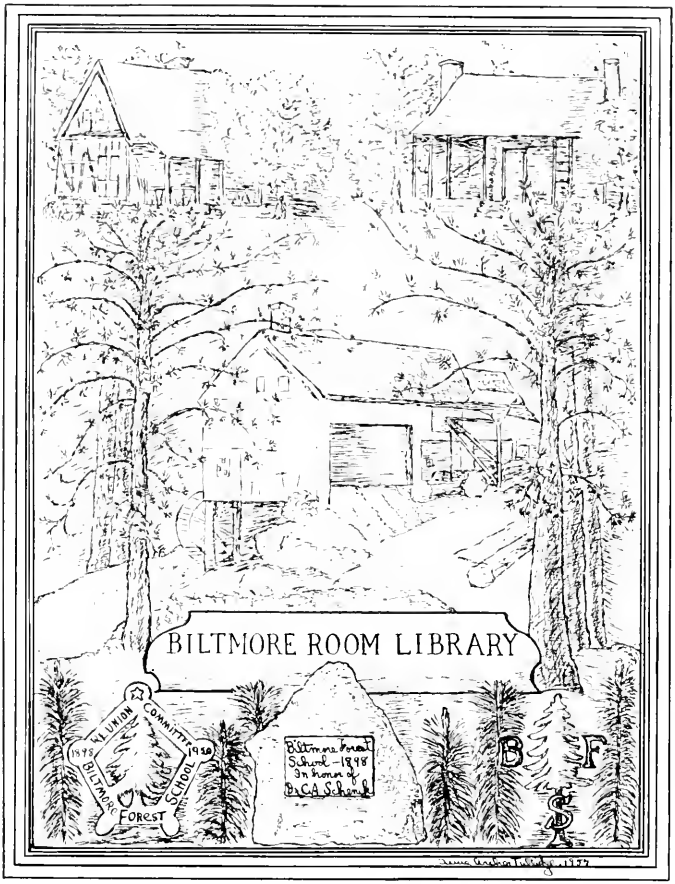
C. A. SCHENCK

FOREST POLICY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Biltmore Forest School

FOREST POLICY

By

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PREFACE.

No-where more than in the United States is all public policy meant to be dictated by the people. For the benefit of the people and for the benefit of American forestry, a handbook might come in good stead giving the principles and the effects of a truly American forest policy.

The present treatise, the contents of which are tabulated on pages 8, 9 and 10, does not pretend to fill the place of a comprehensive handbook: It is intended, primarily, for the use of the students attending the Biltmore Forest School; it forms the last part of an "encyclopedic textbook of forestry" (comprising silviculture, utilization, finance, mensuration and working plans) written by the author since 1898 on behalf of the Biltmore Forest School.

Forest policy, as a science, covers so vast a field that the lecturer, in an endeavor to present the various parts of his topic in a properly balanced form, must draw upon a large variety of sources. The necessity of borrowing the other man's knowledge has caused, without a doubt, a number of errors to creep into the pages here submitted. The author will be particularly grateful for suggestions and corrections coming from a kind reader.

C. A. SCHENCK.

Biltmore Forest School,
March 1911.

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I. INTRODUCTION INTO FOREST POLICY.

PARAGRAPH I.

WHAT IS FORESTRY?

What is Forestry? Public opinion identifies the term "forestry" in the prairies with tree-planting, in the east with conservative lumbering, in the city parks with landscape work. There exists, indeed, a mix-up of opinions with reference to the meaning of forestry in the minds of even the most enlightened.

The "Century Dictionary" defines forestry as "the art of forming or of cultivating timber, or the management of growing timber."

Dr. B. E. Fernow, in Bulletin No. 5 of the Division of Forestry claims for forestry in a wooded country a two-fold object, viz., firstly to produce and reproduce certain useful material; and secondly to sustain or possibly improve certain advantageous natural conditions.

Gifford Pinchot, in "Encyclopaedia Americana," defines forestry as "the art of using the forest continuously for the good of man."

In Chap. I of the 2nd. part of his "Primer of Forestry," Gifford Pinchot states: "Forest management and conservative lumbering are other names for practical forestry. Under whatever name it may be known, practical forestry means both the use and the preservation of the forest."

Henry S. Graves, in the "Review of Reviews," April 1910, defines forestry as: "The control of Nature's powers by man for his own good."

Theodore Roosevelt defines forestry as "the preservation of the forests by wise usage."

Sir William Schlich, in the introduction to vol. 1 of "A Manual of Forestry," gives as the task of forestry the following:

> "To ascertain the principles according to which forests shall be managed (Forest Science), and to apply these principles to the treatment of forests (Practical Forestry)."

R. Hess, in his "Encyclopaedia of Forestry," vol. 1, p. 9, states:

> "By forestry is understood the sum total of all activities having reference to the most opportune treatment and to the continuous utilisation of woods, with due regard to the local purposes of their owners."

A. Parade in "Cours elementaire de Culture des Bois" begins his introduction by:—

> "Forestry comprises the sum-total of all knowledge required for the best administration of the forests, with due regard to the interests of the owners in particular, and to the interests of the commonweal in general."

It appears from these definitions that forestry is understood, by the majority of its advocates, to be a business of a somewhat socialistic tendency. Whilst all other business is conducted primarily for the benefit of the owner, the business of forestry is expected to re-act beneficially upon the welfare of the country. Forestry failing to subserve the commonweal, would cease to be forestry,—in the minds of its advocates; or else would be decried by them as "bad forestry."

Can an analogous observation be made with reference to the management of farms or mines or railroads?

Neither agriculture nor mining are expected, a priori, to use the soil for the benefit of the commonweal. Why, then, should forestry mean, necessarily, the use of the forest, or the management of the forest for the benefit of the commonweal? Railroads, on the other hand, being public carriers working under public charters, are indeed expected to subserve the public.

If "forest companies" were chartered—with privileges analogous to those of the railroads,—the public could and should demand of them such conduct in the management of the forests

as would subserve the interests of the commonweal. Where, and as long as, the forests are owned privately, like farms and mines, forestry is and must be a private business, like farming and mining.

Looking at forestry from a broader point of view, it might be well to distinguish between constructive forestry, destructive forestry and conservative forestry.

Constructive forestry is that forestry which increases the assets at hand in the woods.

Destructive forestry is that forestry which decreases the assets at hand in the woods.

Conservative forestry is that forestry which retains the assets at hand in the woods.

The term "assets" might be understood either as a given quantity of wood or timber, or else as a given amount of dollars and cents invested in the woods.

Whether or not forestry as practised by a given owner is good or bad forestry,—that is a matter for discussion and usually a matter of personal opinion. Many are the cases abroad and in this country, in which destructive forestry is superior to conservative forestry, even from the stand-point of the commonweal.

Forestry of a truly conservative type,—id est forestry retaining exactly the original assets—is not found anywhere in the world.

Forestry as practised on the holdings of the various German states has been constructive forestry.

It might be wise to define forestry somewhat more broadly than has been done heretofore: "Forestry comprises any and all activity the object of which is woodland." This definition covers prairieplanting, lumbering, private forestry, government forestry, "good" forestry and "bad" forestry.

Like jurisprudence, engineering, and agriculture, forestry is both science and practice.

The science of forestry is based on a large number of elementary sciences, which might be arranged, together with forestry, in the following schedule:

A. NATURAL SCIENCES	B. FORESTRY PROPER	C. SOCIAL SCIENCES
I. Explanatory Mathematics Physics Mechanics Chemistry	I. Private Forestry a. Production of wood goods: Silviculture Protection Utilization Technology. b. Management of the producing factors: Working plans Administration Mensuration Finance Forest surveying	I. Law
II. Descriptive Zoology Botany Mineralogy Geology	II. Public Forestry a. Forest policy b. Forest criminal law	II. Sociology III. Economics

Natural sciences deal with the phenomena of nature.

Social sciences deal with the phenomena (institutions) of mankind.

Scientific forestry deals (like scientific agriculture) with the influence of mankind on nature.

Some of the best foresters have denied, quite recently, the claim of forestry to rank as a science.

What we know about the trees in the forest is—that is the claim—not forestry; it is merely a certain part of botany; and scientific forestry cannot, of course, cover what is already covered by scientific botany.

The functions of the State with reference to the forests cannot be forestry; and a systematized knowledge concerning these functions cannot be scientific forestry.

The functions of the State are dealt with in the science of sociology; and it would be folly for scientific forestry, as a public function, to overlap sociology. Thus it seems—that is the claim—that there is no such thing as the science of forestry, on the one hand owing to a lack of really specific contents, on the other hand, owing to a lack of a systematized knowledge covering the interdependence of man and forest. It must be admitted that the condition of scientific affairs in other branches of technical activity and of scientific development are far ahead of those at hand to-day in forestry.

In chemistry, mechanics, physics, and so on, the practitioner works not according to a set of rules empirically developed, but according to actual laws, exploiting nature's powers on the basis of a systematic knowledge of those powers, and on the basis of a thorough understanding of the inter-relation existing between cause and effect.

PARAGRAPH II.

PURPOSE AT STAKE IN PRIVATE AND IN GOVERNMENT FORESTRY.

That forestry is best which best complies with the desire of the owner of the forest (Schlich).

This desire may be:

A. The desire of the private owner:

1. To earn money (from sale of timber, pasture, fruit, bark, naval stores, minerals, etc.).
   (Financial forestry.)
2. To enjoy sport.
   (Game preserves.)
3. To enjoy and enhance the beauty of the forest.
   (Park forestry.)

Obviously, financial forestry holds the leading position with the private owner. Park forestry is practised, on a small scale, by municipalities and by wealthy men.

In all three cases, we might distinguish between forestry in existing woodlands and forestry on soil now lying bare.

B. The desire of the commonweal:

1. To conserve or obtain natural blessings supplied or supposed to be supplied by the forest:
   (a) Water supply (for drink, irrigation, navigation, etc.).
   (b) Public health.
   (c) Moderation of temperature.
   (d) Preservation of humidity.
   (e) Rainfall.
2. To prevent calamities:
   (f) Excessive erosion and destructive floods.
   (g) Damage by avalanches, sand shifts, snow drifts, and rough winds.

3. To conserve or obtain national resources:
   (h) Lumber industry, pulp and fibre industry, and other wood consuming industries.
   (i) Productiveness of native soil.
   (j) Navigation; water powers.
   (k) Fuel supply.

The desire of the private owner conflicts frequently with the desire of the commonweal.

The individual owner wants to use the forest to its utmost capacity for his individual purposes; the public, on the other hand, frequently wants the forest left to nature, since the beneficial influences of the forest (a to g, also j) are supposed to be best obtained from natural forests.

A coppice forest is supposed to exercise a small influence on the blessings derivable from the woods.

PARAGRAPH III.

DEFINITION OF FOREST POLICY

Forest policy, as a science, has to deal with the rôle played by the forests and by forestry within the economic system of a commonwealth.

It is evident that many writers on forestry identify the definitions of "forest policy" and of "forestry in general"; forgetting entirely that forest policy is a part—and a relatively small part of forestry, whether it be considered as a science, or whether it be considered as an art or practice.

Forest policy, as an art or practice, is that part of all governmental activity which has the forests and forestry for an object.

SYNOPSIS OF CONTENTS BY PARAGRAPHS.

I. INTRODUCTION INTO FOREST POLICY.

II. THE FOUNDATION OF FOREST POLICY.

CHAPTER I. — CHARACTERISTIC FEATURES OF FORESTRY.

VI. GOVERNMENT FORESTRY IN GOVERNMENT FORESTS.

VII. FOREST POLITICAL MISCELLANY.

THE FOUNDATIONS OF FOREST POLICY.

PARAGRAPH IV.

GENERAL CONSIDERATIONS.

Many are the writers on forestry and on conservation who have claimed that a country losing its forests loses its prosperity incidentally.

Attention has been drawn to the change of economic conditions brought about in the course of many centuries, allegedly through deforestation in Mesopotamia, Palestine, Asia Minor, Egypt, Greece, Italy, and Spain. All these countries, once—to judge from historic records—the leading countries of human civilisation, have been on the decline for centuries after reaching, many centuries ago, the culminating point of prosperity.

Can it be true that destruction of the forest has brought about national and economic decrepitude? Can it be true that the influence of the forest on national health and on economic conditions, on the rivers and streams, on climate—and hence on crops—on navigation, and on irrigation is such as to hinge the conservation of a nation's prosperity on the conservation of a nation's forests?

The answer to the question must be, necessarily, a personal one: an answer of personal opinion. The historian will affirm that, without a doubt, many causes have contributed to the decrepitude of the ancient and modern countries enumerated. The climatologist is ready to prove that the influence on the climate exercised by the forest is, on the whole, a small influence.

In all probability the destruction of the forests of a given country has rather been a sign of economic decrepitude than a cause of it.

There are, indeed, many exceptions to the rule, the most distinguished exception being that of Great Britain and Ireland, where the forests have been neglected and badly destroyed for

centuries; and, where, nevertheless, the resources of the country, mental, physical, and natural, have been wonderfully preserved.

It has been stated frequently that 25 per cent of the surface of a country should be kept under forest, so as to safeguard the many blessings derivable from the forest. If a climate is favorably influenced by the forest, it is obvious that a country having a poor climate should have a larger forest area, relatively speaking, than another country enjoying a climate favorable to agriculture, to health and to wealth. Thus it is that a continental climate, with its extremes of heat and cold, requires theoretically the presence of a larger percentage of forest than does the maritime climate.

Unfortunately the maritime climate, which does not require forest blessings, is more favorable to the production of forests than is the continental climate.

Naturally, the percentage of a country devoted to forestry is affected also by the density of the population, by the configuration of the country, and above all, by the possibility of agricultural pursuits.

Forestry is a business which suffers from many drawbacks (see paras. IX and X). As a consequence the investor is usually averse to embarking on it. In the various European countries, paternal and strong-handed governments have enforced the conservation of the forests,—sometimes at the expense, and against the will of the owners,—for many centuries. Many a state government has held responsible for the conservation of the forests within the state (for the benefit of the commonweal) those unfortunate individuals or corporations who have happened to be the owners of the forests.

In modern states, such forcible compulsion of the few, at their own expense, for the benefit of the many, is apt to be impossible.

In modern states, two courses are open to a far-sighted government, taking its providential duties seriously, namely:

Either to offer such definite inducements to the various owners as will induce them to practise forestry of a desirable type; or to buy up forest land and forests, on public account, and to undertake forestry socialistically, on the people's account.

Forestry will flourish best, without a doubt, in those states in which both these systems are being adopted.

In America, one of the leading questions before the public is the extent to which the federal government should be a forest owner within the individual states. It is obvious that the state of New York would resent the establishment by the federal government of a huge national forest in the Adirondacks. The western states, like Wyoming or Washington, have the natural desire to exercise their rights of eminent domain over the entirety of the state; and are opposed to any federal control of the forests found within the limits of the state as much as the state of New York would be opposed to such control. The question in America is not, it seems, a question of private forestry versus public forestry: it is a question rather, for the time being, of state forestry versus national forestry.

PARAGRAPH V.

ABSOLUTE FOREST LAND.

Forestry is one of the three soil industries (agriculture in its largest sense, mining in its largest sense, forestry in its largest sense). The soil industries dealing merely with the surface of the soil might be arranged, according to the intensity of labor required in their performance, in the following schedule:

Ranching
Sylviculture
Hay raising
Production of Cereals
Orcharding
Truck-farming.

Everyone will admit that, in the long run, "every square foot of national soil should be devoted uninterruptedly to that production under which it pays best." This demand should form a plank in our national platforms invariably.

Soil on which forestry promises to be the most remunerative pursuit in the long run is called "absolute forest soil." The designation of soil as "absolute forest soil" is influenced by the following factors:

I. ECONOMICS

(a) transportation facilities
(b) prevalence of forest fires
(c) forest taxation.

II. CLIMATE

(a) prevalence of fevers
(b) shortness of period of vegetation
(c) prevalence of excessive summer-rains

III. GEOLOGY

(a) steepness of slopes
(b) rockiness of soil
(c) sandiness of soil
(d) swampy conditions of soil
(e) frequency of inundations

IV. POPULATION

(a) density of population
(b) energy or working capacity of the workmen

There is no reason to complain of the disappearance of the forest from "absolute farm soil." Complaints are being made, however, everywhere, and by everybody, the former owners included, that huge stretches of absolute forest land, once stocked with primeval forest, have become unproductive. Here the question arises: Is, or was the primeval forest productive? Is not the land from which the primeval forest has been cleared as idle to-day as the primeval forest would be if it had remained? Is not in the primeval forest the annual production of wood exactly offset by the annual decay of wood?

PARAGRAPH VI.

LAW OF SUPPLY AND DEMAND.

The law of supply and demand does not hold good in constructive forestry.

Wood is the only commodity used by mankind the production of which requires not years but decades of years. A high price of timber will improve the remunerativeness of constructive forestry only at a time at which the mature forests are nearly exhausted. Can we expect that the high price of the commodity will stimulate its production at that time? The production of timber requires from 40 to 50 years at the very least. Will private enterprise fill a gap in the supply, invited by high prices when 40 or 50 years would be required to fill it? The history of the Mediterranean countries, and also of England seems to prove that the gap in the local timber supply is never filled by private enterprise, in spite of the stimulus afforded by the high prices of wood goods.

The law of supply and demand, in other words, is apt to fail in the case of constructive forestry.

A soil bare of forests, or kept bare of forests for a long time resists afforestation. The removal of the forest invites a complication of natural phenomena not fully understood by man, a complication antagonistic to the forester attempting to afforest.

In addition, the present generation dislikes to carry a heavy burden for the benefit merely of succeeding generations.

PARAGRAPH VII.

RATE OF REVENUE.

The merits of forestry depend on the rate of revenue obtainable from it. If it is admitted that forestry is a business, it must be further admitted that forestry is at its best when it yields the best ratio between net returns and investments.

In the long run, the rate of revenue obtainable from conservative forestry is a small one.

The rate of revenue can range high, however, temporarily and locally, at a time at which the valuation of the forests—for economic reasons, and not owing to the growth of timber—increases at a rapid rate.

A high price of stumpage does not involve a high rate of revenue; since the charges of interest against an investment made in high-priced stumpage tend to counter-balance the surplus returns from high-priced stumpage.

The rate of interest in forestry is low, particularly, when stumpage prices are on the decline; it is high, particularly, when stumpage prices are on the increase.

When the price of stumpage remains constant, the rate of interest obtainable from conservative forestry is influenced strongly by the length of the rotation, decreasing with the increasing length of the rotation. It is further influenced decisively by local taxation, by the expense required for protection from fire, and so on. The following tabular statement illustrates the interdependence between the length of the rotation and the rate of interest obtained in conservative forestry.

Note. The term "Tax" here includes expense of administration, protection, and other annually running expenses. The tax is assumed to be independent from the amount of stumpage standing. The data of growing stock and yield are taken from G. Pinchot's yield tables for white pine, second quality.

Length of Rotation	Value of Bare Soil	Value of Growing Crop			Total value per acre	Annual Yield per acre	Revenue less 20 c Tax	Gross Interest without Tax	Interest with Tax
60 yrs.	2.	1200′ x	$ 4.	$ 4.80	$ 6.80	90′ b. m. at $ 5. = $ .45	.25	6.6 %	3.7 %
80 yrs.	2.	3500′ x	4.50	15.75	17.75	150′ b. m. at 6. = .90	.70	5.1 "	4.0 "
100 yrs.	2.	6180′ x	5.	30.90	32.90	185′ b. m. at 7. = 1.30	1.10	4.0 "	3.3 "
120 yrs.	2.	9000′ z	5.50	49.50	51.50	205′ b. m. at 8. = 1.65	1.45	3.2 "	2.6 "
140 yrs.	2.	11800′ x	6.	70.80	72.80	215′ b. m. at 9. = 1.95	1.75	2.6 "	2.4 "

It is evident that the rate of interest in conservative forestry —assuming stumpage values to remain constant—is low, and much lower than the rate of revenue obtainable from other investments now-a-days in the United States.

The chances for a remunerative outcome in conservative forestry are increased wonderfully where there exists the possibility of finding, in the near future, a market for small timber and wood obtained by way of thinnings.

By means of thinnings may be obtained, from time to time, a surplus revenue, off-setting the interest charges and expenses which have accrued against the investment from the time of the last cut.

The rate of revenue in conservative forestry must remain small, in the long run, for this general reason: Whenever an investment that cannot be duplicated readily yields an increasing revenue, the value of the investment itself is advanced immediately at a rate proportioned to that at which the revenue has increased. To illustrate: A given forest, conservatively treated, was yielding, in 1890, a net revenue of one dollar per acre per year. The forest was sold at that time at 50 dollars per acre. In 1910, the same forest was yielding an annual net revenue of 2 dollars per acre. Its value is now estimated to be 100 dollars per acre. Obviously the surplus dividend obtained by the owner has not been as low as 2 per cent. The cash dividend was 2 per cent indeed; there has been added to the principal, however, a latent dividend, developing the original investment of 50 dollars per acre, in the course of twenty years, into a present investment of 100 dollars per acre.

The nominal rate of interest derivable from any investment must be considered as the resultant of the following factors.

Firstly, the true normal earning power of capital.

Secondly, a premium for risks taken by the investor, which might be considered as a sum making up for the average losses of the investor, or as capital silently refunded to the investor under the mask of a dividend.

Thirdly, a component making up for the declining power of gold to purchase.

The state forests in Saxony, which are managed on financial principles, are divided into approximately 100 ranges, each range

comprising approximately four thousand acres. The investment per acre amounts to approximately 235 dollars. The net returns per acre approximate 6 dollars and 18 cents.

It appears that the rate of revenue obtained from these famous forests—famous for their financial efficiency—amounts to 2.63 per cent only (net cash surplus dividend). It also appears, on the other hand, by the testimony of records which have been kept in Saxony for almost a hundred years, that the forests have risen in value at an average rate of 2 per cent per annum.

PARAGRAPH VIII.

ADVANTAGE OF INVESTMENTS IN CONSERVATIVE FORESTRY.

It is true that storms, drought, insects, and man endanger the forest more than they do agriculture, in as much as agriculture exposes the crop of one year only, whilst forestry must expose the crop of many a year to such dangers. Statistics show, however, that only a very slight percentage of the forests conservatively handled are visited by disasters; on the annual average .005 per cent. If a mature forest is destroyed by some calamity, as a rule very little is lost provided that the dead timber can be made into money at once. If a young forest is killed by fire, fungi, or insects, little is lost, since young growth has little value.

Agriculture must sell its product, even if prices are low; in the forest, harvests may be restricted during years of a depressed market.

The following points are noteworthy especially:

1. Safety of capital—provided fires are kept in check: Forest property has maintained the standing and the wealth of many families for many centuries better than any other property. Its value can never decline.

"The forest is safer than a safe." Much larger fortunes have been made, in America, by forest owners than by sawmill owners.

2. Safety of revenue: The forest once established *must* grow, as sure as the sunshines, the wind blows, and the rain falls; for sunshine, air, and water are the main components of wood fibre. Growth is, in conservative forestry, the making of revenue. Revenue may be left added to the principal, if the owner so desires, for an indefinite number of years.

3. To the capitalist loving nature, no investment can offer greater attractions than does forestry. As a gentleman's out-of-door business, forestry is unique. In all countries, democratic or otherwise, owners of forestal estates occupy an enviable social and political position.

PARAGRAPH IX.

CLUMSINESS OF FOREST INVESTMENTS.

Forest investments are clumsy, unwieldy, bulky, and difficult to handle, for the following reasons:

1. It is difficult to buy or sell forests. Quick minded speculation is impossible. Valuation of forests is time-taking, expensive, difficult. No two forests are alike; hence no valuation by analogy is possible. Forest stock companies, the shares of which might be sold more readily, do not exist.

2. Mortgages on forests offer little security, and can be obtained, consequently only at a high rate of interest.

3. Division amongst heirs is difficult.

4. It is difficult for the owner to prevent fraud by managers, foresters, or rangers.

5. An undeveloped forest yields an irregular revenue only. The development of a forest consumes more time than does the development of any other investment.

6. Large areas are required (excepting wood-lots on farms). The owner is forced to place much money on one card.

PARAGRAPH X.

IMPEDIMENTS TO CONSERVATIVE FORESTRY IN THE UNITED STATES.

The greatest impediments peculiar to conservative forestry in the United States are:—

1. The imminent danger of forest fires. This danger is particularly great in the United States owing to the long periods of drought frequently met with; owing to the accumulation of débris prior to and after logging; owing to the insufficiency of a country police; owing to the habits of the people.

It is quite true that a forest containing mature timber cannot be killed by fire any worse than it is killed by the lumberman's saw or axe. The cases are rare in which a mature forest is actually consumed by the flames; so that, usually, the trees merely killed by the flames are good for logging, and for the production of lumber, provided only that there are at hand means of transportation by which the logs can be conveyed from the burned woods to the saw-mills.

In the case of second growth, and notably in the case of planted forests, the danger from fire is extreme. With young second growth forests, the salvage obtainable from the woods after burning amounts, in Europe as well as in America, to practically nothing.

Contributory to the great danger by fires is the land policy of the United States, under which, on the average, 160 acres were sold in separate holdings to different parties, with the result that large and solid pieces of timber-land [which can be protected by their owners] form the exception rather than the rule in the United States.

In Central Europe, no investment is considered so safe as an investment in timber. It is in Central Europe alone that conservative forestry has been practised and is being practised to-day.

2. The American method of taxation, which levies a tax from the value of a taxable object, instead of levying it from the revenue derived therefrom.

The detrimental influence of forest taxation is shown in Schenck's "Forest Finance," paragraph V.

The younger the forest is, the greater is the deterrent to conservation involved in forest taxes.

3. Experience in conservative forestry, financial statistics, and object lessons exhibiting the possibilities of conservative forestry are lacking in the U. S. The owners of timber-land are at a loss to guess at the probable returns obtainable from a second growth.

4. Conservative forestry, in Germany now-a-days, does not require as much managerial skill as does the introduction of conservative forestry in the primeval woods of Hungary, India, or Russia, and also of the United States. The owner of timber-land, not knowing what to do, may be excused for doing nothing towards the establishment of a second growth out of a first growth.

5. The owner of forest lands in Central Germany obtains from an acre of forest, at the time of the final cut, as many as 500 or 600 dollars. Under these conditions he can readily set aside for afforestation a sum of ten to twenty dollars per acre.

The American owner does not clear, in many a case, so much money from a first growth on the average acre as will be required for the establishment of a complete second growth. In agriculture no one will raise a crop when the crop is unable to cover the cost of replanting; no one will raise wheat when it is worth 30 cents a bushel, or cotton when it is worth 4 cents a pound. Why should the owner of forests raise timber as long as the stumpage value is low; as long as he is selling stumpage at a price smaller than that at which such stumpage can be reproduced? Constructive forestry and a low price of stumpage are incompatible: the advocates of forestry should be advocates invariably of high-priced lumber, or rather of high-priced stumpage.

6. Conservative logging is more expensive than destructive logging. As a consequence, a smaller margin is left to the conservative operator during dull years of trade; the competition

between the various manufacturers is so keen, to the detriment of lumber prices, as not to allow of any increase in the logging expenses, incurred for the benefit of a second cut on the same grounds.

7. The American lumber market is continuously overstocked —comparatively speaking. The per capita production of lumber in America is from ten to fifteen times larger than the per capita production of lumber in European countries practising conservative forestry. It is through "combinations in restraint of trade" that the price of lumber is being maintained all over Germany. The various state governments, being timber owners, are parties to these compacts which would be considered illegal in the United States.

If we desire to produce in the United States the same state of affairs with regard to the production of lumber, we shall be obliged to allow or rather to create combinations similar to those existing in the old country.

Many are the cases in which European Governments force the owners of woodlands to cut no more timber than the equivalent of the annual growth. In most of the American states, any combination of capitalists agreeing to cut no more timber than the forests are producing annually would come in conflict with the anti-trust laws.

8. Uncertainty of tariff laws.

We are in the habit of comforting ourselves in America, in view of the waning timber supply, with the idea that timber may be imported from Canada and from Mexico when our supplies are exhausted.

Granting that such importation is possible: What inducement exists for the owner of timber land to produce at a great expense what can be imported, with the present rates of cheap transportation, from foreign countries? The agitation of the newspapers against the tariff on lumber, and against a tariff on wood pulp and chemical fibre is well-known; and the party platforms in 1908 contained a plank favorable to a reduction of the tariff on many wood goods.

