of any diminution of the demand for it, nor of unsuccessful competition with identical timbers from any other parts of the world.

Although the merits of the Dunedin experiments cannot be contested, they may not be found of much advantage for the purpose of establishing abroad the reputation of New Zealand timbers. Experiments, to have the effect of comparing the intrinsic value of our timbers with that of any standard wood abroad, should be made in the country where a good market is expected to be found.

The difficulty to be encountered abroad for the sale of our forest produce will be this: The timber merchant may well admit the superior value of our timbers, and at the same time refrain from giving orders for it, on the ground that he has his own stock to dispose of; that he has no demand for rimu or puriri, and that he cannot undertake to make a reputation, and thus create a demand, for unknown timbers. The same objections will be repeated at every wholesale house where the timber may be offered for sale. Another side of the question is that, in order to secure its full success, the exportation of New Zealand timber should be undertaken on a large scale.

In France, a means may be found for at once establishing, on an indisputable ground, the reputation of New Zealand timbers. The "*Conservatoire des Arts et Métiers*," at Paris, is a public institution of great European renown. Science, in its application to the industrial arts and agriculture, is there demonstrated by eminent professors. The establishment possesses an ample supply of apparatus and machinery of all kinds, water and steam power, etc., intended for the purpose of testing the merits or properties of any new process or natural product having a character of general interest,

The monthly *Gazette* of the institution affords publicity to the experiments, and these reports have a considerable importance (scientific and commercial) as having the sanction of unquestionable authority. Here the intervention of the Government of the colony may be required; for we do not know how far the request of private individuals, for such a purpose, might be liable to objection. But, if presented by the Government, the request, bearing a character of general interest, would be granted at once. The experiments at the "*Conservatoire*" having thus been promoted through Government action, all surrounding details should be carefully attended to by the Government agent, or, as it may be, by the representative of any intended colonial company, who would have the official reports of the experiments inserted in the leading journals, as well as in the press specially devoted to the timber trade, taking such an opportunity for making special mention of our ornamental woods. Then the time would come for obtaining large orders from Governments, railway companies, etc., likewise for taking orders from well-known houses for our ornamental and furniture woods, and the effect of the experiments would reflect favourably on all classes of New Zealand timbers.

Some difficulties, however, more apparent than real, may also be encountered here. There is an insuperable connection between the forest question itself and the timber exports. Thus, by introducing a systematic management of the public forests, the Government would show a due appreciation of the value of that portion of the natural riches of the colony, thereby stimulating private enterprise as regards the exportation of our timbers to Europe, also helping in the matter so far as Government action may go.

Considered solely from a financial point of view, the forest question in New Zealand will show to any competent person giving attention to it, that within a period of, say ten or fifteen years hence, a permanent State revenue, to the amount of from £3,000,000 to £4,000,000, should be derivable from the State forests, and that meanwhile capital, to about the same amount, would come yearly from abroad, as money derived from the timber exports.

The magnitude of the interests involved in the forest question in this colony comprehends many important points which will have to be elucidated by official investigation in order to enlist public confidence, which will lead to practical results. So far as the conservation of the forests is concerned, the subject has already been treated in the New Zealand Parliament with a remarkable display of talent and patriotism.

In 1868, the Parliamentary debates assumed a character of the highest interest. The motion of Mr. Potts, relative to the conservation of the forests of the colony, received its full development on the part of the pro-

moter himself, and was supported by distinguished members of the House. The information and suggestions contributed on the occasion by the speeches of Messrs. Travers, Stafford, O'Neill, and others, still bear the same force of argument at the present time.

In 1870, the forest question sprang up in the Select Committee on Colonial Industries. Men of science were called in and interrogated. In his reply to Mr. O'Neill, Dr. Hector, in a few words, threw a vivid light on the whole subject. He said:—

“The rapid destruction of the native forests I consider to be most wasteful, and as having the effect of rapidly reducing the natural resources of the country. It is not at all necessary that the forest should be completely removed in the way that it usually is, either for the purpose of agricultural settlement, or the obtaining of timber for mills, firewood, or fencing. The thinnings of the forest would be ample in most cases to supply all the latter wants. By carelessly opening up tracts of forest, and especially by the firing of dead forests, the young growth of trees which comes up to supply the place of the trees that are removed is wholly arrested, and in a short time the air and sun dry up the surface soil of good quality, which characterizes freshly-cleared bush-land, and it is washed away by the rains.” * * *

In 1873, Mr. O'Neill moved “That, in the opinion of this House, it is expedient that proper steps be taken for the conservation of the forests throughout the colony, with which view it is resolved that a respectful address be transmitted to his Excellency the Governor, requesting that he may be pleased to appoint a Royal Commission to inquire into and report upon the State forests and the best means for securing their conservation.”

Sir D. Maclean said: “This subject appeared to have been well considered by the honourable member * * * but all the Government could promise was to look into the matter during the recess, with the view of introducing a bill next session.”

In 1874 the State Forests Act was passed, but its provisions as to the fund intended for the administration of the State forests have since been rescinded.

Since then the forest agitation has subsided, but the extermination of forests by fire and axe has not ceased. Meanwhile the Public Works policy has been developed, extensive lines of railways have already been completed, others are in progress of construction, many more will be asked for, and under all circumstances the Colonial Treasurer will be entitled to look to the proper management of the State forests as an important and hitherto untouched source of revenue.
