

8,42
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1937

SENIOR THESIS

"Some Comparisons of Forestry in a Few Outstanding Countries of The World"



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SOME COMPARISONS OF FORESTRY IN A FEW OUTSTANDING COUNTRIES OF THE WORLD

FOREWORD

The intelligent method, and perhaps the most common method of approach when embarking upon a rather new enterprise is to look around and discover what is going on, or what has already been done in that particular field. Then such information as can be accumulated may be intelligently applied to the particular matter at hand with a view to a more rapid advancement than ordinarily is possible.

Such an approach has been made in regard to forest practice in the United States. From the time this country first became conscious of the forestry situation our foresters have trooped in large numbers to other nations to study their methods of practice. Much literature has been written by these men, as well as some contributions being received directly from foreign foresters.

Forestry has been practiced in some of the European countries for several centuries so that as far as the time element is concerned a sufficiently long period has elapsed for those countries to have reached certain definite conclusions. So, for the person who finds it so necessary to keep abreast of developments in this country, it would seem just as worthwhile that an effort be made to study the situation in other countries.

This paper follows a somewhat different course than is usually the custom when preparing material for such a purpose. Ordinarily the thought is to deal very thoroughly and completely with the subject in mind. On the other hand it is an impossibility to adequately cover this particular subject in such a paper. Rather is it the desire to present a few of the more pertinent and more interesting factors pertaining

to the several countries selected.

In making a comparison of this nature it is at once apparent that there are two distinct angles in which a person might be interested. One of course, is the silvicultural and utilization standards, and the other is the attitude of the people themselves.

THE SITUATION IN GERMANY

Of all the modern nations, it is generally conceded that Germany has most thoroughly mastered forest practice in all its details, and it is largely to this country that we are indebted for our early silvicultural systems. To support a population of 68 million people or about 50% as much as that of the United States, Germany has a total land area slightly less than Michigan, Wisconsin, and Minnesota combined. (16 Germany has 32 million acres, or 20% of the landed surface in forests which is fairly well distributed over all of the area. This is approximately one twentieth as much forest land as there is in the U.S. The ratio of acres per person based on total land area is 1.7, while in the U.S. the ratio is 14.6 acres per person. The forest area of Germany works out to $\frac{1}{2}$ an acre per capita of population which may be compared to approximately 5 in the U.S. Yet through wise use of its soils Germany supplies four fifths of its wood requirements.

The question naturally arises, what would be the consequence if the annual production of timber per acre in the U.S. equalled that in Germany? Such a question may well be considered in view of the trend toward more intensive silviculture and the resulting increased growth. Applying average German growth figures per acre, we would be growing about 180 billion board feet, while our present consumption in 1935 was little more than a tenth of this figure. Probably a more conservative estimate is that our potential growth capacity is two and

one half times as great as the expected demand. As an interesting sidelight, the prediction has been made that the best 200 million acres or one third of our forest area under maximum intensity of silvicultural management would produce all the timber products needed. (16)

It is interesting to compare the element of time between Germany and the U.S. as regards forest management. It took in the neighborhood of 100 years for us to reach regionally, if not nationally, the economic position with reference to the forests that it took Germany as well as Europe as a whole 2000 years to obtain. (3) It remains to be seen if we can reorganize our resources as well as Germany has done. Silvicultural practice and regulation have been in effect over there for 200 years or more. Today there is hardly an acre of state, city, or private forest in the German empire which has not a regular well conceived working plan.

Forest ownership in Germany is as follows: The state forests compose 35% of the total, communal forests 20%, family entail forests 12%, and farm woodlots make up the remaining 33%. The farm woodlots are numerous and very small; 90% of them being less than 25 acres in extent, and 980,000 of them are individually owned. Probably the largest privately owned forest does not aggregate more than 200,000 acres. (3) Almost all land not devoted to agriculture is considered forest land. There is practically no waste land such as swamps, alpine rocks etc. Brushland, cut over land, protection forests beyond any possibility of access, and plantations of seedlings just made are all officially classified as a forest. (17)

The softwoods occupy 70% and the hardwoods 30% of the forest area, with the softwoods continually encroaching. Northern white pine, Douglas fir, and American red oak are doing as well or better than native German species. The trees are small when compared with timber in the U.S. so much

so that logs containing over 300 board feet are rare. Any article written by an American author about European or German forest conditions will invariably express surprise at the small logs being manufactured into lumber. Logs are customarily disposed of at a public auction. The order of things seems to be that a timber grower is very seldom a manufacturer of his raw product. The timber grower and manufacturer operate separately and under different ownership.

THE SITUATION IN THE SCANDINAVIAN COUNTRIES SWEDEN

The Scandinavian countries are outstanding examples of countries in which forest practice is well developed. Norway, Sweden, and Denmark are the three countries usually referred to collectively as Scandinavia. Of these probably Sweden is more outstanding than the others, and for this reason most of the following remarks will be relative to Sweden, although they may be generally applicable to the other two as well. A study of the forests, lumber industry, and lumber export trade of Sweden is probably the most interesting of its kind because Sweden occupies a leading position in the world in the lumber industry, not on account of the quantity produced, but on account of the scientific forest management and efficient manufacture and selling methods.