Whilst the tariff is not very high, the general anxiety to set it aside can be interpreted by the owners of wood goods or of forests only as a deterrent from investments in conservative for-

estry. The certainty of a high tariff to remain for a long time would be an inducement, without a doubt, towards investments in conservative forestry.

9. In the United States is absent the minute net-work of public roads and of railroads which forms, in Germany and in France, the means of ready access to the woods. The cheap transportation of wood goods results in a high value of prospective forests.

10. Forestry productive of timber is possible only on large holdings. The American land policy has been, as far as the public lands are concerned, a policy made to order for the farmer, supplying him with 160 acre lots. The land requirements of forestry have never been considered. Farm woodlands of small size can never solve the forestry problems of the United States.

11. Forestry requires, besides investments in soil and in timber, a large number of other investments: notably investments for transportation, for milling, and that like. In the old country, these additional investments form, stumpage values being very high, a small percentage of the timber investment. In America stumpage values being low, the additional investments frequently require more of an outlay than the original investments made in soil and in timber.

12. Whenever a railroad or any other industrial enterprise requires additional capital it covers its requirements by an issue of bonds or by taking a mortgage on its property. Mortgages are not compatible with conservative forestry. Mortgages and bonds will force the owner, to the detriment of conservation, to cut heavily when the prices are low, so as to meet the requirements of the bondholders by a heavier cut. In addition, conservative forestry does not yield, usually, a rate of interest as high as that, or higher than that, at which mortgages or bonds may be placed.

13. Constructive forestry is easy; destructive forestry is easy: conservative forestry, however, holding the balance between constructive forestry and destructive forestry—that is to say removing from the forests exactly as much value per annum as it constructs in them—is very difficult to maintain. The majority of the owners, in Germany and elsewhere, actually do not know whether they are over-cutting or under-cutting their woodlands.

14. Rules of lumber inspection. The "inspection rules" in vogue for the grading of lumber in the United States are the cause of much waste in the woods. These inspection rules discriminate against "odd lengths" of lumber, and hence of logs; against the presence of sap, or of wane, or of knots; against taper and splits and so on. As a consequence, odd lengths are cut down in the woods or in the mills to even lengths; knots and splits and other defects are cut out and burned, together with large slices of good lumber next to the defect, whilst the rectangular shape of the board is being maintained. In the saw-mill, the sawyer, the edger, and the trimmer are hard at work to produce—not the largest possible output of boards, but the largest amount of money in the boards. Hence an enormous amount of waste in the saw-mill, and also in the woods, where the logs are cut to order so as to yield the maximum of value in the mill. Many a short log, many a knotty log, many a small log must be left in the woods under the present rules of lumber inspection, after the tree is cut.

These inspection rules are made, in the long run, not by the owner of the woodlands; they are made by the consuming public.

15. Freight rates. Whilst the freight rates on lumber in the United States are not high per ton per mile, they are high in the aggregate, owing to the fact that the forests are situated far from the points of consumption.

Unfortunately the freight rates are alike for the upper grades and for the lower grades of lumber, being the same for boards worth ten dollars and for boards worth a hundred dollars per 1000 feet, b. m. at the mill. Obviously a good grade of boards can stand the charge for transportation easily, whilst a poor grade of boards had best be left in the woods, in the log, or else at the mill. If the Interstate Commerce Commission, in cooperation with the railroads and the lumber associations, would revise the freight rates on lumber, so as to leave the total of freight charges unchanged, but so as to increase the freight charges on high-priced, and so as to reduce the freight charges on low-priced lumber,—the prospects of conservative forestry in the United States would be greatly subserved.

PARAGRAPH XI.

LABOR REQUIRED IN CONSERVATIVE FORESTRY.

On the whole, conservative forestry requires, in Germany, one-tenth only of the labor required, acre for acre, for farm land.

Fortunately forest labor fits in well with agricultural work, being performed usually during winter, at a time at which agricultural labor is unemployed.

In addition, many craftsmen like masons, carpenters and railroad hands are thrown out of employment during the winter months.

In many sections, the winter-cutting of trees is the rule; the loggers taking advantage of snow and ice, and of the spring freshets thereafter. Further, logs cut in winter are less apt to be damaged by fungi and insects than logs cut in summer.

According to Prussian statistics, there are employed in the Prussian state forests, on every 1,000 acres conservatively managed, 22 workmen working on 145 working-days on an average per annum.

The process of manufacture which agricultural products undergo: e. g. threshing and milling, is of a simple or of a somewhat uniform nature. It is different in the case of forestry; here quantities of different kinds of wood goods are being produced: and the industries depending on the forests exhibit more varied features than do the industries which refine agricultural products.

The cost of American labor employed in the woods is higher per hour than the cost of European labor.

It is an indisputable fact, however, that the effect of labor (= work done) in the woods, on the whole, is no more expensive in America than it is in Germany.

In Germany, as well as in America, ceteris paribus, the cutting, per cord of wood, costs from 75 cents to $1.25 (in the state forests of Germany, as much as $1.31 per cord). In Germany

and in America, the cutting of a thousand feet board measure of logs costs between 60 cents and a dollar. In the state forests of Hessen, the annual expense per acre incurred for salaries, logging, road-building and planting [id est spent on salaries and wages] amounts to $3.18, composed of:

cutting	$1.44
road making	.33
planting	.57
salaries of rangers and foresters	.84

In the same section of Germany, the wages have risen, in the decade between 1898 and 1907, by 30%.

Conservative forestry in Germany does not know of "logging camps"; the country of conservative forestry is so densely settled that the help for the forest is recruited from the settlement nearest the forest.

The American woodsman is more efficient than the German woodsman; and his earnings per day are much better, as a consequence, than those of the German.

The figures of the census relative to labor employed in American lumbercamps, sawmills and planing mills are as follows:

Census year	1900	1890	1880	1870	1860	1850
wage-earners, number . .	283.260	311.964	147.956	149.997	75.862	55.810
total wages . .	$ 103.741.166	$ 87.170.668				
average wages per employed . .	$ 394	$ 298	$ 214	$ 267	$ 284	$ 251

The Forest Service claims in circular No. 171 that the American industries which subsist wholly or mainly upon wood pay the wages of more than 1,500,000 men and women.

The "American Lumberman" estimates that the total number of wage-earners depending on the forest is not far from 750,000.

PARAGRAPH XII.

TRANSPORTATION IN FORESTRY.

All over the world, the success of a business enterprise depends on the charges made for the transportation of the commodities produced. Forestry is no exception to the rule: On the contrary, its products being bulky and heavy, selling per pound of weight at a low price, the profits of forestry are governed in a measure by the freight rates charged against the products of forestry.

The finest mahogany tree in Brazil has no value for the time being, unless it can be removed; the finest yellow poplar in western North Carolina had no value prior to the advent of the railroads. Inaccessible woods, now and for a long time to come beyond the reach of the lumberman, cannot be used for the production of timber: the only chance left being the use of such forests for the pasturage of sheep, cattle, and horses.

The farther remote from transportation a forest is, the more valuable per pound must be the produce derived from it; the larger is the waste, as a consequence, of inferior parts of trees in the woods, and of inferior parts of the boards at the mills.

Indeed, it might be stated that forestry is essentially a problem of transportation.

The main expense incurred when the trees are converted into commodities, to be conveyed to the hands of the consumers, consists of charges for transportation. The actual charge incurred for the manufacture of woodgoods is relatively small when compared with the expense incurred for the transportation of the log from the stump of the tree to the mill; for the transportation of the board from the mill to the yard, from the yard to the car, from the car to the depot at the consuming city, and thence to the shops of the consumer.

In the United States the distance between the lumber-producing forests and the lumber-consuming centres is becoming larger and larger, in the course of decades of years,—until, now-

a-days, the consuming centres obtain their hard woods as well as their soft woods from the very ends of the country, from the Pacific side and from the gulfcoast.

The cost of transportation from sections where the forests are left intact is so high as to minimise the value of stumpage. As a consequence, the reproduction of stumpage since it is considered of small value is financially undesirable.

In close proximity to the consuming centres, stumpage—if there were any left—would be high-priced indeed; here alone the reproduction of stumpage might pay; here, however, there is no stumpage left which, when removed, might net the owner a sum of money far in excess of the cost of afforestation, be it afforestation by nature or by man.

A. FREIGHT RATES ON LOGS AND LUMBER.

Freight rates on logs and lumber, in the interstate commerce of the United States, are subject to the approval of the Interstate Commerce Commission. Changes of freight rates must be published 30 days before the time at which they come into effect. The various railroads working one and the same section of the country are in the habit of combining into tariff unions, agreeing as to the freight rates on the various commodities, including lumber and other wood products, which they will charge.

On the whole, the freight rates on lumber are lower in the United States than they are in the old country. On the German railroads (state railroads), the charge for the movement of logs and lumber is, generally speaking, 5.7 cents per 100 miles and 100 lbs. This charge is reduced, in the case of logs in South Germany, to 5.1 cents, and further, in the case of certain Bavarian railroads having a water terminus, to 4.2 cents per 100 miles and 100 lbs.

The lowest rate charged by the German railroads is that charged for pulp wood, fuel wood, mine props, and railroad ties. Here, up to a distance of 220 miles, 4.2 cents are charged per 100 miles and 100 lbs. Beyond the limit of 220 miles, the rate is reduced to 2.8 cents.

The lowest rate on lumber made by European railroads seems to be the charge from Austria to Germany and France, which is reduced to less than 2 cents per 100 miles and 100 lbs. for

the avowed purpose of meeting the custom tariff of Germany and of France by a reduction of the freight on lumber exported into these countries.

On American railways there is no uniform rule whatsoever as to the charges (per 100 miles and 100 lbs.) made for the transportation of lumber and of articles taking lumber rates (boxes, paving blocks, pickets, piling, posts, shingles, spoke timber in the rough, cooperage stock, telegraph poles, railroad ties, waggon lumber in the rough). The rate for shipments in car-load lots is invariably reduced. The minimum weight shippel as "a car-load" is 24,000 lbs. (intra-state commerce), or 30,000 lbs., or 34,000 lbs., or 40,000 lbs. The tendency of the railroads is to increase the minimum weight of the "carload."

The actual freight rates vary per 100 miles and 100 lbs. between $1^1/_2$ cents (trans-continental shipments) and 5.8 cents (intra-state shipments). On an average the rates will approximate $3^1/_2$ cents per 100 miles per 100 lbs. Water competitive rates are usually reduced rates. On a number of eastern roads certain species (hemlock, gum, oak, cotton-wood, poplar) bear a lesser rate, the rate being reduced by 1 to 3 cents per 100 lbs. over a given distance.

Black walnut, cherry, cedar and tropical woods frequently take a rate per 100 lbs. increased by 3 cents over a given distance. The rate of yellow pine is sometimes higher and sometimes lower by 1 to 4 cents per 100 lbs. over a given distance. On the whole, the lowest freight rates in the East are those charged on shipments of hemlock, cotton wood, and gum. Special rates are sometimes granted also for spruce.

The cases are getting rare in which freight rates are charged, not per 100 lbs., but per 1000 feet board measure; or in which the minimum load of a car is given, not in pounds, but in feet board measure, or in cords.

Freight rates charged according to weight discriminate against the shipment of heavy kinds of lumber and logs (e. g. hickory or beech), favouring species of light specific gravity (e. g. white pine), and incidentally increase the stumpage value of the light species as compared with that of the heavy species. Freight rates charged per thousand feet facilitate the shipment of green lumber fresh from the saw-mill and of lumber in the rough.

The public desires lower rates of freight, whilst the railroads are eager to increase them, claiming that freight rates are the only "commodity" which, with the decreasing purchasing power of gold, and with the increase of wages, has not been increased simultaneously.

A general increase of all freight rates all over the United States by a given percentage—say by 10 per cent—would discriminate against shipments over long distances, and would favor, relatively and absolutely, the shipper and also the owner of woodlands close to the points of consumption.

An absolute increase of all freight rates by a fixed sum—say by 2 cents—would, on the other hand, favor the shipper far away from the point of consumption, and would discriminate against the shipper from points close to consumption.

Naturally, where the operating expenses of a railroad are high [in a broken country, and far from coal], the expense of freightage, and hence the freight rates are high,—higher than under the reversed conditions.

The Interstate Commerce Commission is now called upon to decide the so-called "tap line" cases; the cases of "car stake equipment", and so on.

Low freight rates have the tendency to increase the size of the various industrial enterprises, and to eliminate the small and weak establishments; they have the tendency to produce—by the elimination of the weaker producers—combinations of the strong ones; they have the tendency to kill home industries, and to favor the large factory; have the tendency to favor importation, notably, of raw material; have the tendency to decrease the cost of living.

The change of a freight rate gives, when it is locally increased, an undeserved blow to the local industries; when it is locally decreased, it gives an undeserved advantage to the producer.

B. STUMPAGE VALUES AND SOIL VALUES.

Suppose lumber is selling at 25 dollars per M. delivered to a given city. The lumber may come at the freight charge of 5 dollars per M. from a place at which it sells at 20 dollars f. o. b. cars; or it may come at the freight charge of 20 dollars from a place at which it sells f. o. b. cars at 5 dollars per M.

If the lumber weighs 2,500 lbs. per M. its f. o. b. price must be at points having:—

20	cents rate per 100 lbs.	$20.00
30	„ „ „ „ „	17.50
40	„ „ „ „ „	15.00
50	„ „ „ „ „	12.50
60	„ „ „ „ „	10.00

If the lumber is cut, logged, milled, and loaded on cars at 15 dollars per M. the stumpage from which the lumber is produced, has a value at points having:—

20	cents rate	$5.00 per M.
30	„ „	2.50 per M.
40	„ „	nothing per M.
50	„ „	—2.50 per M.
60	„ „	—5.00 per M.

The distance from the market for points having a

20	cents rate is about	600 miles.
30	„ „ „ „	1000 „
40	„ „ „ „	1300 „
50	„ „ „ „	1700 „
60	„ „ „ „	2000 „

It is obvious that, under the conditions described, lumber cannot be shipped over distances exceeding 1300 miles—unless its value in the market exceeds 25 dollars. Inferior lumber having a lesser value is doomed to become "mill cull."

We may distinguish between the various belts or zones encircling a consuming centre as follows:—

a zone	600	miles away	having stumpage values of $5.00
„	100	„ „	stumpage values of 2.50
„	1300	„ „	no stumpage values
„	1700	„ „	negative stumpage values: the

manufacturers losing $2.50 when converting stumpage into lumber.

Stumpage is most valuable in close proximity to the market; as a consequence it can be produced or grown best in such close proximity to the market; and can be produced or grown least at a distance far from the market.

In America, unfortunately, no stumpage is left, practically, close to the market, so that the owner cannot, when cutting the stumpage, set aside a part of the receipts for afforestation.

Far from the market, on the other hand, the value of the stumpage is often less than the cost at which a plantation might be started, be it by planting or by self-sown seed.

Far from the market, only such stumpage can be raised which commands a very high price in the market.

Such stumpage consists of valuable prime big trees,—trees of a character obtainable only by long rotations, and by investments extending over centuries rather than over decades of years.

Near the market, inferior lumber may be grown successfully. Such lumber can be produced in short rotations and by investments extending over fifty or a hundred years.

This must be so for another reason: the value of poor soil (like the value of stumpage and the value of any other commodity or any other producing factor) is larger near the market than far from the market. In conservative forestry, the charge for interest on soil value is particularly heavy. It accumulates against the value of the trees in a geometric ratio, as the years pass by.

In the case of long rotations on valuable soil, the accumulation of interest charges exceeds in the end the value of the timber.

Short rotations alone can stop the accumulation of the interest charges.

Under a fixed system of freight rates, there must exist, under otherwise equal conditions, a zone encircling a consuming centre, within which conservative and constructive forestry are the most remunerative; it is that zone at which the sum of the freight charges on wood goods plus the interest charges on soil values is at a minimum. Within this zone, destructive forestry is undertaken only on soil having a higher value—distinctly so —under agriculture than under forestry.

Since agricultural produce is more valuable, and can be shipped for longer distances than forest produce, the zone or the belt fit for conservative and constructive forestry is apt to lie in close proximity to the city—indeed just beyond the zone characterised by the truck farmer and the milkman.

In America, unfortunately, where stumpage is found in large quantities, it is low-priced, and, as a consequence, not worth reproducing; where stumpage would be high-priced, none is left to pay for its own rejuvenescence.

Conservative forestry is possible only where there is stumpage. Where there is none, constructive forestry, with its many disadvantages, is the only chance left.

C. DIFFERENTIATION OF STUMPAGE VALUES.

We have spoken thus far of stumpage values as if they were a unit within a given zone. Such is not the case: within a given zone stumpage values depend:

1. on the fixed charges connected with the production of lumber, and
2. on the percentage of the various grades of lumber obtainable from the stumpage.

ad 1. The fixed charges are:—

(a) expenses incurred for felling trees, cutting logs, swamping, and so on (about one dollar per thousand);

(b) expenses incurred for milling in the saw-mill (about one dollar to four dollars per thousand);

(c) expenses for logging from the stump to the mill (ranging between one dollar and ten dollars per thousand approximately).

The felling expenses given under (a) are not apt to be subject to heavy fluctuations.

The milling expenses given under (b) depend, notably, on the daily out-put of the mill. The out-put is governed, in its turn, by the quantity of stumpage economically tributory to the mill (small portable mills versus large stationary mills). The milling expense is smaller for big and soft logs than for hard and defective and small logs. Nevertheless, it can be considered, for a given set of conditions, to be a fixed and unalterable sum.

The logging expenses given under (c), on the other hand, are very variable: least variable where steam is used; most variable where animal labor is used for logging. The logging expense depends on:—

density of stand;
skidding distances;
roughness and configuration of logging grounds.

It appears that identical trees might show, in the same section of country, very large differences of stumpage values, depending on the three local factors just given.

ad 2. The percentage of lumber grades is dependent, to a large extent, on the diameter of the logs, the larger logs yielding a higher percentage of the upper grades than the smaller logs. It further depends on the straightness of the logs and on the defectiveness of the logs; also on the skill of sawyers, edgermen, and trimmermen; and, last but not least, on the rules of inspection governing each given timber species.

Trees, the logs of which yield a high percentage of firsts and seconds, or of upper grades, are trees of relatively high stumpage value.

Trees, the logs of which yield a large percentage of lower grades (cull, mill-cull, and scoots) are trees of a low stumpage value. Here, the expense incurred for the transportation of the logs is relatively high,—owing to the large amount of offal in the case of poor logs. The expense of milling is relatively high, in the case of poor logs, owing to the larger amount of handling which such logs and the lumber obtained from them require in the mill. The stumpage value of trees yielding a large percentage of poor lumber is apt to be negative, which means to say: such trees had best be left in the woods.

D. CONCLUSIONS.

1. The practising forester finds in forestry more of a problem of transportation than of sylviculture and of milling. In America, the largest item in the cost of forestal production is the expense of forestal transportation.

2. Ear from the market, a tree fit for lumbering must be a fine tree, yielding a small percentage of low-grade lumber.

3. The value of the trees must be condensed or concentrated into a minimum of weight at a mill situated in close proximity to the forest, particularly if the stumpage value of the trees is small. The wasting of top logs, stumps, slabs, edgings and trimmings is advisable where wasting pays better than saving.

4. Stumpage values decrease rapidly with increasing logging expenses, and with increasing outputs of cull lumber.

5. Where, and as long as the public means of transportation are deficient, the production of bye-products (e.g. naval stores, forest pasture, maple sugar) pays better than the production of timber.

PARAGRAPH XIII.

SOIL REQUIREMENTS IN FORESTRY.

The trees take from the soil a smaller amount of mineral matter than do the field crops.

In the field crops we remove from the farms a large amount of phosphates, nitrates, and potash, contained in the seeds (small grain, corn, and cotton). In the case of the forests, not the seeds of the trees, but the fibre is removed, which consists almost exclusively of carbo-hydrates.

What mineral food the trees may take from the soil is obtained from the lower rather than from the upper strata of soil.

The disintegration of the underlying rock may keep pace with the exhaustion by the trees of the inorganic matter in the soil.

Ebermeyer finds that the yearly growth of a forest takes from the soil 54% of the mineral substances which an ordinary field crop would require. 46% out of the 54% used by the trees is, however, restored to the ground when the leaves or needles are dropped, so that only 8% is actually converted into wood fibre. In other words: The forest withdraws from the soil by 12½ years growth as much fertility as does the farm crop in one year.

It is a well-known fact that trees can be grown on soil which is too poor for agriculture. The exhausted farms in the south are redeemed almost invariably by the re-establishment, spontaneously, of the woods.

The following tabular statement shows the requirements of inorganic matter, per acre per year, on the farm and in the forest:

Substance:	K_2O	Ca_2O	MgO	P_2O_5	SO_2	SiO_2
Farm:	78	43	17	28	11	37
Forest:	4	9	2	1.4	0.4	1.6

It should not be assumed, however, that the trees are insensitive to the quality of the soil: the contrary is the case.

Recent experiments by Dr. Vater (Tharandt) demonstrate the influence upon the growth of the trees, as exercised by a lack or an abundance of nitrates, phosphates, potash, and magnesia in the soil. The fact that the trees grow faster on good soil than on poor soil is readily understood. Rapidity of growth is, however, by no means an indication of quality of growth. In the long run, that soil alone can be claimed for forest production, on which such production pays a better dividend than the production of farm produce (including under this term cattle, sheep, and horses).

Every acre of soil should be devoted to the production under which it assumes the maximum of value. It is the poor soil rather than the rich, the rocky soil rather than the smooth, the steep slope rather than the gentle, the swampy land and the inundation district rather than the upland, on which tree production is apt to be found most remunerative.

PARAGRAPH XIV.

UTILITY OF THE FOREST.

The utility of the forest is two-fold:

First: Direct utility, or utility to the owner (money earned).

Second: Indirect utility, or utility to the commonweal (losses prevented).

The indirect utility of the forest has been and is in dispute among scientists.

The indirect value of the forest lies in:

(a) The influence of the forest on hygienic conditions (par. XV).

(b) The influence of the forest on temperature of soil and air (par. XVI).

(c) The influence of the forest on moisture conditions (par. XVII to XIX).

(d) The influence of the forest directed against the mechanical action of water, wind, avalanches, etc. (par. XX).

Historical data relative to the indirect utility of the forest must be read with care. The advocates of forestry have attributed to the forest the origin of all the good things which Heaven bestows on mankind.

Mr. Willis L. Moore, the Director of the Weather Bureau in the department of Agriculture, entertains views entirely at variance with those of leading foresters, geologists and civil engineers. These views are given in a report made by Mr. Moore to the Secretary of Agriculture, submitted in December 1909. Mr. Moore's deductions and final results are the following:—

"1. Any marked climatic changes that may have taken place are universal and not local, and are appreciable only when measured in geologic periods. Evidence is strong that the cutting away of forests has nothing to do with creating or augmenting droughts.

2. Precipitation controls forestation, but forestation has little or no effect upon precipitation.

3. Any local modifications of temperature and humidity caused by forest covering, buildings in cities etc. could not extend upward more than a few hundred feet, and in this stratum of air, saturation rarely occurs even during rainfall; whereas precipitation is the result of conditions that exist at such altitudes and on such a grand scale as not to be controlled or affected by the small thermal irregularities of the surface air.

4. During the period of accurate observations the amount of precipitation has not increased or decreased to an extent worthy of consideration.

5. Floods are caused by excessive precipitation, and the source of the precipitation over the central and eastern portions of the United States is the vapor borne by the warm southerly winds from the Gulf of Mexico and the south Atlantic Ocean. At times spring floods occur from the rapid melting of unusually large quantities of accumulated winter snows, and, as Chittenden has pointed out, such floods come oftener from the forest than from the open.

6. The disastrous effects of soil erosion, however caused, appear to have been exaggerated, and erosion is not always an unmixed evil.

7. Compared with the total area of a given watershed, that of the headwaters is so small that, except locally in mountain streams, their runoff would not be sufficient to cause floods, even if deforestation allowed a greater and quicker runoff. Granting, for the sake of argument, that deforestation might be responsible for general floods over a watershed, it would be necessary in order to prevent them to reforest the lower levels with their vastly greater areas, an impossibility unless the lands are to be abandoned for the use of men.

8. The runoff of our rivers is not materially affected by any other factor than the precipitation, except that the forest, by facilitating evaporation and entirely restraining small or moderate rainfalls during the dry weather, may slightly intensify low water conditions.

9. The high waters are not higher, and the low waters are not lower than formerly—in fact, there appears to be a tendency in late years toward a better low water flow in summer.

10. Floods are not of greater frequency and longer duration than formerly."

With regard to the effects of forests on rainfall, the following may be quoted from recent writings of Professor Cleveland Abbe, the senior professor of the Weather Bureau, and a member of the National Academy of Science. He says:

"It is a pity that the errors of past centuries should still continue to be disseminated long after scientific research has overthrown them. In this day and generation the idea that forests either increase or diminish the quantity of rain that falls from the clouds is not worthy to be entertained by rational intelligent men.

It is doubtless safe to say that there is no scientific proof that the growth of forests increases the rainfall of a locality or that their cutting away appreciably diminishes it."

The experts of the National Weather Bureau conclude:

"It is apparent that the precipitation that causes floods in the eastern half of the United States is derived from the aqueous vapor raised up from the vast waters to the south and southeast of our continent, and that the supply is inexhaustible. Our rainfall, then, is the result of such fundamentally great causes as not to be appreciably affected by planting or cutting away of forests, or by any of the operations of man in changing the character of the surface covering of the continent."

PARAGRAPH XV.

THE HYGIENIC INFLUENCE OF THE FOREST.

The hygienic influence of the forest is explained by the presence of ozone and the absence of bacteria and dust in the forest air.

Ten acres of forest exhale, in the course of a day, as much oxygen as is needed for the life of sixteen men.

The air in the forest, nevertheless, is no richer in oxygen than the air over the field, with the exception of the edge of the forest and of the crown space where a slight surplus of oxygen is found.

The amount of ozone, however, suspended in the air is greater in the forest than over the field, and exceeds by far the ozone in the city air. The latter fact is apt to be due more to the number of fires in the city than to the absence of trees.

Ten acres of forest exhale, in the course of a year, as much oxygen as is required for the burning of twelve tons of coal.

The influence of the forest on fever-breeding bacteria is denied by some medical authorities and affirmed by others. At the present moment, it is impossible to see clear. The ecological conditions of bacterial life are not understood sufficiently.

Ebermeyer attributes the protection against fevers which, in his opinion, the forest offers, to the conditions of the forest soil. The vegetable components of the forest soil contain less matter nutritive to bacterial growth than the soil in the field. The acidity of the humus is antagonistic to pathogenic bacteria. So far, no microbes have ever been found in forest soil; a gramm of soil in the field contains from two to three hundred thousand bacteria.

The absence of dust in the forest is explained by the fact that there is less wind in the forest, and that the carpet on the ground does not allow any dust to form. The bacteria are carried about not by the air, but by the particles of dust suspended in the air.

As a sanitary filter of drinking water, the forest, or rather the soil under the forest, is unexcelled.

PARAGRAPH XVI.

TEMPERATURE.

The *air temperature* is certainly more influenced by altitude, latitude and proximity of ocean or gulf stream than by the proximity of the forest.

Daily temperature: The forest air is warmer during the night and cooler during the day than the field air.

Mean temperature: In summer the forest air is by three degrees cooler than the field air; in winter there is scarcely any difference. Shade-bearing species show a greater influence on temperature than light-demanding species.

Extreme temperature: The extremes of temperature seem to be considerably influenced by the forest, if observations by Woeickof are correct. After him, the forest lessens the extremes of temperature by about ten degrees. For Germany, the summer extremes in the forests are about seven degrees lower than in the field, the winter extremes about two degrees higher. The radial posts of the meteorological stations now established in Europe may throw additional light upon the subject.

The *soil temperature* is "limping behind" the air temperature by about two months, the difference increasing with increasing depth. In the soil, during May, the temperature decreases with the depth; in October, it increases with the depth.

The soil temperature in the toplayers of the field is almost equal to the air temperature in the field. In the forest, there is a difference of two degrees in favor of the air.

The daily range of temperature is smaller in the forest soil than in the field soil. The summer temperature in the field soil is about six degrees higher than in the forest soil. In winter, there is almost no difference.

The temperature of the bole of a tree ranges between soil temperature and air temperature. The temperature of the inner layers of the bole, during winter, is higher than that of the outer layers.

PARAGRAPH XVII.

HUMIDITY.

The humidity of the air depends more on altitude and proximity to the ocean than on the presence or absence of forests.

The absolute humidity of forest air, all the year round, is equal to the absolute humidity of field air. The relative humidity, however, is less in the field than in the forest—during summer by 10 per cent, during winter by 3 per cent, and during the year by 6 per cent—owing to the lower temperature of forest air. As a consequence, radiation is checked during the night; sudden changes of temperature are mitigated in the forest; and the forest soil is kept more moist during the summer.

PARAGRAPH XVIII.

MOISTURE AND PRECIPITATION.

From a theoretical standpoint we should assume, the relative humidity being greater in the forest than over the field, that more precipitations occur in the forest than in the field.

European experiments relative to the influence of the forest on precipitation are not conclusive. The position of the ombrometer influences the result to a high degree.

As a maker of rainfall, elevation is of largely greater importance than presence of forests. In Europe the higher elevations are usually covered with forests. Experiments showing the truth of the matter can only be made in a level country. It seems as if the forest were decreasing the precipitations in a stretch of open country adjoining it on the leeward side (G. Wyssotzky).

PARAGRAPH XIX.

EVAPORATION OF SOIL MOISTURE.

There is a vast difference between the evaporation from field soil and from forest soil, especially if the leaf litter is left on the ground in the forest.

In the latter case, after Ebermeyer, the evaporation from forest soil is only 16 per cent of the evaporation from field soil. When the litter is removed by rake or fire, the proportion is 38 per cent.

On the other hand, the evaporation from the crowns of the trees is enormous. The forests irrigate the atmosphere. Forests, it may be said, are the greatest consumers of water on earth. Observations in the Russian steppes prove conclusively that the level of the groundwater is lower beneath the forests than in the country surrounding them. Where there is water, we invariably find forests. Cause and effect should not be mixed.

Evaporation largely depends on the velocity of the wind. The velocity being reduced by sheltering belts of forest, drought might be checked locally by screens of woodland placed, gridiron-fashion, across country at proper intervals. (Compare Green, p. 28.)

PARAGRAPH XX.

SPRINGS AND RIVERS.

The influence exercised by the forest over the discharge of the rivers cannot be established by experimentation.

Experiments consisting in guage readings within the same river basin, prior to, and after deforestation, are out of the question; and if they were possible, the results obtained would be influenced, in all probability, more by the periodic change of the rainfall than by the presence or absence of the forests.

Another possibility in parallel experiments would be the comparison of the discharges of streams situated together as close as possible, draining one and the same geological formation, having one and the same rapidity of fall, and one and the same aspect: The drainage basin of one of these streams should be deforested, and the other should be kept abundantly stocked with forests.

Even here, however, absolute parallelism of the factors [other than forests] influencing the discharge of the two rivers cannot be established. A near approach to parallel factors was obtained by the Biltmore Estate with the help of the Hydrographic Branch of the National Geologic Survey, when there was controlled by it, on the one hand, the discharge of Davidson's river, Transylvania county, North Carolina; and, on the other, the discharge of the Tuckaseegee river, in Jackson County, North Carolina. These streams are draining the same geologic formation; their headwaters are found within one and the same range of mountains; the steepness of the slopes is the same on both watersheds. A vital difference, however, is found in the treatment to which the soil of the forest has been subjected: The headwaters of Davidson's river have been protected from fires, from heavy lumbering, from reckless farming, and from erosion on the hillsides ever since 1895. The headwaters of the Tuckaseegee river, on the other hand, have been burnt, farmed, pastured, and logged; so much so that, in many cases, the entire litter on the forest floor is destroyed.

The Tuckaseegee river is the larger river; it shows, nevertheless, slightly greater fluctuations in its discharge than does the Davidson river. The discharges, in the case of the Davidson river, are more even than the discharges of the Tuckaseegee river. It must be admitted, however, that the influence of the forest, or, rather, of a fair measure of soil protection shown at Davidson river, is not very pronounced; it is slight, and the relative differences in the discharges of the protected and of the unprotected stream can be expressed by a small percentage.

The following factors tend to influence the rapidity, if not the amount of water running from the forest-clad watershed:

1. The greater porosity of the forest soil increases its permeability; the water precipitated from the clouds sinks into forest soil easier than into field soil.

2. The litter on the ground, in the forest, checks the superficial run-off of water.

3. The litter and the debris on the ground act as a sponge.

4. The melting of the snow is retarded under a dense forest cover. If the forest soil is frozen before snow-fall, and if there has been accumulated in the forest on such frozen soil a large quantity of snow, then, indeed, this retardation of the melting process may become disastrous at a time in spring, when the south wind causes the snow to melt rapidly.

5. The evaporation from forest soil in summer is reduced.

Floods cannot be avoided; and disastrous floods will occur as often as the atmospheric constellations are such as to bring about—in the various headwaters of the various tributaries of a main stream—heavy rain-falls, timed in such a manner as to arrive, discharged by the tributaries, simultaneously in the main channel of the stream.

If the gradient of the streams at their headwaters were smaller than the gradient or fall of the streams in their lower courses, inundations would be rare. Unfortunately, all over our globe, the opposite is the case. The rivers are fed, like the gutters on the roofs, from steep slopes; and the fall of the rivers forming the gutters is very gentle.

Geologically there is no doubt but that floods and inundations were much more formidable in former geological periods than they are in the present era.

PARAGRAPH XXI.

MECHANICAL INFLUENCE OF THE FOREST.

The mechanical influence of the forest is shown by the prevention of excessive erosion on forest-covered slopes. Successful afforestation puts a stop to local erosion. Previous to the afforestation of gullied slopes, breastworks should be made beginning at the upper edge of the gullies. When the soil is quieted down, planting may begin.

Forest plantations may also be used to prevent the inland movement of sand dunes along the seashore. To begin with, the dunes must be fixed and raised with the help of rough fences, sandgrasses, sandweeds etc. That done, afforestation may begin on the leeward side of the dunes, or in the dales between the dunes.

Forests are also recommended as remedies for avalanches. The formation of avalanches must be prevented at the "point of rupture." This point, however, lies above timber line frequently. Stone walls are certainly more efficient at such points than plantations of trees.

Forests further offer protection against air currents. In the prairies, shelter belts of trees prevent the blizzards from laying the wheat lands bare of snow. The existence of a wood lot facilitates the wintering of cattle, sheep, and hogs.

The influence of the forest on hail storms is limited, perhaps imaginary.

PARAGRAPH XXII.

DIRECT UTILITY OF THE FOREST.

The variety of raw products furnished by the forest is very considerable. We may distinguish between "principal products" and "minor products." The former comprise wood and timber only; the latter include all other raw material obtained from the forest, e. g. naval stores, tanbark, litter, moss, rubber, gutta-percha, cork, game, minerals, pasture, etc.

The value of minor products formed by or found in the forest frequently exceeds the value of wood and timber annually produced. This is the case, especially, in the backwoods, at high elevations, and in the tropics.

FOREST STATISTICS.

PARAGRAPH XXIII.

STATISTICS OF CONSUMPTION.

The consumption of timber in any country depends on the habits of its people; on the price of building material other than timber; on the form of settlement—whether scattered or concentrated into cities; on the climate; on the stage of civilisation; on the prevalence of prosperity or depression.

The consumption of timber other than fuelwood approximates for the time being (Schlich vol. I, p. 15) the following amounts, per capita, per annum:—

in France	7	cubic feet per head of population
in Great Britain	14	" " " " " "
in Germany	18	" " " " " "
in Canada	60	" " " " " "
in the United States	145	" " " " " "

The consumption of fuelwood depends on the climate, on the price of coal, peat, kerosene, and on the prevailing prosperity.

Per capita per annum, the consumption of fuelwood in the United States is .9 cords (circular 181, Forest Service). The census of 1880 gave the consumption in the United States per head of the population at 2.8 cords.

The combined consumption of timber and fuelwood per head of population in various countries is estimated by circular 171, Forest Service, to be as follows:—

Great Britain	14	cubic	feet	per	head	of	population
France	25	,,	,,	,,	,,	,,	,,
Germany	37	,,	,,	,,	,,	,,	,,
Canada	200	,,	,,	,,	,,	,,	,,
United States	230	,,	,,	,,	,,	,,	,,

The 230 cubic feet used per capita in the United States include 470 feet b. m. of lumber, produced from about 70 cubic feet of logs. Another 80 cubic feet are used technically in miscellaneous forms, and the balance of 80 cubic feet per capita is consumed as fuel.

The consumption of fuelwood is decreasing all over the world, and most rapidly in such countries as are showing a rapid increase industrially.

The consumption of fuelwood on the farms in the U. S. exceeds 82 per cent; the smaller towns in the United States have a consumption of about 15 per cent; whilst the larger cities consume only 2 per cent of the total quantity used in the United States.

The annual consumption of all wood goods in the United States, expressed in billions of cubic feet, is given by circular 181 of the Forest Service as follows:—

lumber and shingles	9.0	billions	of	cubic	feet
fire wood	7.0	,,	,,	,,	,,
poles, posts, and rails	1.7	,,	,,	,,	,,
railroad ties	1.5	,,	,,	,,	,,
cooperage stock	.3	,,	,,	,,	,,
pulp wood	.2	,,	,,	,,	,,
mining timbers	.2	,,	,,	,,	,,
distillation wood	.1	,,	,,	,,	,,

In the above figures there is not included any waste like that connected with the clearing of farms, or that caused by forest fires.

The consumption of all timber is equal to the commercial production of all timber in the United States, approximately.

The exports (2½ billion feet b. m.) overbalance the imports (1½ billion feet b. m.) by only 1 billion feet b. m.

Census statistics going back to the year 1850 give the consumption of sawed lumber as follows:—

1850	5	billion	feet	board	measure
1860	8	,,	,,	,,	,,
1870	15	,,	,,	,,	,,
1880	18	,,	,,	,,	,,
1890	24	,,	,,	,,	,,
1900	35	,,	,,	,,	,,
1907	40	,,	,,	,,	,,
1908	33	,,	,,	,,	,,
1909	44	,,	,,	,,	,,

According to R. S. Kellogg, the most reliable statistician in American forestry, the total quantity of lumber consumed in the United States since 1850 has unquestionably been not less than 1,200 billion feet board measure.

The following tabular statement is taken from an address by R. S. Kellogg, delivered before the National Lumber Manufacturers' Association. It illustrates the consumption of lumber in the United States by species:

Lumber Consumption of the United States, by Species.
1900—1908.

Kinds	1900 M board feet	1906 M board feet	1907 M board feet	1908 M board feet
Yellow Pine	9,658,923	11,661,077	13,215,185	11,236,372
White Pine	7,742,391	4,583,727	4,192,708	3,344,921
Douglas Fir	1,736,507	4,969,843	4,748,872	3,675,114
Oak	4,438,027	2,820,393	3,718,760	2,771,511
Hemlock	3,420,673	3,537,329	3,373,016	2,530,843
Spruce	1,448,091	1,644,987	1,726,797	1,411,992
Western Pine	944,185	1,386,777	1,527,195	1,275,550
Yellow Poplar	1,115,242	677,670	862,849	654,122
Maple	633,466	882,878	939,073	874,983
Cypress	495,836	839,276	757,639	743,297
Redwood	360,167	659,678	569,450	404,802
Red Gum	285,417	453,678	689,200	589,347
Chestnut	206,688	407,379	653,239	539,341
Basswood	308,069	376,838	381,088	319,505
Cottonwood	415,124	269,458	293,161	232,475
Elm	456,731	224,795	260,579	273,845
Cedar	232,978	357,845	251,002	272,764
Birch	132,601	370,432	387,614	386,367
Ash	269,120	214,460	252,040	225,367
Beech	(a)	275,661	430,005	410,072
Hickory	96,636	148,212	203,211	197,372
Larch	42,394	166,078	211,076	239,132
Sugar Pine	53,558	133,640	115,005	99,809
Tamarack	8,225	123,395	113,433	143,334
Walnut	38,681	48,174	41,490	43,681
Sycamore	29,715	(a)	46,044	43,332
White Fir	(a)	104,329	146,508	98,120
Tupelo	(a)	47,882	68,842	69,170
Balsam Fir	(a)	(a)	53,339	69,956
Not specified	498,150	164,845	27,734	47,873
Total	35,067,595	37,550,736	40,256,154	33,224,369

Yellow pine supplies one third of the lumber consumed in the United States; the consumption of white pine has decreased rapidly, while that of Douglas fir has increased rapidly.

(a) = not separately reported.

The Forest Service insists that we consume in the United States three times as much timber per annum as we produce.

The lumber prices, f. o. b. mill, in the period 1900—1908 are illustrated by the following table taken from Kellogg:—

Mill Values of Lumber, 1900—1908.

Species	1900	1904	1906	1907	1908	Increase 1900—1908 %	Decrease 1907—1908 %
Walnut	$ 36.49	$ 45.64	$ 42.25	$ 43.31	$ 42.53	16.6	1.8
Cherry	. . .	. . .	. . .	33.99	30.36	. . .	10.7
Hickory	18.78	23.94	30.42	29.59	29.66	57.9	† .5
Ash	15.84	18.77	24.35	25.01	25.51	61.0	† 2.0
Yellow Pop.	14.03	18.99	24.21	24.91	25.30	80.3	† 1.6
Cypress	13.32	17.50	21.94	22.12	21.30	59.9	3.7
Oak	13.78	17.51	21.76	21.23	21.23	54.1	0.0
Basswood	12.84	16.86	18.66	20.03	20.50	59.7	† 2.3
Elm	11.47	14.45	18.08	18.45	18.40	60.4	.3
White Pine	12.69	14.93	18.32	19.41	18.17	43.2	6.4
Cedar	10.91	14.35	18.12	49.14	18.03	65.3	5.8
Sugar Pine	12.30	. . .	16.11	19.84	17.78	44.6	10.4
Cottonwood	10.37	14.92	17.15	18.42	17.76	71.3	3.6
Birch	12.50	15.44	17.24	17.37	16.42	31.4	5.5
Maple	11.83	14.94	15.53	16.84	16.30	37.8	3.2
Chestnut	13.37	13.78	17.49	17.04	16.27	21.7	4.5
Spruce	11.27	14.03	17.33	17.26	16.25	44.2	5.9
Redwood	10.12	12.83	16.64	17.70	15.66	54.7	11.5
Western Pine	9.70	11.30	14.01	15.67	15.03	54.9	4.1
Sycamore	. . .	. . .	. . .	14.58	14.67	. . .	† .6
Balsam Fir	. . .	. . .	. . .	16.16	14.36	. . .	11.1
Hemlock	9.98	11.91	15.31	15.53	13.65	36.8	12.1
Beech	. . .	. . .	14.05	14.30	13.50	. . .	5.6
Tupelo	. . .	. . .	44.13	14.48	13.36	. . .	7.7
Red Gum	9.63	10.87	13.46	14.10	13.08	35.8	7.2
Tamarack	12.48	12.42	15.63	15.71	12.86	3.0	18.1
Yellow Pine	8.46	9.96	15.02	14.02	12.66	49.6	9.7
Douglas Fir	8.67	9.51	14.20	14.12	11.97	38.1	15.2
Larch	8.00	8.94	11.91	13.07	11.81	47.6	9.6
White Fir	. . .	. . .	12.91	15.45	11.38	. . .	26.3
Average	11.13	12.76	16.54	16.56	15.37	38.0	7.2

† means increase instead of decrease.

The millvalues of lumber in the U. S. have increased 38%, from 1900 to 1908. Here it is interesting to find, from German statistics, that the average value of all wood goods sold from the Prussian stateforests has increased 47%, from 1898 to 1908.

The consumption of mining timber might be guaged from the fact that the production of one ton of coal requires two cubic feet, and the production of one ton of iron 20 cubic feet of mining timber (Dr. D. D. Hayes at the 1905 Forest Congress in Washington).

The consumption of timber for railroad ties (in the U. S.) is such that two trees should be kept growing continuously at the side of each tie (Gifford Pinchot).

For repairing purposes alone, our railroads require 300 ties per mile per year; or, approximately, 75 million ties (at 40 feet board measure each) per annum. Two-fifths as much oak timber is required for (hewed) ties as is for lumber. The southern pine furnishes nearly 18 per cent of the hewed ties, and cedar and chestnut about 8 and 7 per cent respectively. Of the entire tie-consumption, three quarters consist of hewed ties, and one quarter of sawed ties.

The total number of crossties used in the U. S. was

in 1907	154	million crossties
in 1908	112	,, ,,
in 1909	124	,, ,,

The consumption of shingles in the U. S. approximates 15 billion pieces per annum, of which the western cedar furnishes three-fifths.

The consumption of pulp wood in the U. S. amounts to approximately 4.0 million cords, one-fifth of which are imported from Canada.

Three-fifths of the pulp wood consumed by us consists of spruce, and one-fifth of hemlock.

The consumption of tight cooperage stock in the United States requires approximately 250 million staves and 18 million sets of heading; the consumption of slack cooperage consists of over one billion staves, 125 million sets of heading, and over 330 million barrel hoops.

We consume annually close to four billion pieces of lath (one quarter of which is white pine, and one quarter yellow pine); further, over 1,000,000 cords of wood in the manufacture of charcoal, wood alcohol, and acetic acid; also 326 million feet board measure, log scale, for veneers (one-fifth red gum); finally, 3½ million round poles for electric conduits, of which poles three-quarters are cedar, and one quarter chestnut.

As regards bye-products of the forest, we consume annually 1,400,000 cords of tan bark (two-thirds of which are hemlock bark); further, over 30,000,000 gallons of turpentine, and over 3,000,000 barrels of rosin.

It is probable that the consumption of woodgoods in the United States has passed, in the year 1910, the point of culmination.

PARAGRAPH XXIV.

STATISTICS OF PRODUCTION.

The production of the forests may be considered in two ways:

(a) As increment production, or as the amount of new wood actually formed in the forest.

(b) As commercial production, or as the amount of timber and wood taken from the forest.

ad (a). Increment production, as regards timber fit for lumber, is almost at a standstill in the United States. In the primeval forests, the death rate equals the production; and in cut-over forests, the production of timber proper is very small. Since large amounts of timber are annually destroyed by fire or caused to deteriorate, it may be said that the actual increment production of good lumber in the United States is nil. On the other hand, the production of wood fit for fuel, etc., is large on cut-over land not too heavily burned. It is impossible to give accurate figures; 200,000,000 cords, perhaps, is a safe estimate of the wood annually produced by growth in the United States.

Theoretically the increment or rate of production in any given forest depends on:

1. Species grown, conifers generally producing more than hardwoods.
2. Climate and soil.
3. Condition of the stumpage.

In the German forests the average annual production of timber per acre is 90 feet b. m. The fuel production per acre and year amounts in Germany to two-thirds of a cord.

In Germany, the production of lumber is increasing, while the production of fuel wood is decreasing continuously. For the various state forests in Germany, the participation in the

total annual output of technical timber and of fuel wood is the following:—

Saxony	Timber	83%	Fuel Wood	17%
Württemberg	„	63%	„	„	37%
Baden	„	48%	„	„	52%
Bavaria	„	52%	„	„	48%
Hessen	„	40%	„	„	60%

There are at hand no statistics with reference to the *possible* increment production of the forests of the United States. The amount of increment depends largely upon the amount of precipitations, upon the growing season and upon the quality of the soil. These factors are more favorable, on an average, to increment production in the United States, than in Germany. It stands to reason, as a consequence, that the production, per acre and per year, of forests under conservative forestry might far exceed, in America, the data obtained in Germany. If the total acreage of forests and forest lands in the United States is 550 million acres, the annual production of increment obtainable from them in the distant future, under proper forestry methods, might easily exceed 100 billion feet board measure.

The Forest Service, in circular 171, estimates the yearly growth of wood in our forests not to exceed 12 cubic feet per acre; so that the yearly growth in our forests is less than seven billion cubic feet altogether.

The Forest Service adds that 36% of our woodlands are composed of primeval forests—mainly in the Northern Rockies, and on the Pacific coast—in which yearly growth is balanced by decay; 46% of our woodlands (mainly in the Southern Mountains, and in the Southern Pine Belt) are partly cut over or burnt over, though re-stocking annually with enough young growth to produce a merchantable crop; and 18% of our woodlands (chiefly in the Lake States and in the Southern Pine Belt) are cut over and burnt over so heavily that young growth is either wholly lacking upon them, or too scanty to make merchantable timber.

The vast forests of Russia in Europe are said to produce, per acre and year, 31 cubic feet of wood and timber; those of Hungary are producing, per acre and year, 50 cubic feet; while

the forests in Austria, per acre and year, produce 42 cubic feet of wood and timber. For Norway, the increment production per acre and year is given for the south western parts as 22 cubic feet; and for the northern parts as 11 cubic feet per acre and year.

ad (b). The commercial production of home-grown lumber and timber in the United States is in excess of its consumption. The surplus which is exported consists of:—

2 billion feet b. m. of sawed lumber
5 million cubic feet of hewed timber
60 million staves
20 million shingles
10 million dollars worth of other raw woodgoods.

The exportations amount to the following, in our leading lumber species, for the time being:—

In the case of Yellow Pine 11½ per cent of the total cut
„ „ „ „ Redwood 10 „ „ „ „ „ „
„ „ „ „ Douglas Fir 8 „ „ „ „ „ „

In the total commercial production of sawed lumber,—some 44 billion feet board measure now-a-days,—the following leading species participate:—

Yellow Pine	36	per	cent	of	the	total	amount
Douglas Fir	11	„	„	„	„	„	„
Oak	10	„	„	„	„	„	„
White Pine	9	„	„	„	„	„	„
Hemlock	7	„	„	„	„	„	„
Spruce	4	„	„	„	„	„	„
Western Pine	3	„	„	„	„	„	„

From year to year, there *seems* to occur a slight upheaval in the rank-list of the various states considered as participants in our lumber production. The upheaval is not actual; and it *can* not be actual: It is explained by the unusual difficulties connected with the annual collection of true lumber statistics. The number of sawmills in the United States, e. g., cannot have increased in the recent past. The XIII[th] census reports, nevertheless, an increase in the number of sawmills, within the

one year 1908 to 1909, from 33,000 to 44,000 mills! At the present time, the rank of the various states as participants in the lumber production seems to be the following:—

First: Washington
Second: Louisiana
Third: Mississippi
Fourth: North Carolina
Fifth: Arkansas
Sixth: Virginia
Seventh: Texas

Nineteen states (including the above 7 states) are cutting annually over one billion feet board measure, supplying thereby three-quarters of the total annual production.

The following nine states are producing each, approximately, 1½ billion feet board measure of lumber per annum:—

Wisconsin
Oregon
Michigan
Alabama
Minnesota
Pennsylvania
West Virginia
Georgia
Tennessee

Florida, California and Maine each produce slightly over one billion feet b. m. per year.

The following states produce between half a billion and one billion feet, board measure, per year:—

New York
Kentucky
New Hampshire
South Carolina
Idaho
Ohio
Missouri
Indiana

The following produce less than half a billion feet, board measure:—

Massachusetts
Montana
Vermont
Maryland
Oklahoma
Connecticut
Illinois
Colorado
Iowa
New Mexico
Arizona
Delaware
New Jersey
Rhode Island
South Dakota
Wyoming
Utah

In 1905, the north eastern states, the Lake states, and the Pacific states were producing approximately identical percentages in the total cut, namely 14 per cent of the total for each geographical set of states.

The southern states were producing in 1905 three times 14 per cent,—or as much as the northeastern, the Lake states, and the Pacific states taken together.

The Census Bureau has issued comparative reports for the year 1907, 1908 and 1909, illustrating the geographic distribution of our lumber production. The various sets of states have supplied the following percentages:—

Relative participation in the lumber production of the United States by the region of	was in the year 1907	1908	1909	per cent
New England and New York	9	9.6	7.5	%
Lake States	13.6	13.2	12.3	%
Pacific Coast States	16.8	16.2	15.5	%
Southern States	44.3	45.3	49.5	%

It seems as if the Southern States had been yielding, in the year 1909, almost as much lumber as did the remaining states of the Union altogether.

It is particularly interesting to note that certain states reported exhausted, as far as primeval timber is concerned, several decades of years ago, have increased their commercial production nevertheless.

Virginia, for instance, has reported the following total productions in the following years:—

1880	300	million	feet,	board	measure
1890	400	,,	,,	,,	,,
1900	960	,,	,,	,,	,,
1907	1400	,,	,,	,,	,,
1908	1650	,,	,,	,,	,,

As regards the production of individual woods, statistics for 1908 show the following:—

Arkansas	leads	in	producing	red gum and hickory;
California	,,	,,	,,	redwood, sugar pine, western yellow pine;
Indiana	,,	,,	,,	walnut and sycamore;
Kentucky	,,	,,	,,	oak;
Louisiana	,,	,,	,,	cypress, long-leaved pine, tupelo;
Maine	,,	,,	,,	spruce and balsam;
Michigan	,,	,,	,,	maple, beech and ash;
Minnesota	,,	,,	,,	white pine and tamarack;
Mississippi	,,	,,	,,	cottonwood;
Montana	,,	,,	,,	larch;
Pennsylvania	,,	,,	,,	chestnut;
Washington	,,	,,	,,	Douglas fir and red cedar;
West Virginia	,,	,,	,,	yellow poplar and cherry;
Wisconsin	,,	,,	,,	hemlock, bass wood, elm and birch.

With a view to the future of the various commercial woods, we might distinguish (after Kellogg) three classes as follows:

1st. class. Maximum of commercial production is passed:

White pine, oak, eastern hemlock, eastern spruce, cypress, yellow poplar, cotton wood, ash, elm.

2nd. class. Production is apt to remain stationary for some years: Southern pine, maple, red gum, chestnut, beech, redwood, birch, bass wood, cedar, hickory, sugar pine, tupelo, walnut.

3rd. class. Production continues to increase: Douglas fir, western hemlock, western spruce, western pine, larch, white fir, lodgepole pine, western mountain white pine.

The northeastern states as lumber producers have held their own remarkably well; producing approximately the same amounts of lumber annually in every year since 1870.

The Lake states have shown in 1875 an output of lumber equal to that of the northeastern states; have reached highwater mark in 1898, with an output of almost 9 billion feet board measure; and have since dropped down, like falling stars, to the same annual output which was reported for them in 1875.

The southern states and the Pacific states play a most important rôle as lumber producers. From 1870 on, the flight upwards of the southern states has been more phenomenal than that of the Lake states in days past. The southern states have doubled their output between 1870 and 1880; have doubled it again between 1880 and 1890; have more than doubled it for a third time between 1890 and 1900, and are reaching now-a-days the zenith of their lumber production with about 20 billion feet board measure of lumber annually produced.

The production of the Pacific States has taken a spurt upward ten years later than that of the Southern States, namely in 1880. The production of the Pacific States has been increased, however, more slowly; during the period lying between 1907 (16.8 billion feet b. m.) and 1909 (15.5 billion feet b. m.) it seems to have declined temporarily.

The Pacific States are far from having reached the zenith of their commercial timber production. When reaching it, their production is apt to exceed the present highwater mark of production shown in the southern states.

The participation of the various sets of states in the total commercial timber production of the U. S. since 1850 is shown by the following tabular statement:—

Year	Northeastern States	Lake States	Southern States	Pacific States
1850	54.5 %	6.4 %	13.8 %	3.9 %
1860	36.2 »	13.6 »	16.5 »	6.2 »
1870	36.8 »	24.4 »	9.4 »	3.6 »
1880	24.8 »	33.4 »	11.9 »	3.5 »
1890	18.4 »	36.3 »	15.9 »	7.3 »
1900	16.0 »	27.4 »	25.2 »	9.6 »
1908	14.0 »	14.0 »	42.0 »	16.0 »
1909	12.0 »	12.3 »	49.5 »	15.5 »

R. S. Kellogg, in an address before the National Lumber Manufacturers' Association, shows the trend of the movement in the production of the five leading species of lumber by the following remarks:—

"White pine lumber manufacture began in New England, and moved across New York and Pennsylvania to the Lake States; now the center of production is again swinging eastward. The Lake States produced almost 8,000,000,000 feet of white pine in 1884, and reached a maximum of more than 8,500,000,000 feet in 1892. In 1900 the output in the Lake States had fallen to 6,000,000,000 feet, and in 1908 it was but 1,775,000,000 feet. Then Michigan, supreme for many years, had fallen to sixth place, and Wisconsin, which succeeded her, dropped behind, leaving Minnesota in the lead. New Hampshire and Maine each cut more white pine lumber in 1908 than they did in 1900, giving these states third and fourth rank, and even Massachusetts and New York produced nearly as much white pine lumber in 1908 as in the earlier year. The virgin pine timber of the Lake States is nearly gone. The second and third growth of the Northeastern States, small and knotty though it be, is coming on the market to make many a box and crate.

There has been a westward movement in yellow pine production similar to that in white pine. Beginning along the Atlantic coast in the northeastern part of the yellow pine belt, Georgia held first rank in 1900, Texas second, North Carolina third, and Louisiana seventh. A quick shift

came, however, through the rapid exploitation of the western part of the yellow pine territory, and by 1904 Louisiana attained first rank, which position it has since held undisputed. Texas is still in second place, while Mississippi has advanced to third place, Georgia has dropped to sixth, and North Carolina to seventh place. Since 1880 at least 150,000,000,000 feet of yellow pine lumber has been put upon the market. The cut of 13,000,000,000 feet in 1907 is the largest annual output yet reported. But the capacity of the yellow pine mills is so great that this total may be surpassed [it was surpassed, seemingly, in 1909 by 3 billion feet] in any year in the near future which offers good market conditions. While the center of production will undoubtedly be in the West for some time, it does not seem improbable that with the exhaustion of the virgin stumpage in that region the utilization of the rapid growing loblolly pine of the Carolinas and Virginia will eventually bring those states again into greater prominence, as second growth white pine has done for New England.

The cut of oak in 1900, 4,438,000,000 feet, was the largest yet recorded, and doubtless it will never be equaled in the future [It was equaled, seemingly, in 1909]. The output in 1908 was but little more than three-fifths of the production in 1900. In 1900 Indiana was first in oak production, with nearly four times the cut reported in 1908, and Ohio was second, with a cut almost three times as great as eight years later. Even Kentucky and West Virginia, which advanced from fourth and fifth place in 1900 to first and second place in 1908, fell off in total output. Small increases have occurred in Missouri, Mississippi, Virginia, and North Carolina, but these have been too slight to retard greatly the downward sweep of the curve.

Hemlock, our fifth wood in point of total lumber production, has also passed its maximum. In 1908 the output was but three-fourths as large as in 1900. In 1908 Wisconsin displaced Pennsylvania and ranked first in hemlock cut for the first time. Pennsylvania, which as long as memory runs, had been the leading hemlock state, produced but 36 per cent as much hemlock lumber in 1908 as it did in 1900. The day of hemlock is surely passing, for there is no rapid second

growth coming on to partially fill the gap made by the exhaustion of the virgin timber. Hemlock lumber of more than the immediate future will be chiefly the western hemlock of Oregon and Washington, where there is much stumpage that so far has been but little drawn upon."

The value of the commercial products of the sawmills and planing mills in the United States, since 1850, is shown by census statistics as follows:—

Census	Value of Products.
1850	$ 60,400,000.00
1860	96,200,000.00
1870	210,100,000.00
1880	233,300,000.00
1890	437,900,000.00
1900	566,600,000.00

The value, at the points of manufacture, of our various forest products produced in the year 1908 was as follows:—

Value of forest products 1908	
Total	$1,050,000,000
Lumber, lath, shingles, and veneer	560,000,000
Firewood, posts, poles, and rails	325,000,000
Hewed cross-ties	45,000,000
Cooperage stock	32,000,000
Turpentine and rosin	30,000,000
Pulp wood	20,000,000
Tan bark and tanning extracts	15,000,000
Miscellaneous	23,000,000

In Germany the commercial production at home falls short of covering the home requirements.

As a consequence, Germany imports a large amount of lumber and timber from Russia, Austria, Hungary, Scandinavia, the United States, and Canada. Noteworthy is it that Germany, although having plenty of stumpage at hand, refuses to supply her industries fully with the home-grown timber; thus forcing the industries to seek additional supplies abroad.

The excess of the German imports over the German exports has averaged, between 1895 and 1900, almost 4 million tons of timber and lumber, valued at approximately 55 million dollars.

Germany could easily supply her commercial needs, without any timber imports, for a great number of years, if she were willing to reduce her forest capital as unscrupulously as the United States of America are reducing theirs.

Raphael Zon, in circular 159, Forest Service, comes to the following conclusions:—

"Countries with about 100 acres or more of woodlands per 100 inhabitants produce more wood than they actually consume; countries with 85 acres or less of woodlands per 100 inhabitants produce less wood than they actually consume."

The productivity of the forests in commodities other than wood goods is illustrated in circular 171, Forest Service, as follows:—

"The National Forests in the Rocky Mountain and Pacific Coast States afford summer ranges to over 12 per cent of the cattle and 21 per cent of the sheep in the States in which they lie. If this live stock were not fed in the forests during the summer months it would be without natural forage during the winter. For the East, the number of forest-fed live stock can not be given. But notably in the southern pine belt, and in the southern mountains, live-stock owners, especially small holders, turn out their sheep, cattle and hogs in the forests for the larger part of each year.

That the existence of nearly all kinds of wild game depends directly upon the conservation of the forest is well known. The deer killed in six states alone in the Northeast represent each year a food value of over $1,000,000. The raw furs exported yearly from the United States are worth $7,000,000 to $8,000,000, and raw furs worth in the aggregate still more are kept for manufacture here. Most of these furs are taken from forest animals. Relatively few kinds of freshwater fish, and mainly those of inferior food value, will endure in streams fed from denuded watersheds."

To day forest in America covers on 28% of its area

PARAGRAPH XXV.

FOREST AREA.

Generally speaking, countries having over twenty per cent of woodlands have forest resources sufficient to supply their lumber industries and their firewood consumption, provided that such area is properly stocked and conservatively used. It must be admitted, however, that Germany even does not fulfill this proviso.

To supply the present consumption of the United States, the present forest area, ceteris paribus, seems more than sufficient. 550 million acres, the present forest area, should yield, at the small rate of 115 feet board measure produced per acre and year, sixty-three billion feet board measure per annum.

Verily, if this enormous stretch of forest were properly stocked and conservatively managed, the lumber consumption of the United States, now about forty-five billion feet board measure, could never exceed, in times to come, the increment production of her forest area.

After circular 171, Forest Service, the original forests have covered in the United States not less than 850 million acres (45 per cent of our land surface). This area has been reduced, down to the present time, to approximately 550 million acres; so that the forests cover, now-a-days, 29% of the United States.

The northern forest now contains 90 million acres, or 60 per cent of its original area.

The southern forest now contains 150 million acres, or 69 per cent of its original area.

The central forest now contains 130 million acres, or 46 per cent of its original area.

The Rocky Mountain forest now contains 100 million acres, or 91 per cent of its original area.

The Pacific forest contains 80 million acres, or 89 per cent of its original area.

After the Forest Service, we have, now-a-days, 200 million acres of mature forest; 250 million acres partly cut over or burnt over; and 100 million acres cut over and burnt over heavily.

The 200 million acres of mature forest in the United States are mainly in the northern Rockies and on the Pacific coast, the very regions in which the immature forests grow most rapidly. The 250 million acres partly cut or burnt over, but restocking naturally with young growth, are mostly in the southern mountains, and in the southern pine belt. The 100 million acres cut over and burnt over, upon which young growth is wholly lacking or too scanty to make merchantable timber, are chiefly in the Lake States and in the southern pine belt.

With reference to the future, Raphael Zon predicts (circular Forest Service 159) the following:—

"The land chiefly valuable for growing forests will shrink (by the year 1950) to about 360,000,000 acres, less than one-fifth of the extent of the United States proper. Together with the woodlots which will continue to form part of the farm land, the total forest area will amount to approximately 450,000,000 acres, or a fourth of the total land area.

This reduction in the extent of the forest land is an inevitable consequence of the economic development of this country. The land devoted to agricultural crops must increase with the increase in population. It is self-evident that with a population of probably not less than 150,000,000 people in 1950 the land necessary to supply the food for home consumption alone must be larger than at present, even with the improved methods of cultivation.

Where will this increase come from?

Although some land can be won from the plains through reclamation and dry farming, this area will hardly be enough

to offset the loss of productive land through the growth of cities, and will at best supply only a small part of the additional area needed for raising farm crops. In the West, except in a few places along the Pacific coast, the forest areas will not be reduced, for the simple reason that the land there is not suitable on the whole for agricultural purposes. If it were reduced, the result would be to reduce the farm land lying below, which is dependent upon irrigation. The additional agricultural land must come, therefore, chiefly from the East through improvement of the present unimproved farm land and swamp land and at the expense of the forest land proper.

The forest area will be confined more and more to land which is clearly unsuitable for agriculture, and which can best be utilized in producing trees. This absolute forest land as we may call it, will occupy, as far as one may judge, about 360,000,000 acres, or nearly one-fifth of the total land surface. Of this about 63 per cent, or 12 per cent of the whole land area of the United States will be in the West and 37 per cent, or 7 per cent of the land surface of the country, in the East. In the East this land will be found mainly in New England and in the Adirondack region of New York; in eastern and northern Minnesota, northern Wisconsin, and Michigan; along the Allegheny and Cumberland plateaus; in the Blue Ridge and Smoky mountains in the States of Virginia, North Carolina and Georgia; in the Middle West, in the Ozark region of Missouri and Arkansas and in the far West, along the Rockies and the Pacific coast mountains."

The forest areas of the various countries, per one hundred inhabitants, are given in circular 159, Forest Service, as follows:—

Country	Forest land per 100 inhabitants
Exporting countries	Acres
Canada	2,490
Finland	1,850
Sweden	952
United States	775
Norway	762
Russia in Europe	462
Bosnia-Herzegovina	405
Bulgaria	230
Servia	155
Roumania	127
Austria-Hungary	103
Importing countries	
Greece	85
Switzerland	66
Germany	61
France	61
Italy	32
Denmark	25
Belgium	20
Netherlands	10
Great Britain	7

Where the forest area per capita of population is large, and where the means of transportation are poorly developed, we do not find any attempts at sylviculture, or any such thing as conservative forestry. Obviously the production of timber, like that of wheat and cotton, cannot be remunerative to the owner of the land when the producing area is extravagantly large.

The question arises: At what maximum figure of area is it possible for conservative forestry to be remunerative; and with what minimum of area can our commonweal be satisfied?

The area problem must be compromised between the private owners of forest land, and the people.

Dr. Max Endres, in "Forstpolitik," 1905, p. 6, gives the following tabular statement with reference to the various European countries:—

Countries	Forest area in acres	Percentage of forests	Acres per capita of population	Percentage of State forests.
Germany	34,750,000	25.9	.62	33.7
Austria	24,250,000	32.5	.92	7.3
Hungary	22,500,000	28.0	1.17	15.2
Bosnia and Herzegovina	6,250,000	50.0	4.05	78.4
European Russia	467,450,000	37.0	4.62	66.4
Finland	50,500,000	63.0	18.75	35.0
Sweden	48,750,000	47.6	9.50	33.2
Norway	17,000,000	21.0	7.62	28.5
Switzerland	2,120,000	20.6	0.65	4.6
France	24,000,000	18.2	0.62	12.0
Italy	10,500,000	14.6	0.32	4.0
Spain	21,500,000	16.9	1.15	84.0
Portugal	770,000	3.5	0.15	8.0
Great Britain	3,050,000	3.9	0.07	2.2
Belgium	1,300,000	17.7	0.20	4.8
Netherlands	560,000	7.0	.10	?
Denmark	600,000	6.3	.25	23.8
Turkey	11,250,000	20.0	1.75	?
Bulgaria	7,570,000	30.0	2.30	29.6
Servia	3,750,000	32.0	1.55	36.6
Roumania	6,250,000	18.0	1.25	40.0
Greece	2,050,000	13.0	0.85	80.0
Luxembourg	190,000	30.4	0.82	0.0
	766,960,000	31.0	1.97	——

The Percentage of Forest Area by States in the Union is shown in the following table:—

Two States having over 70 %	Four States having over 60 % and under 70 %	Nine States having over 50 % and under 60 %	Six States having over 40 % and under 50 %
Maine (78 %) Arkansas	Alabama New Hampshire North Carolina South Carolina	Connecticut Florida Georgia Louisiana Mississippi Tennessee Virginia West Virginia Washington	Michigan Missouri New Jersey Oregon Vermont Wisconsin
Seven States having over 30 % and under 40 %	**Three States having over 20 % and under 30 %**	**Ten States having over 10 % and under 20 %**	**Six States having under 10 %**
Idaho Kentucky Maryland Massachusetts New York Pennsylvania Rhode Island	Minnesota California Delaware	Arizona Colorado Indiana Montana New Mexico Ohio Oklahoma Texas Utah Wyoming	Illinois Iowa Kansas Nebraska North Dakota (1 %) South Dakota Nevada

The percentages tabulated above, taken from Forest Service circular No. 166, are at variance with those given by Gannett in the census report of 1900.

In the deserts, prairies, and prairie borders, there is not and never will be sufficient woodland to influence materially the general conditions of the commonweal. In the Rocky and in

the Appalachian mountains, the forest area is ample, provided that it be kept stocked with trees, and that the litter be left on the ground. In all other sections, the forest area is more than sufficient for the people's welfare, the vicinity of the cities excepted.

"For each million acres of forests in the United States found in public ownership, over four (?) millions are owned privately. The number of private owners of forests in the United States is 3,000,000." (Forest Service circular 171.)

Herbert Knox Smith reports on Febr. 13th, 1911, to President Taft, that 88,579,000 acres of timberland in the U. S. are owned by only 1,802 parties; and that 195 "holders" are in possession of 48% of all timber privately owned in the Pacific North West (including Montana, Idaho, Washington, Oregon, California), in the Southern pine region and in the Lake states.

In the South, 67 "holders" own 39% of the long leaf pine, 29% of the cypress, 19% of the shortleaf pine and 11% of the hardwoods.

In the Lake States, 215 "holders" have control of 65% of all the timber.

Mr. Smith "discovers" in his report:—

"1. The concentration of a dominating control of our standing timber in a comparatively few enormous holdings, steadily tending toward a central control of the lumber industry.

2. Vast speculative purchase and holding of timberland far in advance of any use thereof.

3. An enormous increase in the value of this diminishing natural resource, with great profits to its owners. This value, by the very nature of standing timber, the holder neither created nor substantially enhances."

Let us hope, in the interest of American forest conservation, that Herbert Knox Smith is correct!

ad 1: Conservative forestry has never been practised by the small owners, neither in America nor in Europe. A dominating control is required of farsighted financiers, public or private, over the timber left standing. This control must fix the price of the timber so high that it will pay to reproduce the timber. [Compare page 25, under (7).]

ad 2: Conservative forestry, where it exists, depends on large holdings of timberland, the major parts of which (viz. the parts not ready for the axe) are held for dozens of years, "in advance of any use thereof." [Compare page 16, entire; page 24, under (5); and page 26, under (10).]

ad 3: Conservative forestry as a business can yield a dividend sufficient for the owners of forests only where and as long as the price of stumpage increases automatically. [Compare page 17.]

Again: Let us hope, true patriots free from the socialistic craze, that Mr. Herbert Knox Smith is correct!

If he is correct, the dawn of truly American forestry is at hand. What has "unlimited competition," practised by 45,000 sawmills and by 300,000 dealers in lumber, what has it done to the forests in the East? "Limited competition preserves; unlimited competition despoils the woods." It is easier also to regulate, in the interest of conservation and by legislative action, the limited competition of the few than the unlimited competition of the many. Conservation is incompatible with unlimited competition.

After Dr. Fernow, 30 per cent of our woodlands are attached to farms; after R. S. Kellogg (in Forest Service circular 166) the figure is 36%, so that 200 millions of acres of woodland, out of 550 millions, are owned by farmers. After Dr. West (Agricultural Year Book, 1898) 36 per cent of the woodlands of the country are still controlled by the United States.

PARAGRAPH XXVI.

THE FOREST WEALTH OF THE WORLD.

Attempts have been made, to establish, by co-operation of the leading foresters of the world, a fairly correct estimate of the forest wealth of the world. The American legislatures have been appealed to, repeatedly, by requests to furnish the means required for an estimate of the forest wealth of a state or of the nation, and many a layman believes—and quite correctly so—that the solution of the forestry problem depends largely on a correct knowledge of the forest wealth of the world.

Indeed if there is plenty of timber at hand in the world, what is the use, it seems, of predicting a timber famine, and all the evils connected with it?

Unfortunately, statistics with reference to the world's wealth of timber will never be collected for the following reasons:

1. The majority of the woodlands of the globe are not placed under forest administration; and there is not at hand, usually, a staff capable of estimating correctly the stumpage found in them.

2. It is surprising to find, in America even, that the most up-to-date lumber concerns are admittedly ignorant of the amount of stumpage controlled by them.

3. The definition of the term "timber" depends on locality as well as on time; and many a tree that is now considered timber in a given section would not have been included in an estimate of timber some ten years ago.

4. In Germany, even, there is not at hand any knowledge of the amount of timber actually standing; and there are many young forests gradually growing into timber which cannot be considered as timber to-day.

5. The expense of a universal timber estimate would be gigantic. There is many an acre of forest in Canada, in South

America, in Russia, in Siberia, and in Africa, which has less value than the sum which its correct cruising would cost.

Under these conditions rough approximations are all that we can obtain with reference to the timber supply and the forest wealth of the world.

At the 1900 world's fair in Paris, a well-known French forester, M. Melard, delivered a most interesting address with reference to the world's timber supply, predicting a world's timber famine for 1950.—His statements were corroborated by Sir William Schlich, of Oxford, and were attacked by Professor Endres, of Munich.

For the United States, estimates have been made again and again with reference to the standing timber: Most of them have been found to be under-estimates.

Dr. B. E. Fernow, in an attempt to be on the safe side, is responsible for the following statement—intended for an over-estimate—made in 1898:—

Stumpage of the United States

Southern States	700	billion	feet,	board	measure
Northern States	500	"	"	"	"
Pacific Coast	1000	"	"	"	"
Rocky Mountains	100	"	"	"	"
Total forest wealth of the United States	2300	billion	feet,	board	measure.

Mr. T. B. Walker, of Minneapolis, Minnesota, one of the most wide-awake lumbermen of the country, estimates (in Wood and Iron December 1903) the standing timber of our whole country at only 1003 billion feet, board measure. Of this amount 625 billion feet are claimed for the three states of the Pacific coast.

Mr. R. A. Long, another leading lumberman, in an address delivered before the Southern Lumber Manufacturers' Association, in 1903, estimates the stumpage of all conifers found in the United States at 822 billion feet board measure. The experts of the American Lumberman, in 1905, estimate the total stumpage of conifers at 1,570 billion feet board measure, and the total stumpage of hardwoods at 400 billion feet board measure.

After circular 171, Forest Service, there is found in the United States:—

On public forest lands	484	billion	feet,	board	measure
On farmers' woodlands	300	„	„	„	„
On corporate holdings	1400	„	„	„	„
making a total of	2184	billion	feet,	board	measure.

The same circular estimates the original stand of the United States, prior to the advent of white men, at 5,200 billion feet, board measure, of merchantable timber, distributed as follows:—

Northern forests	1,000	billion	feet,	board	measure
Southern forests	1,000	„	„	„	„
Central forests	1,400	„	„	„	„
Rocky Mountain forests	400	„	„	„	„
Pacific forests	1,400	„	„	„	„

R. S. Kellogg gives the following estimate:—

Locality	Present Stand	Percentage of original stand left
Northern forests	300 billion ft.	30 %
Southern forests	500 » »	50 »
Central forests	300 » »	21 »
Rocky Mountain forest	300 » »	75 »
Pacific forests	1300 » »	79 »
Totals	2700 billion ft.	48 %

Estimated by species, Mr. Kellogg believes that the conifers comprise four-fifths and the hard woods one-fifth of the present stand. His estimates in detail are the following:—

Present stand by species

Douglas fir	525	billion	feet,	board	measure
Southern yellow pine	350	„	„	„	„
Western yellow pine	275	„	„	„	„
Redwood	100	„	„	„	„
Western hemlock	100	„	„	„	„
Western cedar	100	„	„	„	„
Lodgepole	90	„	„	„	„
White and Norway	75	„	„	„	„

Eastern hemlock	75	billion	feet,	board	measure
Western spruce	60	„	„	„	„
Eastern spruce	50	„	„	„	„
Western firs (abies)	50	„	„	„	„
Sugar pine	30	„	„	„	„
Cypress	20	„	„	„	„
Other conifers	100	„	„	„	„
Oak, Beech, Maple, Birch, Chestnut, Gum, Yellow poplar	500	„	„	„	„
	2500 billion feet, board measure.				

Mr. Kellogg estimates the stands according to ownership as follows:—

Nation and States	500	billion ft.,	or	20%	of	all	timber
Large private holdings	1700	„	„	68%	„	„	„
Small woodland holdings	300	„	„	12%	„	„	„

Herbert Knox Smith, Commissioner of Corporations, in a report submitted to President Taft on February 13th, 1911, gives the following estimates:

Stand of timber in the Continental United States located or owned		billion feet b. m.
in National Forests		539
on other non-private land		90
owned by Southern Pacific Co.	In Pacific North West	106
owned by Weyerhaeuser Timber Co.	In Pacific North West	96
owned by Northern Pacific Railway Co.	In Pacific North West	36
owned by 5 next largest holders in Pacific North West	In Pacific North West	94
balance privately owned in Pacific North West	In Pacific North West	681
privately owned in Southern pine region		634
privately owned in the Lake States		100
balance privately owned in the Rockies South of Montana, in the North Eastern and in the Central States		424
Grand Total:		2.800

As regards the supply of the two leading timber species in the United States, Mr. Kellogg predicts (circular 129) the following:—

"The cut of yellow pine is nearly one-third of the total lumber cut in the United States. The minimum and maximum estimates of yellow pine stumpage at hand are 130 and 300 billion feet, board measure, respectively. The present rate of cutting will exhaust the supply in about ten years in the first case, and in about 25 years in the second case, neglecting the annual growth, which is rapid with old field pine, and slow with long-leaved pine.

The largest estimate of the stand of Douglas fir is 350 billion feet. This means a 70 years' supply at the present rate of cutting, neglecting the annual growth. As it is probable that the cut will more than double within a few years, the outlook is that there will be comparatively little Douglas fir left in from 25 to 30 years. The case of Douglas fir now is parallel to that of white pine in the Lake States 30 years ago; and there is much reason to believe that the supply of Douglas fir, outside of the national forests, 30 years hence will be as limited as is that of white pine now."

As regards Canada, the forest wealth of Canada, in sawtimber, is estimated not to exceed one-third of our forest wealth. In pulp wood supplies, on the other hand, Canada exceeds us by far. When our timber supply has shrunk down to a point insufficient to satisfy our needs, we shall be forced to draw upon the timber wealth of Canada, Mexico, South America, Africa, Northern Europe, and notably Asiatic Russia and Manchuria. The possibility of supplying our needs from these countries depends largely on the possibility of water freightage. Naturally, lumber must be high-priced in the United States so as to allow in the future of importation from other continents.

The following tabular statement [by Schlich] illustrates the rôle played by the various leading countries, as exporters or importers:—

Excess Imports and Excess Exports of Timber for Various Countries in Million (long) Tons

Countries	Excess Imports	Excess Exports
United Kingdom	10.0	
Germany	4.6	
France	1.2	
Norway		1.1
Sweden		4.5
Austria		3.7
Russia		5.9
United States		1.0
Canada		2.1

As regards the United States, all experts agree that our imports must soon exceed our exports of lumber.

As regards Austria, its present excess of exports is apt to decline in the future. Von Guttenberg believes, nevertheless, that:—

"Austria will continue to export timber, hereafter as heretofore, especially so if the small forest owners succeed in improving the present management of their woodlands."

It is evident, on the other hand, that a large part of the export taking place from Austria is obtained, now-a-days, from the primeval forests situated in the Carpathians, in Slavonia, in Bosnia, and in the Bukowina.

As regards Russia, we must bear in mind that her forests are unequally distributed over the country. Woodlands abound in the northern part of European Russia, whilst the southern part is a prairie country. The northern forests are relatively inaccessible: The streams empty northwards into the Arctic Sea, and railroading is expensive owing to the absence of coal-mines.

Whilst it must be admitted, also, in view of the cold and northerly climate of Russia, that the trees are small, and their growth slow, it can be predicted, nevertheless, that the exports of Russia will show in the future a great increase over the present figures. The only dissenting voice with reference to exportations from Russia is that of M. Melard, who believes that Russia's industries and Russia's home demands will have developed by

the middle of the present century to such a degree as to preclude the possibility of continued timber exports.

The Russian forest administration claims:—

"that it does not withdraw from the woods, annually, one half of the raw material annually produced by growth; that three-fifths of the timber offered for sale is not marketable; that many of the huge state forests have not any outlet whatsoever; that the exportation of timber from Asiatic Russia is absolutely nil so far; and that the forests of Asiatic Siberia will, in days to come, form an inexhaustible timber reserve to supply the most remote parts of the globe."

As regards Sweden, it appears at a glance that Sweden is particularly favorably situated for the easy exportation of wood-goods. In addition, the quality of the Swedish spruce and of the Swedish pine is the best. The general prediction is that Sweden will continue to export at its present rate for an indefinite number of years. An increase in exportation is scarcely possible, for the simple reason that Sweden's forest area amounts to approximately 25 million acres only.

Norway has a much smaller forest area than Sweden; and its forests have been exploited with less regard to future production than have those of Sweden. Its timber exports seem to have a decreasing tendency.

Canada and Mexico are, of course, of the greatest interest to us with reference to the possibility of timber supplies at a time at which the United States will cease to produce an amount of timber sufficient for home consumption.

Without a doubt, exports from Canada will continue to increase, and probably very rapidly. It must be repeated, nevertheless, that the standing saw-timber in Canada is estimated at one-third only of the figure supposed to represent the amount contained in the United States; that Canada's main streams, like those of Siberia, empty themselves towards the north, generally speaking; that the timber line of Canada runs, from a point in central Alaska, southeastwardly to the southernmost part of Hudson Bay, continuing eastwardly to the southernmost part of Labrador; that very large areas within the timber zone of Canada consist of barren wastes heavily fired in the last fifty or sixty years; that the timber in the eastern provinces diminishes

in quantity and in size rapidly as we proceed northward. As regards pulp wood, on the other hand, we can rely upon Canada's exports for a great number of years to come: Canada abounding in spruce admirably adapted for the manufacture of pulp and fibre: And it is in the woods required for the manufacture of paper particularly that we are falling short in the United States of America.

As regards Mexico, it must be remembered that Mexico has been importing rather than exporting timber; that its northern pineries and its southern hardwood forests are relatively inaccessible, and will continue to be so even after the construction of railroads.

Looking over the timber requirements of the various countries, it is striking that these requirements have been on the increase continuously, in spite of the fact that steel and concrete have taken the place of wood very extensively.

HISTORY AND FACTS OF FOREST POLICY.

PARAGRAPH XXVII.

UNITED STATES FOREST POLITICAL HISTORY.

FIRST PERIOD, UP TO 1800. — "EARLY REGULATIONS."

1640 Exeter (now New Hampshire) regulates oak cutting.

1682 Pennsylvania ordains that "The grantee must keep the one-sixth part of land (granted in Pennsylvania) in forest."

1708 New Hampshire fines the cutting of mast trees on ungranted land and appoints the first forest official, "Surveyor General of Forests."

1780 All thirteen States adopt forest fire laws, modeled after European patterns but without European police.

1785—1805 Travels of the two Micheaux and the publication of their "North American Sylva."

SECOND PERIOD, 1800—1870. — "STAGNATION OF FOREST POLICY."

1799 Congress appropriates $200,000 for the purchase of naval timber and timber lands on some of the Georgia coast islands.

1817 Congress authorizes the President to reserve live oak and cedar tracts in the Louisiana Purchase for naval use. (About 250,000 acres were thus reserved in the succeeding years.)

1822 Congress authorizes the President to use land and naval forces for timber protection, in parks only (still in use).

1827 Congress appropriates $20,000 for silvicultural experiments with live oak.

1831 Congressional act punishing persons "cutting or destroying live oak, red cedar, or other trees growing on U. S. land."

1840 First Forest Census, reporting 31,000 saw-mills, averaging $400 value of annual output (prices higher than now).

1865 Great development of the lumber industries by the rapid opening of the Lake States, and the building of railroads.

1860—1870 Appearance of scattering articles in agricultural reports and magazines in regard to indirect utility of the forest (mostly translated from European works).

THIRD PERIOD, 1870—1910.— "INFANCY OF FOREST POLICY."

1870 First attempt to canvass the forest resources of the U. S. by Prof. F. W. Brewer (ninth census).

1873 First publication on forest policy by Dr. J. A. Warder, and by G. P. Marsh, on "The Earth as Modified by Human Action."

1873 American Society for the Advancement of Science memorializes Congress and the State legislatures to "promote cultivation of timber and to preserve the forests" and recommends proper legislation towards that end.

1873 Timber culture act, making it possible to acquire a quarter section of prairie land by planting 40 (or less in later years) acres in trees. Up to 1889, out of thirty million acres entered under this law, only 779,000 acres were granted. Law was repealed in 1891.

1870—1877 All prairie States, also Wisconsin, Minnesota, Pennsylvania, New York and Connecticut, begin to grant bounties or tax release on forest planting.

1876 Congress appropriates $2,000 for a forest agency in the Department of Agriculture. Duties of the agent: To gather statistics and to furnish information. Dr. F. B. Hough appointed. Three voluminous reports.

1878 Timber and Stone Act.

1881 Agency is advanced to the rank of a division.

1882 Formation of the "American Forestry Congress," styled thereafter "American Forestry Association," at Cincinnati, by the influence of Baron von Steuben.

1880—1890 Decade of "Paper Work" by State commissions.

1880 Monumental report on forestry by C. S. Sargent in Tenth Census.

1883 M. H. Eggleston succeeds Hough as Chief of the Division of Forestry.

1886 Division of Forestry made an integral part of the Department of Agriculture. Dr. B. E. Fernow, Secretary of the American Forestry Association, succeeds Eggleston as chief.

1886—1898 Valuable reports by the Division of Forestry (especially on Timber Physics, Sylvan Nomenclature, Southern Pines, Sheep Grazing), whilst no practical work and no practical results were possible. The public mind, however, fully prepared, by continuous agitation, for future work. Small appropriations, never exceeding $30,000.

1891 Congress authorizes the President (Harrison) to create forest reserves by proclamation.

1897 National Forests [Reserves] Act of June 4th.

1898—1910 Gifford Pinchot appointed Chief of Division of Forestry; practical work begun on a large scale; gradual reconciliation between lumbering interests and forestry.

1901 Division of Forestry elevated to rank of Bureau, with six divisions. (Forest Management, Forest Measurements, Forest Extension, Forest Products, Dendrology, and Records.) Excellent reports of practical value. Appropriation raised to $300,000.

1903 Roosevelt appoints a commission of three (known as Public Lands Commission), to report on the present federal land laws.

1905 Forest Congress in Washington.

1905 Forest Reserves are transferred from the Department of the Interior to the Department of Agriculture, February 1st.

1905 The Bureau of Forestry in the Department of Agriculture styled "Forest Service," March 3rd.

1906 Forest Homestead Act, June 11th.

1907 Reorganisation of Forest Service by which are created six inspection districts in the national forests, and by which the power and the work of the Forest Service is decentralized.

1902—1907 The area of the national forests increased by Roosevelt's proclamations to 150 million acres.

1907 The President's power crippled by Congress with reference

to further proclamations in Oregon, Washington, Idaho, Montana, Colorado, and Wyoming, so that the area of national forests in these states can not be increased hereafter except by Act of Congress, March 4th.

1907 Name of "Forest Reserves" changed into that of "National Forests."

1908 The Governors of the States convene at the White House upon Roosevelt's invitation, and issue a joint declaration in favor of the conservation of the natural resources, May 15.

1908 Annual appropriations to Forest Service exceed three million dollars.

1909 Canada, Mexico, and the United States hold a joint "North American Conservation Conference."

1910 Henry Solon Graves succeeds Gifford Pinchot as Forester of the United States Forest Service.

PARAGRAPH XXVIII.

PRESENT STATUS OF FEDERAL LANDS IN THE UNITED STATES.

A. AREAS AND STANDS.

The total area of the public lands under federal control was, once upon a time, 1,141,436,168 acres.

On June 30th 1904 this total area had dwindled down to 473,836,402 acres (excluding Alaska), according to the report of the Public Land Commission.

Over 300 million acres out of the figure just given are grazing lands.

The greater portion of the vacant land owned by the United States is found in the timbered regions of the southern states, the Lake region, the Pacific coast; and in the mountainous and arid regions of the far west. The portion of land cultivable without irrigation is comparatively small.

According to F. H. Newell, only 71 million acres of the land in the semi-arid region (or 1 acre in 7½ acres) can ever be improved by irrigation. 70 million acres are deserts.

The military reservations of the United States comprise 875,000 acres, situated notably in Montana, New Mexico, Oklahoma, Arizona, Alaska, Nebraska, and Wyoming.

The Indian reserves aggregate approximately 80 million acres.

The national forests, 150 in number, cover an area of 168 million acres, exclusive of the national forests in Alaska comprising 27 million acres and of the national forest in Porto Rico comprising 66,000 acres.

The "national monuments" (within the national forests) occupy 1,426,000 acres, of which 800,000 are situated in the Coconino and Kaibab (Grand Cañon) national forests, and over 600,000 in the Olympic national forest.

The area of the unappropriated land contained in the various states is the following, approximately:—

State or Territory	Area unappropriated and unreserved			Area reserved	Area appropriated
	Surveyed	Unsurveyed	Total		
	1000 acres	1000 acres	1000 acres	1000 acres	1000 acres
Alabama	219	. . . . ,	219	51	32,387
Alaska	. . . . .	[a]368,036	368,036	[b]68	. . . . .
Arizona	12,064	34,937	47,001	20,249	5,541
Arkansas	2,428	. . . . .	2,428	2	31,113
California	28,077	7,136	35,213	20,819	43,937
Colorado	31,733	4,098	35,831	5,294	25,222
Florida	4,997	160	1,157	19	33,895
Idaho	10,848	28,819	39,667	2,061	11,563
Illinois	. . . . .	. . . . .	. . . . .	. . . . .	35,842
Indiana	. . . . .	. . . . .	. . . . .	. . . . .	22,950
Indian Territory	. . . . .	. . . . .	. . . . .	19,714	. . . . .
Iowa	. . . . .	. . . . .	. . . . .	. . . . .	35,645
Kansas	947	. . . . .	947	120	51,315
Louisiana	102	65	167	1,468	27,420
Michigan	340	. . . . .	340	120	36,358
Minnesota	2,243	884	3,127	2,346	45,724
Mississippi	92	. . . . .	92	. . . . .	29,593
Missouri	191	. . . . .	191		43,604
Montana	18,409	38,046	56,455	18,616	18,521
Nebraska	7,822	12	7,834	628	40,674
Nevada	30,833	30,417	61,250	5,983	3,103
New Mexico	38,123	14,128	52,251	7,356	18,820
North Dakota	7,795	3,302	11,097	2,686	31,126
Ohio	. . . . .	. . . . .	. . . . .	. . . . .	26,063
Oklahoma	2,095	. . . . .	2,095	3,055	19,568
Oregon	14,527	5,647	20,174	14,894	26,208
South Dakota	10,413	306	10,719	12,225	26,260
Utah	11,560	28,143	39,703	7,750	5,087
Washington	4,009	4,854	8,863	11,395	22,489
Wisconsin	71	. . . . .	71	432	34,771
Wyoming	34,320	2,609	36,929	15,511	9,992
Total	270,258	571,599	841,857[c]	172,851	794,891

a) The lands in Alaska are mostly unsurveyed and unappropriated. — b) Excluding national forests. — c) The Report of the National Conservation Commission submitted to the Joint Conservation Conference in 1909 makes the total of unappropriated and unreserved lands situated in the Continental United States exclusive of Alaska 386,873,787 aeres.

Situated within the national forests are also the "National game preserves": one of them in the Coconino and Kaibab national forests, comprising 1,500,000 acres; and the other in the Wichita national forest, comprising 57,000 acres.

The "national parks" of the United States cover four million acres approximately.

Over a hundred thousand acres are reserved as reservoir sites.

The stand of timber on the federal lands is estimated in circular 171 of the Forest Service to be as follows:—

		Total stand
In national forests	board feet	390,000,000,000
In national parks	„ „	11,000,000,000
In unreserved public domain ...	„ „	14,000,000,000
In Indian reservations	„ „	34,000,000,000
	Total board feet	449,000,000,000.

B. DISPOSITION OF PUBLIC LANDS.

When the United States obtained possession of vast stretches of land by purchase (Louisiana purchase and Florida purchase), conquest, or treaty, they adopted, for the disposal of such land to private persons, principles similar to those which had been prevalent with the original 13 states disposing of state lands, in the humid east. At that time plenty of timberland was at hand; and the idea underlying the federal policy was entirely that of creating the largest possible number of happy agricultural homes in the newly acquired territories: Our entire land policy during the nineteenth century was framed to meet agricultural needs, solely and directly.

The disposition of vacant land belonging to the United States takes place through the General Land Office in the Department of the Interior, notably under the following laws:

First: The Homestead Law of 1862, which provides that any citizen of the United States may acquire one hundred and sixty acres of land of the United States, not otherwise occupied or reserved, by filing an affidavit of honest intention with the local land agent, paying certain fees, and either residing on the land for five years, or else residing on the land six (viz. fourteen) months, and paying for the value of the land at the

minimum rate of one dollar and twenty-five cents per acre (Commutation clause).

In the State of Missouri public lands are sold privately at the rate of one dollar and twenty five cents per acre away from the railroads, and in alternate sections along the railroads at two dollars and fifty cents per acre.

In Oklahoma, homesteaders settling under the homestead law must pay from one dollar to two dollars and fifty cents and in Minnesota, on the former Chippewa reservation, one dollar and twenty-five cents extra per acre.

A number of special laws facilitate homesteading for certain applicants and in certain localities. The "preemption laws" and the "timber culture acts" are repealed.

The homestead law was framed to suit the settler in the prairies.

The Interior Department excuses temporary absences of homestead claimants when rendered necessary. The homestead must be used by the claimant, however, to the exclusion of a home elsewhere. For criticism of the Commutation Clause of the Homestead Act see page 7 in the Second Partial Report of the Public Lands Commission, attached to Roosevelt's message to Congress dated February 13th. 1905. The Commutation Clause results frequently in the abandonment of habitations.

The annual disposition of land under the Homestead Act amounts in the last decade to approximately $3^1/_2$ million acres.

In the year ending June 30th 1908, there were 29,636 entries covering 4,242,710 acres. The annual acreage patented to homesteaders taking advantage of the Commutation Clause is on the increase. In 1904, for instance, over 2 million acres of homesteads were commuted out of a total of 3.2 million acres homesteaded.

Between 1868 and 1906, 100 million acres exactly were homesteaded (including commutations).

Second: Isolated areas of vacant land are sold upon request of parties interested, after advertising in the local papers, in tracts not exceeding one hundred and sixty acres, at public auction. Minimum price must be $1.25 per acre. These are the only auction sales of public lands.

The acreage annually sold under this law is small, having rarely exceeded 100,000 acres in any given year.

Third: The Timber and Stone Act, of June 3rd. 1878, permits every citizen or prospective citizen to acquire one hundred and sixty acres of land, unfit for either agriculture or mining, and chiefly valuable for timber or stone, at a price of two dollars and fifty cents per acre. The entryman is forbidden to act under previous agreement of sale to some third party.

From the passage of the Timber and Stone Act to June 30th. 1904, 7,600,000 acres (only!!) of timber and stone land were patented under its provisions; and 7,644 claims for 1,100,000 acres were pending on the date given (figures from Report of Public Land Commission).

Simultaneously with the Timber and Stone Act, there was passed, on June 3rd. 1878, another Act permitting citizens and other persons to cut and remove timber and wood (of 8" diameter or more) from any mineral lands in any mineral district of the United States: for building, agricultural, mining, and other domestic purposes. The looseness of the wording of this law has caused it to be used as a cover for timber steals. By this act, however, not the land, but merely the timber is being given away.

Fourth: The Desert Land Act, of 1877, meant to encourage irrigation, permits the disposal of public land in quantities not exceeding 320 acres. The entries made under this act are assignable; the grantee is not required to reside on the land, but must prove the existence of an adequate and permanent water supply. Lands acquired under this act must be incapable of producing a crop without irrigation.

Fifth: The Indian land laws provide that Indian lands ceded to the United States, if agricultural or irrigable, must be opened to homestead entry.

Indian allotments, the President allotting to each member of a tribe from 40 to 160 acres according to his or her age, are held in trust by the United States for the allottees, to be conveyed in fee after the lapse of 25 years. The former Indian territory and some Indian reservations (New York, Nebraska) are exempted from this rule.

Sixth: The Mining Laws distinguish between:—

1. placer mines, which are open to entry in tracts not exceeding 160 acres, obtainable at $2.50 per acre;

2. lode mines, which are patented to the claimant in tracts not exceeding about twenty acres, on payment of $5.00 per acre.

In both cases, the claimant must have invested on his claim $500 for labor and improvements before issue of patent. Mining entries are permitted in the national forests as if the land were vacant.

In the Lake states, further in Missouri, Kansas, and Alabama, mineral land is either sold at public auction or opened to entry like agricultural land.

Seventh: The Carey Act, of August 18th. 1894, donates to each arid land state one million acres, providing, however, that the state should see to the reclamation of that land by irrigation.

Eighth: The Swamp Land Acts, the oldest dating back to September 28th. 1850, grant to the public land states all the swamp land found within their boundaries.

Under these Acts, and under the Carey Act given under "Seventh," the states benefited select "so-called deserts" and "so-called swamp-land" to be patented by the United States to the individual state. The state selections amount to many hundred thousands of acres annually.

Ninth: The Forest Reserve Act, of June 4th. 1897, permits the exchange of private land found within national forests for any vacant land outside the national forests ("lieu" selections; "scrip" land). The scrip law was repealed in 1905; but the scrip continues to exist.

Tenth: Railroad grants. Many of the Western and all of the trans-continental railroads were given huge land grants, so as to help and induce the construction of such railroads. Title was not passed to the railroads immediately, owing to the lack of surveys. As time goes on, the railroads obtain proper title by proper patents for the lands in question. There are 79 railroad grants, and each grant has some feature peculiar to itself. The area covered by these grants was 197 million acres originally, or about ten per cent of the area of the United States. The failure of the grantees to construct the roads has reduced the acreage to approximately 155 million acres now-a-days.

A number of conflicts arise between the railroad grants and the swamp land grants.

In addition, Congress has granted the railroads, upon certain conditions, the right to pass through public lands by Act of March 3rd. 1875.

Eleventh: Schoolland-laws. In every township of every public land state, two non-mineral sections (no. 16 and no. 36) are given to the state for the benefit of the public schools existing within the state. Such "schoollands" must be sold, usually, by the state, to the exclusion of any management thereof (by the state on behalf of the schools). The problem of schoollands situated within national forests is apt to give special trouble (Forestry and Irrigation, 1907, p. 546).

If a school section is established, surveyed and identified within a national forest already existing, the state may select any other unreserved, non-mineral lands of the United States in lieu of such section. In the Dakotas, Idaho, Montana, Utah, Washington and Wyoming, however, the school-sections belong to the state as if the national forests had never been established.

C. CHANGES SUGGESTED.

(Compare Report of Public Lands Commission):

1. The balance of the public lands left vacant must be classified. The present land laws are not suited to meet the changed conditions of the time, and the actual conditions of the lands left vacant.

2. Lieu land laws and scrip laws must be repealed, or should not be enacted any more.

3. Timber and Stone Act must be repealed.

4. Commutation clause of the Homestead Act must be restricted to cases of actual residence exceeding three years.

5. Size of entries under the Desert-Land Act should be reduced to 160 acres; and actual living on the desert land, for not less than two years, and the actual production of a valuable crop on not less than a quarter of the area should be required.

6. The Federal Government should retain in fee simple and maintain in efficient condition either all vacant land, the productiveness of which a private individual can neither secure nor maintain single-handed; or else all land less valuable for

homemaking than for the conservation of the waters and of the timber.

7. The resources still belonging directly to the Nation, which must necessarily be diminished and finally destroyed by use, should be exploited and used in a way to return the greatest benefit in the long run to the greatest number, the essential caution being to prevent waste, and, without prohibiting or hindering economical development, prevent such monopoly as might artificially increase the cost of the resources to the people beyond what would bring to the exploiter a full reasonable profit and no more (from report of National Conservation Commission).

When the land itself, independent of the minerals under its surface, is more valuable for agricultural use than for permanent dedication to public use, it should be given, in such areas as will furnish a reasonable living to an average family, to those who will actually make homes on it and to no others.

D. ADMINISTRATION OF VACANT LAND OF THE UNITED STATES.

All vacant land of the United States is under the control and management of the General Land Office in the Department of the Interior. The General Land Office delegates special agents for litigation, proceedings, examinations, reports, and so on. It maintains a number of land offices in the various parts of the various public land states.

Residents of the western states—whether citizens or otherwise—may cut as much timber as they care to cut from vacant mineral lands for almost any purpose.

Where the vacant land is non-mineral, the residents have no legal chance to secure any timber, and are forced to trespass in a desire to satisfy their timber requirements, unless there are national forests near by.

Railroad and telegraph companies are privileged to obtain timber, for construction purposes, from adjoining vacant lands within ordinary hauling distance.

The Denver and Rio Grande railroad is allowed repair timber as well as construction timber.

In vacant public forests, the "boxing" of timber is forbidden.

Heavy fines are imposed on the firing of vacant public woodlands; but there exists no staff enforcing compliance with the law.

The vacant public lands are, theoretically, open commons, free to all citizens; as a matter of fact, however, a large portion have been parceled out by more or less definite private compacts, among various interests. On the grazing lands, the sheep-men and the cattle-men are in frequent collision on account of incursions upon each other's "domains". The general lack of control in the use of public grazing lands has resulted—naturally and inevitably—in over-grazing (Report of Public Lands Commission).

The National Conservation Commission states:

> "The public range of the western States is estimated to be 300 million acres in area. Upon this range it is estimated that there are 50 million cattle and 40 million sheep. The range is in very bad condition, especially that part occupied by sheep, owing to overgrazing and trampling. These bad conditions can be remedied by an assumption of control over the range by its owner, the United States, and the portioning out of it to stock-ranges individually. This asset of the country has been misused and wasted almost as criminally as the forests."

The Public Lands Commission recommends that suitable authority be given to the President to set aside by proclamation certain grazing districts; such districts to be used permanently under the control of the Department of Agriculture.

Lands of special value for definite purposes (coal lands, water-power sites, irrigation projects) may be withdrawn from entry (Public Lands Withdrawal Act of 1910).

The gross receipts by the General Land Office for public lands sold and for fees and commissions collected (on public lands disposed of otherwise than for cash) have averaged $6,000,000 per annum, since 1885.

On an annual average, 15,000,000 acres of vacant public land are being patented, the title being taken out of the United States.

PARAGRAPH XXIX.

HISTORY OF THE NATIONAL FORESTS.

The "National Forests" of the United States are situated in the so-called "public land states" and territories, and comprise land, the title to which has been vested in the United States ever since the Louisiana purchase, the Florida purchase, the Mexican war, the Oregon settlement, and so on. The difference between national parks and national forests lies (and has been lying) in the following points essentially:—

Firstly: National parks are established by Act of Congress; national forests by presidential proclamation or (rarely) by Act of Congress.

Secondly: National parks are not intended for any use except for public recreation; national forests are intended, and are especially reserved for the use of the whole people—not for the use of individuals—with reference to any and all of their resources.

Thirdly: National parks are in charge of the Secretary of War, and are protected by the army forces; national forests are in charge of the Secretary of Agriculture, and are protected by a special staff of the "Forest Service."

By Act approved on March 3rd. 1891,—after twenty years of public agitation in favor of such Act—,the President of the United States was authorised to reserve as "public reservations" any part of the public lands, wholly or in part covered with timber or undergrowth, whether of commercial value or not. The President was requested to declare the establishment of such reservations and the limits thereof by public proclamation.

The Act was passed under President Harrison, and under the auspices of the then Secretary of the Interior, John W. Noble. Characteristic it is that this basal law of all national forestry was smuggled into an appropriation bill by way of a rider.

The public reservations were named "national forest reserves." President Harrison availed himself immediately (March 30th 1891) of the opportunity offered, creating by proclamation the "Yellowstone Park Timberland Reserve."

A number of national forest reserves were added during Cleveland's administration.

The governmental branch in charge of the forest reserves, the General Land Office, was accused of mismanagement; consequently the Secretary of the Interior requested the National Academy of Sciences in 1896 to appoint a commission instructed to report on a rational forest policy for the forest lands of the United States. This commission was headed by Charles S. Sargent, who appointed Gifford Pinchot secretary of the commission. After traversing the west on a flying tour, the commission advised the establishment of another 21 million acres of national forest reserves, situated in Washington, Oregon, California, Wyoming, Montana, Idaho, Utah, and South Dakota. The commission was unanimous in denouncing forest pasture as practised or permitted in the reserves.

Public opinion in the western states, however, upon the proclamation by President Cleveland on February 22nd. 1897 of the above 21 million acres of reserves, succeeded in forcing the Senate to suspend and set aside the proclamation in question until March 1898. In the meantime a great change took place in the public opinion of the west: The people becoming convinced that irrigation without forest reserves was impossible. In addition, the General Land Office consented to modify the regulations governing the use of the reserves, permitting sheep and cattle pasture to a limited degree,—thus removing one of the greatest causes for complaint.

The change of public opinion was crystallized in the passage of the Act of June 4th. 1897, which forms the basal law under which, with several subsequent amendments, our national forests are being administered. This law:—

1. Provides for the establishment of forest reserves only for the improvement and protection of the forest; for the improvement of favorable conditions of stream-flow; and for the permanency of a timber supply.

2. Provides for the protection of the forest reserves under regulations by the Secretary of the Interior against fire and depredations.

3. Provides for the sale, from the forest reserves, of dead, matured, and large growth of trees.

4. Provides for the free use of timber and fuelwood by settlers, residents, miners, and prospectors for minerals.

5. Provides that the jurisdiction, both civil and criminal, for persons living within the forest reserves, shall not be affected or changed by reason of the existence of such reserves, except so far as the punishment of offences against the United States therein is concerned.

6. Provides—rather ambiguously—that all waters in such reserves may be used for mining, milling, irrigation,—either under the State laws or under the laws of the United States.

7. Provides for the restoration to the vacant public domain, by proclamation of the President, of public lands embraced within the limits of any forest reserve found to be mineral or agricultural.

8. Provides that mineral lands within forest reserves are open to entry hereafter as heretofore; which means to say that, as far as mineral entries are concerned, the national forests are non-reserved for public use.

From 1897 to 1907, it might be said, all opposition to the forest reserves in the west became dormant. It is worthy of note that the lumbermen of the west have never objected to the establishment of forest reserves; that the opposition of the cattlemen and sheepmen has been changed into support through the wise policy of the Forest Service; that the irrigation interests have been—until quite recently—very favorable to the establishment of national forests; and that the fight against the national forest policy in recent years is one of state versus nation rather than a fight of any definite industrial interest against the Forest Service.

Presidents McKinley and Roosevelt had increased by 1904 the number of the national forest reserves to 53, and the aggregate acreage thereof to 63 million acres. The General Land Office, from 1897 on and from time to time, was preparing

rules and regulations governing the use and the administration of the forest reserves. Noteworthy amongst the codifications of these rules is the "Forest Reserve Manual" issued by Filibert Roth, who was for a number of months the chief adviser of the General Land Office.

It became apparent, nevertheless, that the peculiar problems arising from the use of the forest and of the range demanded the introduction of forestry methods, and the employment of a staff trained in forestry. Since this staff could not be provided by the General Land Office under the existing system, the advice and the services of the Bureau of Forestry were sought by the Secretary of the Interior. Thus it came about that the work in the forest reserves was done for a number of years by a number of governmental branches, to wit:—

All surveying, mapping, and classification by the United States Geological Survey.

All technical work in forestry by the Bureau of Forestry.

All administrative work, fee simple work, and all investigations as to trespass and title by the General Land Office.

The necessity of consolidating the various branches of governmental forestry work became apparent, and was urged upon Congress by President Roosevelt. The Act of February 1st. 1905 was the result: by which was transferred to the Secretary of Agriculture the entire jurisdiction over the forest reserves, except in matters of surveying, and in passage of title.

The Secretary of Agriculture immediately placed the national forest reserves in charge of the Bureau of Forestry, soon thereafter styled the "Forest Service of the United States."

President Roosevelt lent his powerful support to the Forest Service immediately. The acreage of the forest reserves was increased very rapidly, so much so that a number of the western senators became alarmed at their growth within their respective states, fearing the domineering interference of the National Government in State affairs.

The result was the Act of Congress dated March 4th. 1907, which provides that the acreage of national forests in the States of Washington, Oregon, Idaho, Montana, Wyoming, and Colorado shall not be increased hereafter except by Act of Congress.

In 1907 the Forest Service was re-organized, the name of the "national forest reserves" being changed into that of "national forests." The re-organization had for its purpose the decentralization of the management of the national forests, so that local questions could be adjudged by forestry officials fully in touch with local conditions. Six inspection districts were established, with headquarters at Missoula, Denver, Albuquerque, Ogden, San Francisco, and Portland. Only matters of exceptional importance touching the national forests are now referred to the Forester in Washington.

On June 11th. 1906 an Act was passed for the re-opening to entry of any areas within the national forests chiefly valuable for agriculture. The Act is known as the Forest Homestead Act, or as the Agricultural Settlement Act. The Act authorizes the Secretary of Agriculture to examine—upon application or otherwise—what lands in national forests are chiefly valuable for agriculture, and may be occupied for agricultural purposes without injury to the national forests. Lists of such lands shall be filed with the Secretary of the Interior, to be re-opened for entry under the Homestead Laws. The lands thus restored must be described by metes and bounds.

On February 15th. 1911, the United States Senate passed the so-called "Weeks Bill" introduced in the House of Representatives by Congressman Weeks in summer 1909. This bill makes possible the establishment of national forests, at the headwaters of navigable streams in any state of the Union, by purchase from private parties, and appropriates for such purchase, to be available for a number of years, several million dollars.

The national forests thus acquired are to be held by the United States as if they had been proclaimed by the President under the power given to him by the Act of March 3rd. 1891. The Secretary of Agriculture must recommend the purchase. The Geological Survey must endorse the recommendation, certifying that the purchase will be of value to the water regime of the streams draining the forest. The state wherein the purchase is to be made must consent by legislative act to the acquisition of the land by the nation; the legal title to the land must be certified as being clear by the Attorney General of the United States; and the purchase must be approved finally

by the National Forest Reservation Commission (annual appropriation $25,000), consisting of three secretaries (War, Interior, and Agriculture), two senators and two congressmen.

The grantors from whom the nation acquires the title may reserve, as easements, mineral rights, timber and so on. Such parts of a national forest thus acquired under the Weeks Bill as are agricultural in character can be re-opened to homesteaders. Since the state and the county wherein a national forest is established by purchase will lose the tax receipts from such forest, it is provided that five per cent of the monies received from a national forest shall be turned over to the secretary of the state treasury, to be spent for public schools and for public roads within the counties composing the national forest.

The acreage of the national forests, including those of Alaska, is close to 200 million acres now-a-days. The location and area of the national forests appears from the following tabular statement:—

LOCATION AND AREA OF THE NATIONAL FORESTS

State or Territory	Forest	Headquarters of supervisor	Area	Total
			Acres	Acres
Arizona . .	Apache	Springerville . . .	1,785,711	
	Chiricahua(in part)	Douglas	287,520	
	Coconino	Flagstaff	3,689,982	
	Coronado	Benson	966,368	
	Crook	Safford	788,624	
	Dixie (in part) .	St. George, Utah .	626,800	
	Garces.	Nogales	644,395	
	Kaibab	Kanab, Utah . . .	1,080,000	
	Prescott.	Prescott	1,541,762	
	Sitgreaves	Snowflake	1,470,364	
	Tonto	Roosevelt	2,110,354	
	Zuñi (in part) . .	. . . . .	266,981	
				15,258,861
Arkansas .	Arkansas	Mena	1,663,300	
	Ozark	Harrison	1,526,481	
				3,189,781
California .	Angeles	Los Angeles . . .	1,350,900	
	California	Willows	1,114,904	
	Cleveland	San Diego	2,236,178	
	Crater (in part) .	Medford, Oreg. .	58,614	
	Inyo (in part) . .	Bishop	1,458,444	
	Klamath	Yreka	2,094,467	
	Lassen	Red Bluff	1,373,043	
	Modoc	Alturas	1,471,817	
	Mono (in part) .	Gardnerville, Nev.	813,789	
	Monterey	Salinas	514,477	
	Plumas	Quincy . . . . . ,	1,407,053	
	San Luis	San Luis Obispo	355,990	
	Santa Barbara . .	Santa Barbara . .	2,027,180	
	Sequoia	HotSprings,Tul.Co	3,079,942	

State or Territory	Forest	Headquarters of supervisor	Area	Total
			Acres	Acres
California .	Shasta	Sisson	1,754,718	
	Sierra	Northfork	1,935,680	
	Siskiyou (in part)	Grants Pass, Oreg.	37,814	
	Stanislaus	Sonora	1,117,625	
	Tahoe (in part) .	Nevada City . . .	1,931,042	
	Trinity	Weaverville . . .	1,834,833	
Colorado .	Arapaho	Sulphur Springs .	796,815	27,968,510
	Battlement	Collbran	759,002	
	Cochetopa	Saguache	932,890	
	Gunnison	Gunnison	945,350	
	Hayden (in part) .	Encampment, Wyo	84,000	
	Holy Cross	Glenwood Springs	595,840	
	La Sal (in part) .	Moab, Utah . . .	29,502	
	Las Animas (i. p.)	La Veta	196,140	
	Leadville	Leadville	1,184,730	
	Medicine Bow . .	Fort Collins . . .	659,780	
	Montezuma	Mancos	1,175,811	
	Pike	Denver	1,457,524	
	Rio Grande . . .	Monte Vista . . .	1,262,158	
	Routt	Steamboat Springs	1,049,686	
	San Isabel	Westcliffe	560,848	
	San Juan	Durango	1,460,880	
	Sopris	Aspen	655,360	
	Uncompahgre . .	Delta	921,243	
	White River . . .	Meeker	970,880	
Florida . . .	Choctawhatchee .	. . . . .	467,606	15,698,439
	Ocala	. . . . .	207,285	
Idaho . . .	Beaverhead (i. p.)	Dillon, Mont . . .	304,140	674,891
	Boise	Boise	1,147,360	
	Cache (in part) . .	Logan, Utah . . .	276,640	
	Caribou (in part)	Idaho Falls	733,000	
	Challis	Challis	1,161,040	
	Clearwater	Kooskia	2,687,860	
	Coeur d'Alene . .	Wallace	1,543,844	
	Idaho	Elo	1,293,280	

State or Territory	Forest	Headquarters of supervisor	Area	Total
			Acres	Acres
Idaho. . . .	Kaniksu (in part)	Newport, Wash. .	544,220	
	Lemhi	Mackay	955,408	
	Minidoka (i. p.) .	Oakley	619,204	
	Nezperce	Grangeville	1,946,340	
	Payette	Emmett	844,240	
	Pend d'Oreille . .	Sandpoint . . . : .	913,364	
	Pocatello (in part)	Pocatello	288,148	
	Salmon	Salmon	1,762,472	
	Sawtooth	Hailey	1,211,920	
	Targhee (in part)	St. Anthony . . .	1,101,720	
	Weiser	Weiser	764,829	
				20,099,029
Kansas . . .	Kansas	Garden City . . .	302,387	
				302,387
Michigan .	Marquette	. . . . .	30,603	
	Michigan	. . . . .	132,770	
				163,373
Minnesota .	Minnesota	Cass Lake	294,752	
	Superior	Ely	909,734	
				1,204,486
Montana . .	Absaroka	Livingston	980,440	
	Beartooth	Red Lodge	685,293	
	Beaverhead (i. p.)	Dillon	1,506,680	
	Bitterroot	Missoula	1,180,900	
	Blackfeet	Kalispell	1,956,340	
	Cabinet	Thompson Falls .	1,020,960	
	Custer	Ashland	590,720	
	Deerlodge	Anaconda	1,080,220	
	Flathead	Kalispell	2,092,785	
	Gallatin	Bozeman	907,160	
	Helena	Helena	930,180	
	Jefferson	Great Falls	1,255,320	
	Kootenai	Libby	1,661,260	
	Lewis and Clark.	Chouteau	844,136	
	Lolo	Missoula	1,211,680	
	Madison	Sheridan	1,102,860	
	Missoula	Missoula	1,237,509	
	Sioux (in part) .	Camp Crook, S.Dak.	145,253	
				20,389,696
Nebraska .	Nebraska	Halsey	556,072	
				556,072

State or Territory	Forest	Headquarters of supervisor	Area	Total
			Acres	Acres
Nevada . .	Humboldt.	Elko.	1,158,814	
	Inyo (in part) . .	Bishop, Cal. . . .	62,573	
	Moapa	Las Vegas	390,580	
	Mono (in part) .	Gardnerville . . .	535,337	
	Nevada	Ely	1,222,312	
	Tahoe (in part) .	Nevada City, Cal.	61,085	
	Toiyabe	Austin	1,678,714	
				5,109,415
New Mexico	Alamo.	Alamogordo . . .	1,513,817	
	Carson	Antonito, Colo. .	1,390,680	
	Chiricahua (i. p.)	Douglas, Ariz. . .	178,977	
	Datil	Magdalena	2,869,888	
	Gila	Silver City	1,782,562	
	Jemez	Santa Fe	944,085	
	Las Animas (i. p.)	La Veta, Colo. .	480	
	Lincoln	Capitan	677,790	
	Manzano	Albuquerque . . .	587,110	
	Pecos	Santa Fe	622,322	
	Zuñi (in part) . .	. . . . .	404,000	
				10,971,711
North Dakota	Dakota	Camp Crook, S.Dak.	13,940	
				13,940
Oklahoma .	Wichita	Cache	60,800	
				60,800
Oregon . .	Cascade.	Eugene	1,767,370	
	Crater (in part)	Medford.	1,061,220	
	Deschutes.	Prineville	1,504,207	
	Fremont	Lakeview	1,260,320	
	Malheur	John Day.	1,167,400	
	Oregon	Portland.	1,787,280	
	Siskiyou (in part)	Grants Pass . . .	1,264,579	
	Siuslaw	Eugene	821,794	
	Umatilla	Heppner	540,496	
	Umpqua	Roseburg	1,567,500	
	Wallowa	Wallowa	1,750,240	
	Wenaha (in part)	Walla Walla, Wsh.	494,942	
	Whitman	Sumpter	1,234,020	
				16,221,368
South Dakota	Black Hills	Deadwood	1,190,040	
	Sioux (in part) .	Camp Crook . . .	104,400	
				1,294,440

State or Territory	Forest	Headquarters of supervisor	Area	Total
			Acres	Acres
Utah	Ashley (in part) .	Vernal	947,490	
	Cache (in part) .	Logan	257,200	
	Dixie (in part) . .	St. George	475,865	
	Fillmore	Beaver	578,459	
	Fishlake	Salina	537,233	
	La Sal (in part) .	Moab	444,628	
	Manti	Ephraim	786,080	
	Minidoka (in part)	Oakley, Idaho . .	117,203	
	Nebo	Nephi	343,920	
	Pocatello (in part)	Pocatello, Idaho .	10,720	
	Powell	Escalante	726,159	
	Sevier	Panguitch	710,920	
	Uinta	Provo	1,250,610	
	Wasatch	Salt Lake City . .	249,840	
				7,436,327
Washington	Chelan	Chelan	2,492,500	
	Columbia	Portland, Oreg. .	941,440	
	Colville	Republic	869,520	
	Kaniksu (in part) .	Newport	406,520	
	Olympic	Olympia	1,594,560	
	Rainier	Orting	1,641,280	
	Snoqualmie	Seattle	961,120	
	Washington . . .	Bellingham	1,419,040	
	Wenaha (in part)	Walla Walla . . .	318,400	
	Wenatchee	Leavenworth . . .	1,421,120	
				12,065,500
Wyoming .	Ashley (in part) .	Vernal, Utah . . .	4,596	
	Bighorn	Sheridan	1,151,680	
	Bonneville	Pinedale	1,627,840	
	Caribou (in part)	Idaho Falls, Idaho	7,740	
	Cheyenne	Laramie . . . : . .	617,932	
	Hayden (in part)	Encampment . . .	370,911	
	Shoshone	Cody	1,689,680	
	Sundance	Sundance	183,224	
	Targhee (in part)	St. Anthony, Idaho	377,600	
	Teton	Jackson	1,991,200	
	Wyoming	Afton	976,320	
				8,998,723
Total of 147 National Forests in the United States				167,677,746

State or Territory	Forest	Headquarters of supervisor	Area	Total
			Acres	Acres
Alaska . . .	Chugach	Ketchikan	11,280,640	
	Tongass	Ketchikan	15,480,986	
				26,761,626
Porto Rico	Luquillo		65,950	
				65,950
Grand total of 150 National Forests				194,505,325

„i. p." or „in part" signifies that the national forest is located in two states.

The following national monuments situated within National Forests have been created under the act of June 8th., 1906 (34 Stat. 225), for the preservation of objects of historic or scientific interest:—

Name	National Forest	State	Area
			Acres
Cinder Cone	Lassen	California	5,120
Gila Cliff-Dwellings .	Gila	New Mexico . . .	160
Grand Canyon	Coconino and Kaibab	Arizona	806,400
Jewel Cave	Black Hills	South Dakota . .	1,280
Lassen Peak	Lassen	California	1,280
Pinnacles	Monterey	California	2,080
Tonto	Tonto	Arizona	640
Wheeler	Cochetopa and Rio Grande	Colorado	300
Mount Olympus . . .	Olympic	Washington . . .	608,640
Total area of national monuments within National Forests . . .			1,425,900

The following national game preserves situated within National Forests have been designated under special acts of Congress for the protection of wild animals:—

Name	National Forest	State	Area
			Acres
Grand Canyon . . .	Coconino and Kaibab	Arizona	1,492,928
Wichita	Wichita	Oklahoma	57,120

After the Spanish War, the United States came in possession, in the Philippine Islands, of some 47 million acres of tropical woodlands. In 1907, the Philippine Bureau of Forestry reports that, within this acreage, 40,000 square miles (or approximately 25 million acres) of woodlands are stocked with valuable timber.

To begin with, the Philippine forests were managed under the auspices of the War Department: Capt. G. P. Ahern being placed at the head of forestry in the Philippines.

The "Philippines Forest Act," of May 7th. 1904, provides that the public forests shall be administered for the protection of the public interests, and for their self-perpetuation by wise use; that the public forests shall include all public lands covered with trees of any age or size; that special forest reserves may be set apart from the public lands by proclamation of the civil governor, and that such reserves shall not be entered or sold; that the timber of the forests can be sold at fixed prices under regulations prescribed by the Bureau of Forestry; and that the boundary lines of the forests and of the forest reserves shall be demarcated by the Public Survey upon request of the Bureau of Forestry.

One of the most difficult problems in Philippine forestry is the irregular sort of squatting known as "caingin."

The "Philippines Reorganization Act," of October 26th. 1905, provided for the consolidation of several Government bureaus in the Islands; and placed the Bureau of Forestry in charge of a "Director of Forestry." The division of forest inspection in the Bureau was abolished at that time; and all fiscal matters connected with the Philippine forests were transferred to the Philippine Bureau of Internal Revenue.

The transfer made possible the abandonment of some of the 56 forest stations existing within the ten forest districts of the Philippines prior to 1906.

The Philippine Bureau of Forestry is placed under the Secretary of the Interior.

Residents of the Philippines, under a general order of 1905, were allowed to utilise, free of charge and without licence for five years, any and all forest products, except trees of the so-

called "first group." A small number of American-trained foresters are employed in the Philippines.

In the Hawaiian Islands, there have been established so far 250,000 acres of government forest reserves. Some of the forests are now under lease; upon the expiration of the leases, they will become forest reserves automatically.

In 1903 a law was passed establishing in Hawaii a board of Agriculture and Forestry. Under this law a division of forestry was organized, headed by Ralph S. Hosmer. The work of the division has consisted chiefly in the setting apart of forest reserves. The peculiar feature of the Hawaiian law seems to be the possibility of converting private land into forest reserves. Some 200,000 acres of private forest reserves have thus been established. It is probable that another 300,000 acres of forest reserves will be established.

PARAGRAPH XXX.

HISTORY OF STATE LANDS IN THE UNITED STATES.

To understand the situation of state lands in the United States it is necessary to distinguish between

A: the lands of the thirteen original states and of the six states admitted (Kentucky, Vermont and Tennessee in the 18th. century; Maine, Texas and West Virginia in the 19th. century).

B: the lands of the public land states.

In the original states and the six states added, when their constitutions were passed, the State was the owner of all vacant land.

In the public land states the nation remained—when their constitution was passed—the owner of all vacant lands; and these new states would not own to-day a square foot of soil if it were not for a number of land grants to them by the United States. Among these land grants are noteworthy, notably, the Swamp Land Acts of 1850 and of subsequent years, and the Carey Act of 1894.

Under the Swamp Land Acts, about 75 million acres of land were granted to the new states. A large majority of the land thus granted was found, after the title had been vested in private individuals, to be not swampy, but directly agricultural in character. Claims under these laws are still made by the states or by the counties to which the various states have often ceded their rights.

The Carey Act of 1894 donates to each arid land state one million acres, with the proviso that the lands thus donated must be reclaimed by irrigation.

State forest reserves have been established, after Forest Service Circular 167, in

Connecticut	(1300	acres)
Indiana	(2000	,,)
Maryland	(3500	,,)
Massachusetts	(1000	,,)
Michigan	(39,000	,,)(†)
Minnesota	(43,000	,,)
New Hampshire	(60	,,)
New Jersey	(9000	,,)
New York	(1,600,000	,,)
Pennsylvania	(863,000	,,)
Wisconsin	(254,000	,,)

The states have not availed themselves of the opportunity to manage their lands conservatively, whenever such lands consisted of soil unfit for agriculture.

State forests have been formed almost exclusively through the purchase of private land and not by the retention of vacant land; whilst national forests have been formed by the retention of vacant land, and not by purchase.

State forests are found in the East alone; national forests alone in the West (exc. Florida).

Vast tracts of absolute forest land lying unproductive are found, notably, in the Gulf states and in the Atlantic Coast states, from Delaware southward; also in the Lake states. The southern states are—and will be for a long time—too poor for the establishment of state forest reserves, or, as far as that goes, for any action in state forestry requiring any outlay whatsoever.

By the School Land laws, every public land state comes into possession of sections 16 and 36 in every town of the state.

Private land within a state forfeited for non-payment of taxes reverts to the state; such land is, however, usually claimed by the counties as well; and a clear title cannot be obtained, by prospective purchasers or by the state, owing to the lack of systematic laws.

(†) The Michigan Public Domain Commission speaks, in 1911, of 277,000 acres of state forest reserves.

PARAGRAPH XXXI.

HISTORY OF STATE FOREST POLICY IN THE UNITED STATES.

It is not intended to give in this paragraph a detailed history of the forest policy followed by the various states of the Union. The forest policy, past and present, of the various states and territories is given in detail in another part of "Forest Policy."

At this point, it is necessary only to make a few historic remarks on the salient features of state forestry in the past.

The forestry problem of the United States is—like the railroad problem, the tariff problem, the water-way problem, and the race problem—an interstate rather than a state problem.

The influence of the forests in one state extends directly and indirectly over the adjoining states, and beyond them. Wood goods are shipped from one state to the other; and it is safe to say that the majority of the wood goods produced in one state are consumed in another state. Similarly, the sources of our rivers and their mouths belong in rare cases only to one and the same state. It seems, as a consequence, as though the federation, rather than the state, should be charged with the care of American forestry.

The Weeks Bill, mentioned in Paragraph XXIX, breaks for the first time in the history of the nation with the principle of non-interference by the nation in matters of state forestry. In this innovation there are involved three new principles:—

1. Any "group of states" is authorized to form, by special agreement or compact, a union of its own, not in conflict with any law of the United States, for the purpose of conserving the forests and the water supply.

2. The Secretary of Agriculture is authorised (appropriation $200,000) to co-operate with any such group of states, and also with any individual state in the maintenance of a system of

fire protection in either state forests or private forests, provided that such forests are drained by navigable streams, and provided that the state spends at least as much money on forest fire protection as will be donated to it by the United States.

3. The Secretary of Agriculture may enter into a "working plan agreement" with any private owner of woodlands at the head of navigable streams, to the effect that:—

(a) the owner should cut and remove the timber from his own land only under rules and regulations sanctioned by the nation's representative;

(b) the nation, at its expense, administers and protects such private forests as if they were national forests. The Weeks Bill, however, does not provide any appropriation for the purpose named under (b).

President Taft maintains that the constitution of the United States does not authorize any federal control over the forests in any state, unless such forests are owned by the nation; and that the control over private forests is a matter of state rather than federal forest policy.

There remains, whatever the case may be, one duty for each state: viz., that of handing down to posterity, unimpaired by reckless use, all such resources of the state as are possible of conservation.

Prominent amongst these resources is the soil—farm soil as well as forest soil—and the productiveness thereof.

In the eastern states, from the beginning of the settlement on, the cry of the day has been "down with the woods." It was cleared land, and not forest land that the pioneer desired to obtain. From the farmer's standpoint the trees are the most objectionable weeds on a farm: the forest is, was, and could be considered only as an encumbrance of the ground. The successful devastation of the forest for the benefit of farming caused general rejoicing at the "log rollings." Thus it happened that the demand of all state forestry in the past was "to get rid of the timber." All of the states were slow in perceiving the turning-point of the economic situation; all of the states were (or are) at a loss to see that a policy, wise on agricultural soil, becomes unwise when practised on sandy soil, fit in the long

run only for the production of timber, or on steep, rocky and cold slopes, where farm crops can never be produced successfully.

Towards the middle of the nineteenth century, the lumber industry was centred in New York and Pennsylvania; Albany playing that rôle which is being played now-a-days by Chicago. In the sixties, the lumber industry moved westward to the Lake states; Ohio, Indiana, Kentucky, and Tennessee were cleared of timber with a phenomenal rapidity. By the end of the century the predominance in lumber production of the north and northwest had ceased, and the lumber industry of the south became paramount. Whilst many of the eastern states have lost their importance from the standpoint of lumber production in the relative sense, they have maintained, or even increased their production of lumber absolutely.

A definite and successful forest policy by the various states meant to provide for the conservation of the forests has not, it must be admitted, been inaugurated anywhere; the tendency still prevails, in the forest policy of the various states, to advance lumbering and the industries connected with lumbering rather than forest growth.

In the public land states, the majority of the work in forestry was, and still is, left by the state to the nation. In the eastern states we find, more recently, frequent cases of co-operation between state and nation: generally, in a preliminary way, canvassing the forest resources of the state.

The south has been prevented, by its very poverty, from taking any action in a policy of forest conservation; while the north has, in the recent past, made some strides towards progress.

Eighteen states have begun fire protective systems, viz.,

the three states of the Pacific coast;
the three Lake states;
three states in the south, viz., Alabama, Louisiana, Tennessee;
and all of the northeastern states with the exception of Rhode Island.

A number of the states have had (or still may have) "forest commissions"; and the relegation of forestry to these forest commissions is, in many of the states, responsible for putting to sleep the movement towards conservative forestry. The com-

missions have worked, frequently, without pay and without appropriation.

The forestry propaganda in the various states has been usually on a par with the propaganda for good and charitable purposes led by public benefactors, by the noble spirit of the women's clubs, or by the enthusiasm of lovers of sport and nature. The real business interests of the various states have been, and continue to be absent from the forest propaganda.

As if economic problems could be solved by that portion of the people which stays away from economic production! As if sentiment rather than economic sense could become the mainspring of an economic policy!

The chief hindrances to state forest conservation—aside of the poverty of the states, many of which are prevented from making loans for any such purpose as forestry—are the following two things: forest fires and forest taxes.

If there were no forest fires, nothing except the plow could prevent our cut-over lands from reproducing their crops of trees in the long run. If forest taxes were reduced, the financial chances of an embryo forest would be improved.

The state bounty laws relieving the taxes which burden the forests or forest plantations have been ineffective. The forest tax problem will be solved, in all probability, only at a time at which the majority of a state's revenue is derived from an income tax.

Alabama: In 1907, at the occasion of a special session of the legislature, an act was passed inaugurating a forest policy for the state.

A state forester was appointed and tax exemptions were provided.

California: In 1885, a state board of forestry was established, serving originally as a bureau of education, but supplied with police powers in 1887. Board issues three botanical reports, and establishes two forest experiment stations. Board discontinued in 1891; the two stations being made over to the University of California.

Instrumental in formulating a definite forest policy was the Sierra Club, organized in 1892, with John Muir for leader, and the California Water and Forest Association organized in 1899.

In 1904, forest fire law; on March 20th. 1905, establishment of a new board of forestry.

The position of state forester and of assistant state forester is created in 1905. An appropriation of $10,000 is made to secure the co-operation of the Bureau of Forestry.

Colorado: The state constitution is unique in having a passus dealing with forestry. The legislature makes various attempts to obtain control of the federal forests.

In 1885, a forest commissioner, soon without salary.

In 1897, department of Forestry, Fish and Game.

In 1901, law relative to campers' and hunters' licenses.

In 1904, two political platforms contain planks on state forestry.

In 1905, a state board of land commissioners is instructed to select, sell, lease or manage the state lands and schoollands.

In 1905, the Colorado School of Forestry established.

In 1906, the Colorado State Forestry Association asks the state assembly to embark on a definite forest policy for Colorado.

Connecticut: In 1895, formation of the Connecticut Forestry Association.

In 1901, appropriation of $2000 for state forestry.

In 1902, the agricultural experiment station appoints a forester who is made "state forester" soon thereafter, with the duty of creating and managing the state forests. A state forest of 1100 acres was established and a state nursery was formed.

On July 5th. 1906, efficient forest warden law (town and district wardens); a "fire fine fund" is one of its peculiarities.

Delaware: In 1907, co-operation with the Forest Service for the study of the forest problems of the state.

Georgia: In 1906, a Chair of Forestry is established at the University of Georgia.

In 1907, formation of a State Forestry Association.

Idaho: In 1905, law providing for campers' permits and for the enforcement of the fire laws, also for safeguards against fires on railroad lines.

Illinois: In 1905, Forestry Commission and a forest reserve act.

Indiana: In 1900, State Forestry Board and a State Forester. Tax exemption on small tracts having 170 trees per acre. Activity in catalpa planting stimulated by John B. Brown.

In 1903, state forest reserves of 2000 acres and state nurseries.

In 1905, new tax exemption law and new fire law. The road supervisors are fire wardens.

Iowa: In 1902, the Iowa Park and Forestry Association was organized.

In 1906, law encouraging the planting of forest trees and of fruit trees (tax exemption).

In 1906, the duties of "state forest commissioner" are added to those of the secretary of the Iowa State Horticultural Society.

Kansas: In 1887, forestry commission. Two state nurseries distribute seedlings for some time.

In 1907, state forester and assistant state forester.

Kentucky: In 1901, co-operation with the United States Bureau of Forestry, for the purpose of canvassing the forest resources of the state. Subsequently, annual appropriations of $2000 for a department of forestry.

In 1910, bill providing for a Board of Forestry and for a State Forester.

Louisiana: In 1904, creation of a Department of Forestry; forest fire law and provision for afforestation.

In 1908, attempt to limit the diameter of trees to be logged to 12 inches.

In 1909, formation of Louisiana Forestry Association.

In 1910, law providing that the funds required for forest protection shall be obtained by a "special conservation tax" of $^3/_4$ of a cent imposed on every thousand feet b. m. of logs removed from the woods.

In 1910, chair of forestry at Baton Rouge; appointment of a State Conservation Commission and of a Deputy State Forester.

Maine: In 1869, forestry commission.

In 1872, tax exemptions for planted forests, the exemptions to hold good for twenty years.

In 1891, the state land agent is made forest commissioner.

In 1903, appointment under the state forest commissioner of a trained forester, and establishment of a chair of forestry at the University of Maine.

In 1905, the forest commissioner is directed to establish fire districts, and to appoint chief fire wardens and deputy wardens.

The fire law is remodeled. The number of wardens increased to 160.

In 1906, fire observatories established on the Kennebec River.

In 1907, state co-operation with the U. S. Forest Service.

In 1909, twenty two fire observatories in operation.

Maryland: In 1900, co-operation of the State Geological and Economic Survey with the Bureau of Forestry.

In 1902, bill for the establishment of a State Board of Forestry, and of a state park.

In 1906, establishment of a Board of Forestry, two members of which are practical lumbermen. A state forester is appointed, fire wardens are installed, and the purchase of state forests is authorized.

In 1910, new forest fire law (forest fire wardens to have charge of not more than 15,000 acres). Expenses of fire service divided between state and county.

In 1910, there exist four state forest reserves (experimental forests), aggregating 1957 acres.

Massachusetts: In 1882, improved law with reference to municipal forests.

In 1898, formation of the Massachusetts Forestry Association.

In 1898, Tree Warden Law.

In 1890, the State Board of Agriculture is instructed to report on forest conditions.

In 1904, creation of a state forest service. The state forester acts as instructor at the Massachusetts Agricultural College. State nurseries. Effective fire laws. Assistance to private owners.

In 1910, the state takes charge of small private tracts for reforestation, with a promise of their return to the owner after ten years, provided that the owner will then refund the state's outlay. The state forester is authorized to accept bequests or gifts of land.

In 1910, the state grants up to 250 dollars to every town which appropriates an equal amount of money for defense against forest fires.

Michigan: In 1887, the State Board of Agriculture is made a State Forestry Commission.

In 1893, "Tax Homestead Law," by which the state secures title to tax-forfeited lands.

In 1899, a three-headed commission charged with the preparation of a forestry bill to be submitted in 1901. The commission is authorized to withdraw from sale 200,000 acres of state land unfit for agriculture.

In 1902, chair of forestry at Michigan State Agricultural College.

In 1903, chair of forestry at Ann Arbor.

In 1904, appointment of a state forester, and of a state game, fish and forestry warden.

In 1905, organization of the Michigan Forestry Association.

In 1905, the forest commission establishes forest reserves covering 35,000 acres on tax-forfeited land.

In 1907, law creating a commission of inquiry with reference to the forests of the state.

In 1909, Public Domain Commission placed in charge of the state's interests in forestry. It sets aside and protects from fire and trespass an area of 277,000 acres. Forest reserve maps are prepared.

In 1910, formation of the "Northern Forest Protective Association."

Minnesota: In 1894, Hinkley Fire.

In 1895, Fire warden law. Subsequently excellent reports by Chief Fire Warden (C. C. Andrews).

In 1900, Forest Reserve Bill, which authorizes the State Forestry Commission to accept lands for forestry purposes.

In 1907, Congress grants to the state 21,000 acres for a state forest.

From 1895 to 1910, chair of forestry (Samuel B. Green) at the State Agricultural School in St. Anthony Park.

In 1909, Holmberg forestry bill, appropriating $10,000 for the fire warden system. Heavy fines for failure to pile and burn slashings. Close season for use of fire in the open. Forestry Commissioner.

Mississippi: In 1905, chair of forestry at the State Agricultural College.

Nebraska: In 1905, the University of Nebraska establishes a department of forestry.

New Hampshire: From 1881 to 1885, and from 1889 to 1893 commissions of inquiry with reference to forestry.

In 1893, permanent forest commission with a paid secretary; commission may receive land donations.

In 1901, formation of the Society for the Protection of New Hampshire Forests.

In 1903, state co-operation with the U. S. Bureau of Forestry.

In 1905, new forest fire law. Wardens are controlled by the forestry commission; upon application of forest owners, special fire wardens may be appointed at the joint expense of state, town, and forest owner.

In 1909, state forest law providing for a state forestry commission and state forester (who is chief fire warden and also lecturer on forestry). Fire wardens are appointed in 1910. The state forestry commission maintains a state forest nursery by private contributions.

In 1910, there were in existence fourteen fire observatories on high mountains connected with telephones.

New Jersey: In 1890, South Jersey Woodlands Association —now extinct. The "New Jersey Forester," its periodical, was converted into the official journal of the "American Forestry Association."

In 1894, the Geological Survey carries an appropriation for the purpose of forest statistics; several valuable reports.

In 1905, the Governor's message contains an important passage on forestry.

In 1905, comprehensive forest law. Five commissioners. State forest reserves may be acquired by deed, gift, or condemnation. The secretary of the commission is a salaried officer; state forest nurseries.

In 1906, fire warden law and law authorizing municipal forests.

In 1907, the state forester is appointed secretary of the Forest Park Reservation Commission. Over 7000 acres of state forest reserves are in existence.

In 1909, excellent forest fire law—probably the best in the Union —providing for appointment of fire wardens paid by the state, and for safety belts 110 feet wide on both sides of railroads.

New York: In 1872, appointment of a State Park Commission which acquires 600,000 acres of wild lands in the Adiron-

dacks in the course of ten years. The state pays taxes on her own forest lands.

In 1885, appointment of a commission for the protection of forests.

In 1893, a constitutional clause prohibits any and all lumbering in state forests.

In 1885, Commission of Fisheries, Game and Forests, charged with superintendence of state forests, with protection of all woodlands and with forestry propaganda.

In 1897, creation of a "Forest Preserve Board," instructed to increase the Adirondack Park.

In 1900, consolidation of the Forest Preserve Board with the Commission of Fisheries, Game and Forests, under the name of "Forest, Fish, and Game Commission." The commission employs 32 "fish and game protectors and foresters," and a superintendent of forests. Its annual reports are beautifully illustrated.

From 1898 to 1903, State College of Forestry at Cornell, and experimental work in the College forest at Axton under B. E. Fernow.

In 1903, single-headed commission in lieu of the former three-headed commission.

In 1903, terrible conflagrations all over the Adirondacks.

In 1904, new forest fire warden law, and appointment of expert foresters. Report by a special committee of the Senate on the future forest policy of the state.

In 1905, message on forestry by Governor Higgins.

From 1906 to 1910, creation of excellent state forest nurseries; fire observatories in the Adirondacks.

In 1909, law requiring the railroads traversing the Adirondacks to use kerosene for fuel during the season of danger from fires.

North Carolina: Since 1891, state forester attached to the Geological Survey; several reports.

Since 1905, co-operation with the United States Forest Service.

In 1909, novel state forest reserve law; the law emphasizes the necessity for forestry at elevations exceeding 2000' above sea-level, and gives a means for the increased protection to timberlands there situated.

North Dakota: In 1890, Commission of Irrigation and Forestry. In 1905, law reducing the taxes on land planted in trees.

Ohio: From 1885 to 1887, a State Forestry Bureau issuing annual reports.

In 1903, organization of State Forestry Society. Forestry instruction at the University of Ohio.

Oregon: In 1903, Governor Chamberlain vetoes the Forest Fire Law, on the ground that the state has no forests of her own to protect, the schoollands of the state having been sold for a mess of pottage.

In 1905, new fire law providing for a service to be paid by the timber owners. Close season for forest fires extends from June 1st. to October 1st.

In 1910, formation of a State Conservation Association.

Pennsylvania: In 1886, organization of the Pennsylvania State Forestry Association, which edits "Forest Leaves."

In 1893, a commission of inquiry reports on watersheds and on state lands. It employs a botanist, an engineer, and a statistician.

In 1895, a division of forestry is established in the department of agriculture. In 1901, the division is advanced to the rank of a department of forestry.

In 1897, efficient forest fire law and active initiation of a state forest reserve policy. Tax exemption law.

In 1900, the Forestry Reservation Commission is authorized to spend up to 300,000 dollars per annum for the acquisition of state forests.

In 1903, establishment of a technical forest school at Mont Alto.

In 1904, the forest reserves aggregate 622,000 acres.

In 1907, establishment of a chair of forestry at the Pennsylvania State Agricultural College.

Rhode Island: In 1906, appointment of a salaried commissioner of forestry.

In 1909, the State Conservation Committee recommends laws for the protection of the forests, and for the establishment, by actual survey, of the areas classed as absolute forest land.

Vermont: From 1882 to 1884, State Forestry Commission. In 1904, State Forestry Association.

In 1904, fire warden law, the state paying the fire fighting expenses of the town, when they exceed five per cent of the "grand list."

In 1905, the state forestry commission reports that four million acres of land in the state are fit only for the production of timber.

In 1907, a state forest nursery is established in connection with the agricultural experiment station at Burlington. The state forest commissioner is replaced by a state forester.

Washington: In 1903, ineffective forest fire law.

In 1905, new fire law providing for a board of forest commissioners, state fire wardens, deputy wardens and forest rangers.

In 1906, the owners of timberlands collect a large sum of money, placing it at the disposal of the state board of forest commissioners.

In 1910, the Governor appoints a commission of twelve to advise a forest policy for the state.

West Virginia: In 1894, famous activity of Dr. A. D. Hopkins, founder of American forest entomology, at the West Virginia agricultural experiment station.

Wisconsin: In 1867, forestry commission (first of any in the U. S.) headed by Increase A. Latham.

In 1895, forest fire law.

In 1897, commission of inquiry.

In 1898, fire warden law.

In 1903, department of forestry; sale of state land discontinued; state forest reserves formed.

In 1904, E. M. Griffith appointed state forester.

In 1906, Congress grants to Wisconsin 20,000 acres of land for state forest reserves.

In 1907, the state reserves amount to 167,000 acres.

In 1910, new forest fire bill, providing for compulsory destruction of slashings by fire.

In 1910, the state forest reserves increased to 206,077 acres.

PARAGRAPH XXXII.

HISTORY OF FOREIGN FOREST POLICY.

Forest economy and forest management, like the economic use of any commodity, are required only at a time when forest products attain a value.

In Central Europe, this time fell in the period of strong, singlehanded, aristocratic forms of government; and in the period of undeveloped means of freightage.

This fortunate coincidence of facts has allowed Germany and France to develop, in governmental and municipal forests, a conservative system of forest utilization imitated but not equalled in other European countries.

When at the approach and in the beginning of the 19th century, democratic ideas, mercantilism and improved facilities of transportation made their appearance, the principles of conservative forestry had impressed the public mind, for decades of years, so forcibly that they withstood the sway of altered conditions. Still, extreme financial stringency has forced European governments, repeatedly, to reduce the area of state forests.

In America, the increasing value of timber and lumber allows forestry to gradually dawn upon us. Will our form of government show strength, counteracting the influence of a splendid system of railroads joining the timbered region with the prairies as well as the seaports, sufficient to allow the sun of forestry to rise and shine forever?

FRANCE.

1669 Colbert's forest ordinance places all forests under governmental control and forces private owners to adopt a management similar to that prevailing in crown forests.

1791—1795 Almost ½ of State forests sold and spoiled; sales continue irregularly during 19th century, reducing state

forest area to $^1/_5$ of its pre-revolutionary acreage. All restrictions of private dispositions suddenly removed.

1803 Change of forest into farm prohibited for 25 years.

1827 Code forestier.

1860 First governmental attempts at reforestation in Alps and Pyrenees, preceded by successful work on the sand dunes of the southwest (Gascogne).

1882 Model law relative to reforestation (Demontzey).

1900 Average annual expense for government reforestation $700,000. Annual expense for salaries and improvements in Algeria $600,000. Here, and in other French colonies (Tunis, Madagascar, Indo China, Reunion), governmental forest administrations are established.

1910 Superior foresters are trained at Nancy [technical school]. Forest area totals 23,500,000 acres, composed as follows:

State forest, 2,700,000 acres of which 600,000 acres are protective forests.

Municipal forest, 4,700,000 acres.

Private forest, 16,100,000 acres.

AUSTRIA.

1800—1870 Financial stringency forces the government, from time to time, to sell large portions of the Crown forests.

1852 Law forbidding devastation and clearing, for farm purposes, of private forests by the owners.

Forests of protective character must be conservatively managed.

1853 Law enabling owner to free his forests from prescriptive rights.

1868 Tax relief on reforested land, for ten years.

1884 Law allowing expropriation of forests at the head of catchment basins.

1895 Reorganization of Forest service.

1910 Total forest area, in Austria, 24,000,000 acres. Forest area, administered by government staff, 2,500,000 acres. Area of protective forests 2,000,000 acres.

14.5% of the communal forests, and 38.4% of the private forests are conservatively treated, on the basis of working plans.

DENMARK.

1805 High forests must not be cleared away. Intensive afforestation on sandy tracts and heathy land, ever since 1810, by governmental efforts and assistance.

1910 Private forests comprise 505,900 acres; State forests 142,140 acres. Almost 50% of all forests stock on land originally barren and waste. Forestry Academy at Copenhagen.

HUNGARY.

1880 Clearings on light sandy soil prohibited; reforestation in protective zone provided for; management of protective private forests regulated.

SWITZERLAND.

1874 New constitution empowers the confederation to stop, on cantonal territories, turbulent creeks and to assist reforestation at head waters.

1876 Law specifically designates the cantonal districts within which the confederation may assume general control over protective forests, cantonal and communal forests (which make up about 65% of total forest area).

Forest utilization in private forests of non-protective character is subject to cantonal regulations, independent of federal influence.

1897 Confederation obtains by public referrendum the right of inspection of forest police over the whole of Switzerland.

1910 The total forest area aggregating 2,105,200 acres (equaling 20% of the country) is composed of:

Municipal forests, 1,403,700 acres.
Cantonal forests, 91,600 acres.
Private forests, 609,900 acres.

Splendid technical school at Zürich, where superior staff is trained.

SWEDEN.

1910 Only $1/4$ of the private forests aggregating 58,715,000 acres (worth $5. per acre) is conservatively managed.

Governmental restrictions prevail only with private forests stocking on loose and light sand.

A law tending to promote regrowth is being prepared. The State forests, aggregating 18,080,750 acres, yield a steady and increasing revenue.

Foresters are trained at the college of forestry at Stockholm.

NORWAY.

1893 Law relative to forests and bare land of protective functions.

1910 Forests under governmental control aggregate 2,587,500 acres (value $2.70 per acre). Sustained yield. Private forests comprise 18,000,000 acres; only 280,000 acres are conservatively managed. Forests are over-cropped. Seeds and seedlings furnished from governmental establishments.

ITALY.

1877 The contourline above which the chestnut ceases to thrive, delineates the forests of protective character, subject to restrictions known as "Vincolo forestale." Here reforestation is demanded; clearing prohibited; management regulated by the letter of the law.

A law meant to facilitate the formation of forestry companies remains unsuccessful.

Financial stringency prevents Italy from carrying into effect what plans her statesmen provide.

1910 The State forests comprise only 129,000 acres; the private forests are said to comprise from seven to ten million acres.

Over ½ million acres require afforestation urgently.

Forest school at Vallombrosa.

RUSSIA.

1888 All private forests must be worked according to conservative working plans approved by government. Private forests of protective character may be declared "forest reserves."

Seeds and plants can be secured from governmental establishments.

1910 Enormous forest area. In European Russia, 516 million acres, 60% of which are Crown forest; in Siberia, 1,250 million acres amongst which 725 million acres of surveyed Crown forest. Forests are considerably underworked, owing to lack of railroads. After Mayr, growing stock in Western Russia lacks 60%, in Central Russia 30 per cent, from being normal.

Forestry schools at St. Petersburg and at New Alexandria supply the required forestal staff.

CANADA.

1849 The first Crown timber act (about timber licenses).

1870 Quebec law respecting clearing of land and protection of forests from fire.

1878 Ontario law authorizing the Lieutenant Governor to create forest fire districts, by proclamation.

1883 Quebec forest reserve act, authorizing the Lieutenant Governor to set aside absolute forest land then under timber license as forest reserves.

(Repealed in 1888 and 1889.)

1883 Ontario establishes a Bureau of Forestry, headed by a Clerk of Forestry, in the Department of Agriculture.

1885 Ontario creates system of fire rangers on timber limits, at common expense of limit holder and Government. (Aubrey White, Chief clerk of the Woods and Forest Branch of the Crown Lands Department.)

1893 Algonquin National Park of 1,110,000 acres set aside in Ontario (tract is under timber license).

1895 Ontario Bureau of Forestry transferred to Department of Crown lands (Thomas Southworth, Director of Forestry).

1896 British Columbia Act relative to forest fire districts.

1897 Report of Ontario Forest Commission.

1898 Ontario Forest Reserve Act, resulting in the creation of the Eastern Forest Reserve (80,000 acres) and the Sibley Forest Reserve (45,000 acres), which contain second growth timber, and the Temagami Forest Reserve (embracing 5900 square miles in 1903).

1899 Appointment of E. Stewart as "Chief Inspector of Timber and Forestry" in the newly created Dominion Forestry Branch of the Department of the Interior.

1901 Beginning of prairial planting under Dominion co-operation.

1902 Dominion Forest Reserves, set aside by Governor in Council, aggregate 4,082,000 acres.

1905 Ontario Bureau of Forestry retransferred to Department of Agriculture, so as to annul its influence on forestry in the Crownlands.

1907 University of Toronto establishes a department of Forestry under B. E. Fernow.

1910 Forestry College at Quebec.

1910 Entire East slope of the Rockies, from the international boundary line northward to the 54th. parallel, is proclaimed as a Dominion Forest Reserve.

The total area of the Canadian woodlands is, after E. Stewart, 800 million acres, of which only 266 million acres are stocked with timber.

GERMANY.

There does not and there never did exist any "German forest policy", initiated or stimulated or guided by the confederation of states known as "the German Empire". Whatever forestry there exists in Germany, depends solely and exclusively on state activity; the Empire has not had any opportunity or any cause to interfere with the forest policy of the twenty six states composing it.

The development of forest policy in the states composing the empire is so diversified, that a general account only can be given.

A forestry movement began, on a large scale, in or about 1750, when a general timber and wood famine was predicted, in the absence of coal or of means of transportation.

The mountain forests, at that time, had scarcely been touched by the axe.

The feudal system had prevented forest destruction, the feudal lords wishing to maintain the forests as harbors of deer. The foresters were hunting masters.

About 1775, steps were taken by the leading state governments to secure a sustained yield from governmental forests.

About 1800, begins the epoch making activity of George L. Hartig and Heinrich von Cotta, founders of forestry.

When, by 1850, the fear of a wood famine had subsided, the idea and the ideals of conservative forestry had taken deep root in the public mind.

Restrictions of the owners relative to the management of their holdings exist:—

(a) Where the state forests form a small percentage only of the total forest area.

(b) Where a private forest has protective character.

Communal forests, however, are frequently found under government control or management.

About $^1/_8$ of all German woodlands is free from any restrictions with reference to destructive lumbering.

A German government's practical forest policy, in 1911, consists of:—

1. Conservative use and gradual improvement (roads; growing stock) of all forests under governmental control; combined with energetic increase of revenue derived from the forests;

2. Reforestation of all waste land; purchase of small wood lots mismanaged by their owners; and gradual increase of forest area under governmental control;

3. Expert service for the benefit of private parties: viz., free advice on the spot rather than by letters; working plans; planting plans; co-operation in all branches of administration and of management; forestry excursions; valuation surveys;

4. Attempts at formation of forest-corporations;

5. Extension of fire protection over private lands;

6. Liberation of forests from the burden of prescriptive rights for timber, fuel, pasture, etc.;

7. Special control of protection-forests;

8. Education of rangers and foresters at governmental expense, often in connection with military service;

9. Measures tending to improve the position, the standing, the efficiency of forestry officials;

10. Plant supply from state nurseries, at cost, upon application by private owners;

11. Systematic forest researches through state experiment stations;

12. Public use of all forests for public enjoyment and recreation.

INDIA.

1855 Lord Dalhousie outlines a permanent policy for forest administrations.

1856 Dietrich Brandis appointed superintendent of forests in Pegu.

1864 Office of "Inspector-General of Forests to the Government of India" created.

1865 First Indian Forest Act passed.

1873 Establishment of a "Forest Survey Branch."

1878 Ranger school at Dehra Dun.

1878 Revised Indian Forest Act, promulgating rules for State forest reserves and for State Forest merely demarkated for protection; providing for village forests (ineffectively); allowing control over private holdings, if public welfare is at stake.

1884 Dr. Wm. Schlich establishes a "Working-Plans Branch."

1884 Forest School at Coopers Hill, England, in connection with the Royal Indian Engineering College under Dr. Wm. Schlich.

1898 Reserves aggregate, 81,414 square miles.
Protected forests, 8,845 square miles.
Working plans exist for 201 square miles.
Working plans are being prepared for 1,101 square miles.

1902 Staff: (a) Administrative: 19 conservators.
122 deputy conservators.
170 assistant conservators.
(b) Executive: 437 rangers.
(c) Protective: 1226 deputy rangers and 8533 guards.

GOVERNMENT AND PRIVATE FORESTRY.

Public measures, affecting private forests, either assist (paragraph XXXIII — paragraph XXXV) or restrict (paragraph XXXVI) the owners.

Public assistance in private forests consists either in safety measures (paragraph XXXIII) or in revenue measures (paragraph XXXIV).

Public action is led by the idea that conservative forestry will be practised by private individuals if it appears to be a safe and remunerative investment. The measures consist of:

(a) Enacting laws;

(b) Creating a staff to enforce the laws;

(c) Appropriating money to cover the expenses.

PARAGRAPH XXXIII.

GOVERNMENTAL (PUBLIC) SAFETY MEASURES TAKEN IN PRIVATE FORESTS.

Safety measures might be enacted:

1. With reference to forest soil:—

(a) Good public records of real property, kept at the county seats, based on public surveys, combined with public maintenance of corner marks; laws punishing destruction of corner marks; laws relative to procession proceedings.

(b) Repeal of laws relative to forfeiture of property through non-use, since conservative forestry, seemingly, leaves the woods unused for decades of years.

2. With reference to trees:—

(c) Laws spreading forestry morals through public schools and government divisions (Arbor Day movement).

(d) Public police staff protecting trees together with farms, fish, and game.

(e) Laws preventing mice and insect plagues, and laws protecting useful animals.—Stocklaw.—

3. With reference to forest fires in particular:—

(f) Laws relative to fire observatories and fire telephones.

(g) Laws enforcing help, in case of forest fires, from all able-bodied males, and laws requiring an observer of forest fires to at once notify the nearest fire warden.

(h) Fire-warden laws. Wardens should not be elected; should be well-paid by state and not by counties; should be efficiently controlled; should have small beats; and should prevent rather than extinguish fires.

(i) Laws relative to the burning of fields and woods by owners. Owners intending to burn their fallow or their slashings, etc., should give notice to adjoining land owners; should fire only in calm weather during certain months of the year, and should pay damages in case of escape of fires.

(j) Laws regulating camp fires, herder's fires, hunter's fires, duties of guides and guide-licenses.

(k) Laws regulating the use of torch lights, tobacco pipes, matches, etc., and distance of cabins from woods.

(l) Laws relative to fire lanes along railroads (in coniferous woods minimum 70 feet; in broadleaf woods 50 feet); relative to spark arresters, kind of fuel used, and responsibility of railroads for conflagrations.

PARAGRAPH XXXIV.

GOVERNMENTAL (PUBLIC) REVENUE MEASURES TAKEN IN PRIVATE FORESTS.

The leading idea in public revenue measures is: that conservative forestry will be practised when it is sure to pay good dividends, namely when its products command a good price, and when its expenses are reduced.

Public revenue measures are:—

1. Improvement of public roads, the state aiding the counties, as in New Jersey; providing road surveyors; and enacting efficient laws for making, maintaining and changing public roads. (Working roads by county prisoners; working roads by taxation; influence of stock law.)

2. Proper railroad charters, control of freight rates, and improvement of navigation.

3. Bounties for afforestation as granted in the prairie states; and for conservation as granted in Indiana and Pennsylvania.

4. Release or reimbursement of taxes—certainly in all forests having a protective character—at expense of state or nation, on the ground that:—

(A) Forest property lies unprotected, and taxes are paid for public protection;

(B) Forests are of benefit to the people, and taxes should be paid by the beneficiary of an object taxed;

(C) Forests consist of soil plus crop. In forestry, just as in agriculture, taxes should not be levied from a growing crop.

Ernest Bruncken proposes to tax forest property according to gross revenue (like railroads). Others recommend taxing the soil annually; and charging the timber for all tax arrears when it is cut.

Tax reduction should be granted at the expense of the federation, because:—

(a) A federal interest is at stake; the forest problem is an interstate problem;

(b) A release of forest taxation should not result in an increase of farm taxation.

The federal government draws its revenue from indirect taxation. Art I. Sec. 8, of the Constitution provides, that "the Congress shall have power to lay and collect taxes, and provide for the general welfare of the United States." The general welfare of the United States depends, undeniably, in a measure on the welfare of her forests.

5. Free advice by the government as to the most remunerative way of using a forest (Pinchot's working-plans); further, as to the technical qualities of timber (Fernow's timber tests); and finally, as to reforestation on prairies and on abandoned land.

6. The establishment of public forest nurseries from which plants can be secured at cost price.

7. Public forest schools and ranger schools, to supply land owners with an efficient staff.

8. Governmental officering of private holdings with foresters and rangers upon request of owners.

9. Statistical publications showing the financial possibilities of tree growth on the basis of volume tables, growth tables and yield tables (see paragraph XLI).

10. Laws facilitating the formation of stock companies chartered to practice forestry, and authorizing the formation of county, town, and city forests.

11. Sale of state forest property, if any, in tracts fit for forestal practice; or limit-system.

12. High and permanent import duties on all woodgoods.

PARAGRAPH XXXV.

FOREST OFFENCES.

Forest offences must be defined by the legislature (forest criminal code); must be prosecuted by the police according to criminal proceedings established by law; and must be punished by judge and jury. The leading ends are:—

Firstly, the restitution, for the benefit of the owner, of the original conditions of affairs; and,

Secondly, the prevention of similar occurrences by deterring, through punishment, from similar unlawful acts.

According to the old Roman and Saxon laws, standing trees cannot be the object of larceny. After occupation, however, —like wild game and wild fish,—they may begin to be objects of larceny.

Forms of offences are:—

1. Damaging a forestal object;
2. Adversely occupying an object;
3. Endangering an object.

The "code" distinguishes between a felony, a crime punishable by death or imprisonment, and a misdemeanor, which term comprises all other contraventions. The criminal proceedings cover arrest, jurisdiction, appeal, limitations, and other points. Fines can be converted into imprisonment in case of inability to pay. A jury should answer only questions of fact, and not questions of law.

PARAGRAPH XXXVI.

PUBLIC (GOVERNMENTAL) MEASURES RESTRICTING THE OWNER OF FORESTS.

The measures restricting the rights of the owner taken by a government for the benefit of the people are influenced by the following factors:—

(a) Climatic conditions.

(b) Area of private forest as compared with the area of public forest and with the entire area of the country.

(c) Importance of a given forest for the protection of lowlands, water supply, navigation, sanitation, etc.

(d) Character of property, whether municipal, entailed or absolutely individual.

The extent of these restrictions might cover the following points:—

1. Devastation of the forest.

2. Forest pasture, which might be prohibited, or restricted to certain species of animals (e. g. no goats) and to certain parts of the forest.

3. Burning the forest, which might be forbidden, or restricted to certain seasons and conditions.

4. Subdivisions of the forest below a specified minimum area, which should be prevented.

5. Compulsory contributions to salary of administrative or protective staff.

6. Control of all working plans by public forester.

7. Plantations forbidden close to fields.

8. Compulsory formation of forest companies.

9. Compulsory afforestation after clear-cutting.

10. Mineral rights.

11. Annihilation of logging debris.

12. Right of hunting and fishing, by limiting sport to certain methods, seasons, sizes and sexes.

13. Expropriation of forest land where private forests have the character of protection forests (New York and Pennsylvania laws of 1897).

14. Diameter limit.

15. Clearing right of way, and proximity thereof, in the case of logging roads; use of kerosene for fuel and of spark arresters on logging engines.

16. Combinations in restraint of trade, including prohibition of agreements tending to work a number of forests for a sustained yield.

FORESTRY IN PUBLIC (GOVERNMENTAL) FORESTS.

PARAGRAPH XXXVII.

PUBLIC, FEDERAL AND STATE OWNERSHIP OF FORESTS.

A. Reasons against public ownership of forests are:—

1. Properties managed by the public have proven failures invariably.

2. Legislative changes handicap the continuity of action which forestry requires.

3. The American principle, ever since the first settlement of the states, has been this: "The public must get rid of its holdings as soon as possible."

4. Underpaid officials, having no pension rights and losing their positions after short terms, are apt to defraud. Dishonesty in the forest is hard to discover.

5. Public forestry interferes, or may interfere, with private enterprise by entering into competition with it.

6. The commonweal, under constitutional restrictions, is not allowed to pay any taxes on its own land. The counties containing public forests do not obtain any tax revenue therefrom.

7. Dependence of all forest workmen and of their votes on the party in power.

B. Reasons for public ownership of forests are:—

1. Only in the case of forests owned by the commonweal is all production of the forest (health, water supply, stability of navigation, and tangible products like wood and timber) derived by the real owner.

2. Longevity of the commonweal allows of a small rate of interest.

3. Large areas—which would smack of feudalism if owned privately—are required for conservative forestry.

4. Far sighted management cannot be expected from private owners.

5. Constitutional prohibition of entailed property. Lack of town forests.

6. The commonweal pays no taxes; public forestry is therefore more remunerative than private.

7. The private individual is unwilling to sacrifice a direct revenue for an indirect revenue obtainable from the forest.

8. The commonweal employs a police force (sheriffs, marshals, etc.) anyhow, and it may secure, through the army and the militia, increased protection for its forests.

9. Possibility of special laws relative to trespassing, firing, pasturing, squatting, and timber-stealing on state lands.

10. Where the public owns large tracts, there is no need to induce private individuals to manage their forests conservatively, either by force or by premia.

11. Realties owned by the commonweal increase the State's credit at exchange.

12. Some forests, namely those of protective character, must be owned by the commonweal anyhow, and the staff in charge of the State's protective forests might as well take charge of the State's revenue forests.

C. The federation is better fitted for the practice of forestry than the individual states for the following reasons:—

1. The head of a river from which the water comes, and the mouth of a river where inundations take place and where navigation is to be protected, are not situated in one and the same state.

2. State governments are less educated, less conservative, and less far sighted than the federal government.

3. The nation might avail itself of the army in officering the forests. The forest staff, as in foreign countries, might yield officers and subalterns for the army in case of war.

4. Many states (e. g., Pennsylvania and Wisconsin) are prevented by their constitution from contracting the loans which would be required for the purchase of forest reserves. The present

generation is unwilling to run into an expense which is of benefit, especially, to future generations.

5. The nation, receiving all indirect taxes, is rich. Raising money for forest purposes by direct taxation increases the tax burden resting on the forest. The nation might, however, in America as in other federated countries (Germany and Switzerland), make over to the individual states, out of excess revenue derived from specified sources, certain sums according to the population of the state for specified purposes.

6. In America the individual citizen shifts from state to state; has little interest in the forestal future of the state in which he happens to reside; is unwilling to be taxed for forest developments in the state of his temporary residence.

PARAGRAPH XXXVIII.

PRINCIPLES OF FEDERAL OR STATE FOREST ADMINISTRATION.

A. Principles of organization:—

1. Merit system; permanent employment; rank and salary increasing with duration of service.

2. Good pay; pensions as in the army.

3. Higher grades of officials (administrators, conservators, supervisors, superintendents, chief foresters) to be secured from men of special training; lower grades or merely protective staff to be recruited from the best workmen.

4. The area in charge of an officer depends on land prices and stumpage prices, intensity of management, dangers threatening the forest and number of tasks (fish, game, roads, sawmills, etc.) entrusted to the official.

Example: In Germany, a superior state officer is in charge of a forest running from 2,500 acres up to 30,000 acres. For Pennsylvania, districts of 10,000 acres are advocated. In the national forests, a supervisor has charge of 1,000,000 acres or more.

5. The official (supervisor, oberfoerster, conservator) in charge of a forest is responsible for all of the work within the forest; and should be given the largest possible amount of authority. It is necessary, however, to have his work inspected from time to time, so as to prevent abuse of authority. Administrators should have sufficient help in the office.

B. Principles of management:—

The basal principle of public forest management lies in the maxim: "Direct returns plus indirect returns must yield the highest possible dividend on the investment."

"Rotation" is the number of years which a forest is allowed to live. A high rotation means a large investment in stumpage

and a low rate of interest (compare the table in paragraph VII). The indirect value of the forest is best promoted by long rotations. Short rotations (e. g. of 20 years) are usually coppice and firewood rotations. A high rotation is advisable in public forestry for the following reasons:—

1. The commonweal can get along, being long lived, with a low rate of interest; and its investments must be absolutely safe.

2. A forest treated in a long rotation is more efficient in securing the desired steadiness of water supply, navigation, public health, lumber industry, etc.

3. Private forestry will never produce that large sized timber which may be required in the future as in the past.

The letter of Secretary of Agriculture Wilson, dated February 1st., 1905, which places Mr. Gifford Pinchot in charge of the management of the National Forests, is worth reprinting:—

"In the administration of the forest reserves it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, and not for the temporary benefit of individuals or companies. All the resources of forest reserves are for *use,* and this use must be brought about in a thoroughly prompt and businesslike manner, under such restrictions only as will insure the permanence of these resources. The vital importance of forest reserves to the great industries of the Western States will be largely increased in the near future by the continued steady advance in settlement and development. The permanence of the resources of the reserves is therefore indispensable to continued prosperity, and the policy of this Department for their protection and use will invariably be guided by this fact, always bearing in mind that the *conservative use* of these resources in no way conflicts with their permanent value.

You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home builder first of all, upon whom depends the best permanent use of lands and resources alike. The continued prosperity of the agricultural, lumbering, mining, and live-stock interests is directly dependent upon a permanent and accessible supply of water, wood, and forage, as well as upon the present and future use of these resources under businesslike regulations, enforced

with promptness, effectiveness, and common sense. In the management of each reserve local questions will be decided upon local grounds; the dominant industry will be considered first, but with as little restriction to minor industries as may be possible; sudden changes in industrial conditions will be avoided by gradual adjustment after due notice, and where conflicting interests must be reconciled the question will always be decided from the standpoint of the greatest good of the greatest number in the long run."

PARAGRAPH XXXIX.

ADMINISTRATION OF FEDERAL WOODLANDS.

The federal woodlands consist of national parks administered by the army; form part of military reservations administered by the army; form part of Indian reservations administered by the Department of the Interior; consist of vacant public timber lands administered by the General Land Office; and consist of national forests administered, since 1905, by the Forest Service in the Department of Agriculture.

None of the governmental divisions, save the Forest Service, have created a special staff for the administration of the woodlands entrusted to their care. In all other cases, the ordinary staff of the governmental branch—a staff without any technical education—is employed for work concerning forests.

With reference to the management of the Indian forests, there did exist for a few months during 1908 a special agreement between the Department of Agriculture and the Department of the Interior, extending the activities of the Forest Service in the Department of Agriculture over the Indian forests.

The General Land Office in the Department of the Interior is charged with the logging operations on the ceded Chippewa lands (Act of June 27th. 1902). The same office employs, in case of timber trespass on vacant public lands, a force of special agents under special instructions.

Of the woodlands under military control, those situated at West Point are managed on forestry principles.

In the national parks, there exists no forestry administration proper, in as much as these parks are meant to be left to nature uninfluenced by man.

The administration by the Forest Service of the national forests is based on the Forest Reserve Act of June 4th. 1897. The administrative principles thus established refer to:

1. The object of the national forests.
2. The public and private use of the national forests for pasture; the free use of timber and stone; the sale of dead, matured, and large timber; rights of way; establishment of churches, schools, hotels, and so on.
3. Entry of mineral lands.
4. Relinquishment of claims.

Hunting and fishing, in the national forests, are free to all, under restrictions merely based on state laws.

Congress has been generous in appropriating money to the Forest Service for administrative purposes. The appropriations of the Forest Service have been:

in 1907, $1,998,550;
in 1908, $3,475,892;
in 1909, $3,804,900;
in 1910, $4,678,427.

Prior to 1908, there was in existence a special "forest reserve fund," into which were flowing any and all receipts, notably those from pasture and timber sales derived from the national forests. This fund was placed at the disposal of the Forest Service for the protection, the improvement and the administration of the national forests.

In 1905, the employes of the Forest Service were placed in the classified service under the civil service law.

25 per cent of the gross revenue derived from any national forest is turned over (Agricultural Appropriation Act of 1907) by the national treasury to the state in which such national forest is situated, with the proviso that the sums thus paid must be used for the benefit of the schools and of the roads in the counties embraced by the forest. No county, however, shall obtain from this source a sum exceeding 40 per cent of its other revenue.

The Forest Service, headed by a forester and by an associate forester, consists, in 1910, of three divisions, viz.:—

I. special staff;
II. four branches;
III. six forest districts.

I. The special staff comprises:—

Special Staff
- 2 General Inspectors
- 1 Law Officer
- 1 Dendrologist
- 1 Editor
- 1 Expert Lumberman.

II. The four branches are:—

A. Branch of Operation.

Office of Occupancy
" " Accounts
" " Geography
" " Maintenance.

B. Branch of Silviculture.

Office of federal co-operation (e. g. about work on Indian Reserves),
" " state and private co-operation (e. g. working plan for Northern Pacific),
" " silvics (e. g. study of the Fraxinus, Taxodium, windbreaks).

C. Branch of Grazing.

e. g. identification of grasses and noxious weeds.

D. Branch of Products.

Office of Wood Utilization (e. g. turpentining; timber tests; distillation; statistics),
" " Wood Preservation,
" " Publication.

III. Six Districts: The staff of a district consists of:—

A. Heads
- District Forester
- Assistant District Forester
- District Law Officer

and four branches, each branch headed by chief and assistant chief.

B. Office Branches

Branch of Operation
1. organization (personell)
2. engineering (improvement work)
3. occupancy
4. accounts (presided by a "district fiscal agent")
5. maintenance.

Branch of Silviculture
1. timber sales
2. planting
3. silvics and experimental work.

Branch of Grazing

Branch of Products (preservative treatment; timber tests; market studies).

C. Field Force

(a) Forest Supervisor (salary $1800—$2500) or Acting Forest Supervisor, or Deputy Forest Supervisor in charge of a National Forest (natives of state); — permanent

(b) Forest assistant, (salaries not fixed), technical adviser of a supervisor (trained foresters); — permanent

(c) Forest ranger (salary $1200 to $1400), or Deputy Forest ranger, or Assistant Forest ranger (natives); — permanent

(d) Forest guard (salary $75 per month) appointed when there are no classified men available, on basis of examinations or when there is temporarily a need of extra help. Guards are not under Civil Service rules. — temporary

ORGANIZATION.

For each of the many lines of special work in the national forest specialists are being employed. The number of forest officers on duty in the national forests was, in 1909, the following:—

Supervisors	106
Deputy forest supervisors	70
Forest assistants	117
Forest planting assistants	11
Lumbermen	17
Forest rangers	188
Deputy forest rangers	420
Assistant forest rangers	413
Forest guards	151
Total	1,493

In 1910, the number of forest rangers was increased by 293; and the total number of all employees at work in the National Forests (including mining experts, hunters and clerks) is given as 2,536.

Every national forest is immediately under the charge of a local forest supervisor. If the supervisor fails to be a trained forester he is given an assistant experienced in forestry. The supervisor must be a man of the west, and must be equipped with a wide practical knowledge of western lumbering and western grazing.

The "planting assistant" prepares and tends the nurseries and superintends the planting of seeds and seedlings. The annual capacity of the nurseries in the National Forests exceeds, in 1910, 16,000,000 seedlings. Almost 10,000 acres situated in 104 National Forests were planted up, during 1910. Obviously, most of this planting work is experimental.

The "lumberman" cruises and estimates the timber, prepares the logging operations, and watches the scalers and the loggers.

The "forest ranger" patrols his district (average district, in 1910, is 104,307 acres), prevents and stops fire, trespass, overgrazing, abuse of privileges, non-compliance with contracts and regulations etc.

NATIONAL FOREST BUSINESS.

The national forests are used to the fullest possible extent for the benefit of the whole people, with the only proviso that the use must not be such as to invite destruction of a resource.

Timber, water, pasture, minerals, and all other resources can be obtained without delay under reasonable conditions. All legitimate business is encouraged. The main uses are:—

I. TIMBER SALES

of which there are three classes:—

A. Up to $50 worth of dead or living timber

Rangers' Sales { by rangers and deputy rangers, without formality other than paying;

B. Up to $100 worth of dead or living timber

Supervisors' Sales { approved by supervisor, estimate required, also map and description;

C. Over $100 worth of timber

Foresters' Sales { must be advertised, approved by the district forester, estimate required, also map and description; applicant deposits $50.

1. No credit is given.
2. If actual cut is below the estimate, refund is made.
3. Sold timber must be removed in less than 5 years.
4. Only marked trees must be cut (except dead trees).
5. Only scaled and stamped logs must be removed.

In recommending a timber sale to the deciding officer, the subaltern dilates on:—

1. diameter limit at breastheight;
2. seed-trees left;
3. diameter limit in the tops;
4. brush piling, cleaning up, burning slashings;
5. stump-height;
6. saw or axe work;
7. months of cutting;
8. timber for roads, buildings, etc.;
9. location of camps, mills, dams;
10. damage to young growth;
11. danger from fires;
12. definition of "merchantable part" of a tree.

II. GRAZING.

A. Objects:—

I. Conservative use of all National forests adapted to grazing;
II. Permanent good of the live stock industry;
III. Protection of homebuilder against unfair competition.

Cattle and horses are allowed on all reserves;

Sheep and goats are restricted as to area, and as to grazing periods;

No permits are required for household stock (up to 10) of settlers, for stock of campers, travelers and prospectors;

The Secretary of Agriculture prescribes annually the number of heads allowed in each forest.

The Forester prescribes the period of grazing and the grazing fees.

To permits which are not transferable are entitled, in the order named:—

1. Small residents, in or near forests, who are dependent on forest pasture.
2. Larger residents, in or near forest.
3. Non-residents inside state.
4. Non-residents outside state.

Fees per head:—

1. "yearlong" rates, cattle and horses, 35 to 60 cents;
   sheep and goats, 10 to 18 cents;
2. monthly rates, for seasons exceeding four months and beginning prior to July 15th., 10% of yearlong rates;
3. monthly rates, for other, and shorter seasons, 12% of yearlong rates.

Stock under 6 months old at time of admission is free, if accompanied by progenitors.

Regulations:—

1. Each forest is divided into grazing districts.
2. Permit-holders are or may be required to repair roads;
   fence springs;
   bed sheep away from springs, and not over 6 times in one place;

dispose of carcases;
salt at designated salting places;
extinguish camp and other fires.

3. Permits are also required for stock merely driven across a forest, except over highways.
4. Special permits are required for erection of fences (division fences; drift fences; inclosing tracts up to 320 acres).
5. Leading livestock associations may consult as advisory boards with officials regarding numbers, districting, and special rules.

III. SPECIAL PRIVILEGES.

These privileges must not amount to an easement, but rather to a lease. Hotels, mills, apiaries, residences, schools, churches, farms, roads or trails, canals, ditches, pipelines, reservoirs, private railroads, telegraph lines belong into this group.

The decision in matters of special privileges rests, in small or urgent cases, with the supervisor, but usually with the district forester.

IV. TRESPASS.

The main cases of trespass on national forests are the following:—

1. grazing or driving without permit;
2. fencing without permit;
3. squatting;
4. building roads, canals, reservoirs, telegraphs, sawmills, or carrying on any kind of work unauthorized;
5. willful destruction of notices, or damaging any property of the United States;
6. firing the woods, or negligence in use of fire;
7. cutting timber, except that used by travelers;
8. cutting more timber on an unpatented mineral claim in a forest than is required for its development;
9. destroying corner marks;
10. cutting timber on one mineral claim for use on another;
11. turpentining.

Trespassers can be arrested:—
without warrant, on sight by any forest officer;

otherwise with warrant from a United States Commissioner, or from a Justice of the Peace. Criminal proceedings cannot be stopped by way of compromise.

The Act of May 5th. 1900, prescribes maximum fine of $5000 or two years imprisonment for conviction of the wilful setting of fire on the public domain, or for suffering a fire to burn unattended near any inflammable material. The fine for leaving a fire unextinguished is $1000.

The receipts from timber sales and from the grazing business are illustrated by the following tabular statement:—

Timber sales.

Fiscal year	Amount of timber sold	Amount of timber cut	Receipts from timber sales
	Board feet	Board feet	
1904 . . .	112,773,710	58,425,000	$ 58,436.19
1905 . . .	113,661,508	68,475,000	73,270.15
1906 . . .	328,230,326	138,665,000	245,213.49
1907 . . .	1,044,855,000	194,872,000	686,813.12
1908 . . .	386,384,000	392,792,000	773,182.33
1910 . . .	. . . . .	484,412,000	1,400,922.69

Grazing business.

Year	Number of cattle and horses	Number of sheep and goats	Receipts
1904 . . .	610,091	1,806,722	. . . . .
1905 . . .	692,124	1,709,987	. . . . .
1906 . . .	1,015,148	5,763,100	$ 514,692.87
1907 . . .	1,200,158	6,657,083	863,920.32
1908 . . .	1,380,145	7,085,311	962,829.40

A remarkable growth in business took place in the fiscal year 1908. While in that year money available increased only 20 per cent and the area of forest administered increased only 11 per cent, the business done increased in the following percentages:—

	Per cent
Timber sales (number of)	236
Timber cut	102
Number of free-use permits	76
Number of special-use permits	67
Sales and fees received	20
Number of grazing permits	11
Total number of sales and permits	46

During that year timber to the amount of 386,384,000 board feet was sold in 5,062 separate sales. Of these sales 4,584 were made for timber valued at $100 or less.

The construction work of 1910 in the national forests comprises:—

2,225 miles of trails
320 miles of roads
1,887 miles of telegraph lines
563 miles of fences
181 miles of fire lines
464 cabins and barns
51 corrals
65 bridges.

FOREST POLITICAL MISCELLANY.

PARAGRAPH XL.

NATIONAL IRRIGATION LAW OF JUNE 17, 1902.

1. States: The law is applicable to all States and territories, excepting Texas, traversed by or west of the 100th degree of longitude.

2. Funds: The expense of survey, construction and maintenance of the works erected under the law is to be paid or rather to be advanced out of a "reclamation fund," amounting, in 1906, to $30,000,000, supplied by:

(a) Receipts from public land sales (deducting 5% for educational purposes) within the State benefited; 51% of the receipts obtained from a given state must be spent in it also. Unfortunately, the best contributors amongst the states are those requiring the least irrigation;

(b) Receipts from sale of water rights at works constructed.

3. Motive:—

(a) The individual settler can enter or acquire small tracts only; the expense of irrigation works, however, is so great, that operations must be conducted on a large scale, for the benefit of many thousand acres at a time. Private control of large tracts is objectionable; private control of water supply is intolerable.

(b) Irrigated farmland is more productive than farmland in the humid region depending on uncontrollable water supply. More homes are required; and none are better than irrigated farms.

(c) The statelaws creating private irrigation companies have proven failures.

4. Entry by settlers:—

Land supposed to be irrigable can be withdrawn, by Secretary of Interior, from all entry, excepting homestead-entry.

Unfortunately, settlers file claims invariably on withdrawn land, before feasibility of project is manifest. Commutation clause is here invalid. Entryman must reclaim 50% of irrigable land patented. Size of claims subject to homestead entry after publication of boundary to be irrigated is decided by Secretary of Interior. Secretary also fixes the water charges to be paid per acre. Payments are usually made in ten instalments.

5. Governmental work entrusted to the "Irrigation Service" consists of:—

(a) Examination and survey (under F. H. Newell).

(b) Construction, usually by contract, and maintenance of works for "storage, diversion and development" of waters.

The Secretary of the Interior reports at each regular session to Congress, what works have been and are being carried out, and the expenses incurred on their behalf.

6. Operation of the irrigation works is left to an organization of the settlers obtaining water, under regulations approved by the Secretary. Minor distributing works are built by the homesteaders. Title to the reservoirs remains in the U. S.

7. Expropriation of private rights and private property required for the works is permitted. Indemnities to be paid out of the reclamation fund.

8. State laws and private water rights obtained under State laws are not cancelled or interfered with by the National Irrigation Act.

On June 18th. 1905 the Omnibus Bill to the Reclamation Act, providing for the subdivision of lands entered under the Reclamation Act, became law.

Firstly: It provides that the Secretary of the Interior may establish farm units of not less than ten or more than 160 acres, in lieu of a fixed area of 40 acres. In the Reclamation Act the smallest limit was 40 acres.

Secondly: It provides that if an entryman loses his rights under the Reclamation Act, he may be permitted to make another entry, as if his former entry had not been made.

Troubles in reclamation work began to result from lack of funds in 1907. The Secretary of the Interior issued orders, in 1907:—

1. To concentrate on a few works nearly completed;
2. To discontinue further expenditures for further investigations of a general character;
3. To reduce or suspend projects so located that favorable bids for construction could not be secured;
4. To restore to entry all lands, then reserved under the Reclamation Act, which could not be used for reclamation in the near future, withholding, however, reservoir sites required in the far future.

The reasons for this change of attitude arose from the fact that the monthly expenditures were averaging about 1½ million dollars. At this rate the funds available for new construction would have been exhausted before the end of the calender year 1907.

In 1910, the "reclamation fund" was overdrawn, the expenses for reclamation exceeding the expectations of the Irrigation Service as well as the receipts. It became necessary for Congress to authorize a loan for the completion of the works under way.

In 1910, the "Public Land Withdrawal Act" recognizes the propriety of reserving all waterpower sites from private entry.— The "Smoot-bill" designed to turn over to the federal land states all waterpower sites therein has failed to become law.

The main reclamation projects are:—

in Arizona: On Salt and Gila rivers;
in California: On Colorado river;
in Colorado: On Gunnison and Grand rivers;
in Idaho: On Snake river;
in Montana: On Milk and Yellowstone rivers;
in Nevada: On Carson and Truckee rivers;
in Utah: On Bear river;
in Wyoming: On Shoshone and North Platte rivers;
in Washington: On Yakima river;
in Oregon: On Klamath river;
in Nebraska: On North Platte river.

PARAGRAPH XLI.

FORESTRY INSTRUCTION, INVESTIGATION AND STATISTICS.

A. Instruction:—

In order to propagate a knowledge of forestry, and in order to provide for a staff of foresters and rangers, a government may appropriate money:—

1. to establish forestry schools at State universities;
2. to establish departments or divisions of forestry, forest commissions, etc.; and to publish their reports;
3. to pay subsidies to forestry associations;
4. to send teachers of forestry to farmer's meetings.

However, the danger of "cranky" instruction by schools, reports and teachers is great as long as men of practical experience are not available for the purpose.

B. Forestry investigation and statistics:—

A knowledge of the financial possibilities of forestry is necessary for the owner of woodlands. Then, only, can he arrange his investments so as make them most productive of revenue. The knowledge must be based on investigation and statistics gathered by the government, since the private individual is usually unable to make them. He will never publish the result of investigations which he may chance to make. Most desirable are statistics on the following points:—

Growing stock of timber in the U. S.; reproduction of timber; influence of fires; yield tables, growth tables and volume tables; log analysis as to quality and quantity of output; timber consumption; timber export and import; study of foreign markets; influence of forests on water supply for irrigation and navigation; influence of the forest on rainfall; results and experiences in prairie planting; silvics of the leading timber species.

Of intrinsic importance in every country is an investigation defining, and causing to be demarkated, what forest is protection forest, and what land is absolute forest land. Necessarily, the quality of soil and the protective character which a forest exhibits must determine the kind and the severity of the measures in public forestry which an intelligent commonweal should enact into law.

C. Forestry schools in the United States:—

The tendency in the United States as well as in Germany with reference to forest schools is a tendency of decentralization. This is unfortunate. Small schools can not develop specialists in forestry; and specialists are badly required for the advancement of forestry.

The forestry schools in the United States are (see American Forestry, December 1910):—

three graduate schools (Yale, Ann Arbor, Harvard);

two university colleges (University of Minnesota and of Washington);

thirteen undergraduate schools (Colorado College, Colorado Agricultural College, University of Georgia, University of Idaho, Purdue University, Iowa State College, University of Maine, Michigan Agricultural College, University of Montana, University of Nebraska, Oregon Agricultural College, Pennsylvania State College, State College of Washington);

two technical schools (Biltmore, N. C., Forest School, Mont Alto, Pa., State Forest Academy);

As the hospital is required for practical study in medicine, and as the chemical laboratory is required for practical study in chemistry, so is the forest required, by teachers as well as by students, in connection with a forest school, for practical study in the woods. The "working fields" for the student of American forestry should be sought in various parts of our huge country, so as to prevent the teacher and the student from becoming one-sided.

The future will have to show whether or not a forestry school attached to an existing institute of learning is superior to the technical school of forestry.

46% Cellulose
35% Liquid
20% Solid

PARAGRAPH XLII.

CUSTOM DUTIES, OR THE TARIFF ON WOODGOODS.

I. Importations:

The importations into the U. S. of forest-products had a value

in 1904 of $ 82,500,000.00
in 1905 of $ 95,700,000.00
in 1906 of $100,100,000.00
in 1907 of $126,600,000.00
in 1908 of $101,200,000.00

The most important product imported is india rubber ($37,000,000 in 1908).

Next in rank are boards, deals, planks, sawed lumber, etc. ($15,000,000 in 1908).

The third rank in importance is occupied by wood pulp ($7,000,000 in 1908).

The sawed lumber importations have risen from 590 million feet b. m. in 1904 to 790 million feet b. m. in 1908.

The estimated total quantity of wood, logs, lumber and timber imported in 1908 is the equivalent of 1500 million feet b. m. The party platforms of 1907—1908 were emphatic in demanding either a low tariff on lumber (republicans) or no tariff on lumber (democrats), for the reason that a "lumbertrust" was then believed to exist.

The tariff rates in the past, those now existing and those proposed for the future are:—

Products	Dingley tariff	Payne-Aldrich tariff	Canadian reciprocity treaty, 1911
Logs	Free	Free	Free
Lumber per M., rough . . .	$ 2.00	$ 1.25	Free
Lumber per M., s. 1 s. . . .	$ 2.50	$ 2.00	$ .75
Lumber per M., s. 3 s. . . .	$ 3.50	$ 2.37½	$ 1.12½
Laths per 1000	$ .25	$ .20	$ .10
Hewn timber, per cubic foot	1 cent	½ cent	Free
Paving, posts, ties, poles, ad valorem	20 %	10 %	Free
Staves, pickets, palings, ad valorem	10 %	10 %	Free
Shingles, per 1000	$ .30	$ .50	$ .30

Reasons for a high tariff on forest products:—

1. As long as timber can be imported more cheaply than it can be grown at home, none will be grown; and ¼ of our fatherland's soil will be doomed to lie idle.

2. The lower the price of stumpage, the greater is the waste of stumpage.

3. Checking of importation results in higher stumpage prices; hence in better chances for conservative forestry.

4. The wages paid for logging and milling should remain in the United States.

5. Revenue is obtained through a tariff on logs and lumber.

Reasons against any tariff on forest products:—

1. It is better to destroy our neighbor's forests than to destroy our own.

2. Only the wood owners close to the Canadian frontier are benefitted by a tariff since, practically, no other country imports dutiable lumber.

3. An increase in stumpage price may accelerate the destruction of the virgin forests, the owners doubting the stability of high prices.

4. Many Americans are the owners of Canadian and of Mexican stumpage.

President Taft is outspoken for free lumber; he says "Free lumber we ought to have. By giving our people access to Canadian forests we shall reduce the consumption of our own, which, in the hands of comparatively few owners, now have a value that requires the enlargement of our timber resources."

President Taft forgets that stumpage prices have risen, in the last ten years, in Prussia, in Austria, in Bavaria, in Sweden, in Russia; in short everywhere.

President Taft forgets that the number of forest owners in the U. S. exceeds the million mark.

President Taft forgets that nothing can be conserved which is not worth conserving.

President Taft forgets that Canada does not contain but one third of our timber-resources, or 800 billion feet board measure.

President Taft forgets that no civilized country practises, now a days, conservative forestry with the door to importations wide open.

A country desirous to establish conservative forestry,—a new industry,—must protect it. Germany where conservative forestry is well established, protects it nevertheless, by the following custom duties:—

logs, round or roughly hewn, per cubic foot: 0.48 to 0.72 cents;
lumber, rough, per 1000 feet b. m.: $2.45 to $3.25.

The Payne-Aldrich tariff law provides, with implied reference to Canada: That if any country, dependency, province, or other subdivision of government shall impose an export duty or other export charge of any kind whatsoever upon, or any discrimination against, any forest product exported to the United States, or if any country, dependency, province, or other subdivision of government forbids or restricts the exportation of any forest product to the United States in any way, there shall be imposed upon all of the forest products of such country when imported into the United States the duties prescribed in section three of this Act during the continuance of such export duties, charges, embargo, discrimination, or restriction. The duty thus prescribed is 25% above the Dingley-rate of tariff.

With reference to nursery-stock (seedlings of trees) imported from Europe, it might be wise to prohibit such importation as long as there prevails the grave danger of serious

diseases (pathological diseases like Diaporthe parasitica and Peridermium strobi) being co-imported.

II. Exportations:

Export premia are granted by countries either wishing to encourage export or else wishing to meet custom duties of countries to be invaded. Such premia are usually paid by means of a differential freight tariff.

Export duties are imposed by countries in which forests are scarce or in which the supply of especially valuable species is approaching exhaustion; or else, by countries which desire to encourage home manufactures by prohibiting the exportation of logs and of pulpwood.

The South American states thus attempt to prevent the exportation of quebracho wood whilst Quebec and Ontario discriminate against the exportation of logs and pulp-wood. Similarly, the exportation, out of South Dakota, of lumber and of timber (unless it be from dead trees) cut in the Black Hills is prohibited.

The exports of forestproducts (including manufactures of all kinds) from the United States had a value

in 1904 of $ 82,500,000.00
in 1905 of $ 75,300,000.00
in 1906 of $ 90,190,000.00
in 1907 of $106,200,000.00
in 1908 of $104,300,000.00

The most important item of our exports in true forestry products is that of boards, deals and planks which comprises over $^1/_3$ of all forestry exports and has a value in 1908 of $36,000,000.00.

Next important is rosin, comprising over 10% of all forestry exports.—Sawed timber ranks third and turpentine ranks fourth.

Significant is the following, for 1908:—

1. The value of our true forestry exports exceeded that of our true forestry imports by $31,355,852.00.

2. Estimated in feet b. m., our forestry exports exceeded the imports by 1000 million feet b. m.; the imports (1500 million feet b. m.) being $^3/_5$ of the exports (2500 million feet b. m.).

3. The true forestry exports form 5.7% of the entirety of our exports (of $1,834,786,357.00).

The value in 1908 of our true forestry exports and imports appears from the following (from Forest Service Circular 162):—

True forestry products.	Exports.	Imports.
Logwood	. . . . .	$244,460
Cork wood or bark, unmanufactured	. . . . .	2,092,732
Quebracho wood	. . . . .	612,971
Mahogany	. . . . .	2,566,954
All other cabinet woods	. . . . .	1,464,907
Logs and other unmanufactured wood	$4,337,766	. . . . .
Logs and round timber	. . . . .	1,264,439
Sawed timber	11,040,677	. . . . .
Hewed timber	1,316,465	. . . . .
Pulp wood	. . . . .	4,989,919
Boards, deals, and planks	5,607 ,508	. . . . .
Boards, deals, planks, and other sawed lumber	. . . . .	15,212,788
Joists and scantling	587,718	. . . . .
Shingles	75,535	2,379,242
Box shooks	958,127	. . . . .
All other shooks	1,716,190	. . . . .
Staves	6,016,690	. . . . .
Headings	176,430	. . . . .
All other lumber	5,216,854	2,665,428
All other unmanufactured	. . . . .	2,214,268
Total	67,043,960	35,708,108

The percentage of our true forestry exports compared with the total value of *all* our manufactured and unmanufactured forestproducts exported in 64.3%. For our imports, this figure is only 35.3%. The explanation of this discrepancy lies largely in the enormity of our rubberimports.