The European land to the south and west of Scandinavia support denser populations and possess much smaller forest areas per capita. These facts together with accessibility by sea, early led to exportation of timber, and lumber. It is for the ability to supply other countries with wood products that the Scandinavian countries rank in importance as they do. (14) Eventually though, in Sweden the forests began to show the effects of the heavy draft they were called upon to meet. The fact was then brought before the Swedish people that their forests, while a renewable asset nevertheless were not inexhaustible. Since over one

half of Sweden's land area possesses little or no fertility as agricultural land, that portion is devoted to its best use in the production of forest crops. Because lumber and forest products constitutes virtually half of the total exports, coupled with the importance of wood within the country itself, it is at once apparent that the standing of Sweden as a cultured and prosperous nation depends absolutely upon its ability to capitalize and stabilize the forests upon a sustained yield basis. (14) The total area of productive forests is 55 million acres of which private forests constitutes 42 million. (15) Perhaps these figures can be taken as an indication of the part private forestry will be expected to play when such excellent business conditions as displayed in Sweden are equaled in other countries.

Sweden has made more forestry progress in the last 50 years than any other nation in the world. Pulp wood was the factor which brought Sweden to a position of preeminence in rank in international trade in forest products. Proximity to England, the worlds greatest lumber buyer, and the improvement in market in the charcoaling industry are other important reasons. All in all though it is the demand for small size material which has mostly been responsible for the present intensive silviculture.

E. A. Sherman writing in the Journal of Forestry advances the argument that American forest policy cannot be compared with Sweden's because of the difference in size and other conditions of the two countries. He holds that the successful use of a given method in solving a relatively small and simple problem is far from proving that the same method will work successfully with a larger and more complex problem. However sound this argument, it is probable that the American forester would be much wiser to concentrate his study on the Swedish situation more than he has done in the past; this in preference to so much investigation

in Central and Southern Europe. While only a small part of the U.S. possesses a climate and forest condition similar to Sweden, Sweden is still more comparable to the U.S. than is any country in Central or Southern Europe. Both countries depend to a large extent upon the export market for disposal of their lumber and other products. Both countries have a large portion of their total land area devoted to forests, and ownership is roughly at about the same percentage, public forests in Sweden comprising slightly more than 20% of the total. (18)

20% of the forests are composed of broadleaves, but they are of little value because of the scattered stands in which they grow. Only two species of coniferous wood are important, *Pinus sylvestris* and *Picea excelsa*. The pine resembles Norway pine and the spruce our Eastern red spruce. The growth is smaller however on the part of the individual trees of the Swedish species, and they have more branches, so that the lumber produced is generally very knotty. The ground litter is not as much sought after here as it is in Germany. (14) Rotations vary from 75 to 200 years. The government maintains control of cutting to prevent exploitation. Logging machinery is not used except that recently a few American tractors have been put in operation. The Swedish loggers have gone Santa Claus one better in that they use reindeer rather widely for skidding their logs. High stumps are unknown, seldom exceeding 3 inches in height. Top logs are rarely left in the woods, and as in most other European countries utilization in other forms is much closer than in the U.S. Most of the logs are barked before being driven in the river to protect the fish, and to prevent accumulation of bark at the sawmills and in the river bottoms. Reproduction as a general thing is secured in Sweden's forests by natural process.

In 1933 a special legislature and expert committee was appointed to investigate the future of forestry in Sweden, and the possibilities of an expansion in the industry. They came to the conclusion that it was virtually impossible to enlarge the industry to any appreciable extent by increasing the forest area or increment. Rather they decided that if forestry was to grow it must grow along the lines of further refinement of the goods sold. This may be explained by the following illustration bearing on the pulp wood industry. At first Sweden produced pulp wood mostly, now they are turning out more pulp, and in the future to keep in line with the committees formula for forest expansion will be in the main turning out products manufactured from the pulp. (24) The committee banks strongly on future scientific development in the matter of wood usage to keep the forests going. It is conceivable that the textile industry which now imports all its cotton may be linked to the yield of the forest; that they will eventually be using sugar made from wood, yeast from pulp, and running their machinery with wood gas.

DenMark

Forestry in Denmark is quite comparable to forestry in the U.S. from the standpoint of time. Danish forestry really dates from the year 1905. (7) Prior to then forest land received no attention and produced little. Beech, Norway spruce, silver spruce, larch, and white fir are the principle trees. Douglas fir stands first among the imported trees. The major portion of the forest income is derived from thinnings. The general practice is to depend on artificial planting rather than natural seeding.

SITUATION IN AUSTRALIA AND NEW ZEALAND

Forestry in these countries is of particular interest because of the unique methods and ideas in vogue. Forest practice has been emphasized there since the world War. The paramount reason being the very high prices paid for softwood products during and immediately following the war. (2) The meagerness of softwood supplies from Scandinavian countries and from North American enabled those Australian owners who were fortunate enough to have exploitable stands of Monterey pine to sell their stumpage at a price of \$2 per 100 board feet which is \$20 per M. Naturally these extraordinary returns induced a number of individuals as well as the government to embark on extensive planting plans. Here, too, the timber famine bogey has played not a little part in hastening large coniferous tree plantations. Another substantial but more recent reason for tree planting has been that of finding work for the unemployed. It has been a traditional public activity in times of depression. 90% of the plantations now growing in Australia have been set out since the world war, so the expansion in forestry has been very rapid. Of this amount one third has been conducted under sponsorship of private enterprise.

Remarkable cultural success has been attained in New Zealand and Australia with Monterey pine (*Pinus radiata*), and the planting of this tree was concentrated upon. At least three quarters of the plantations are planted to Monterey pine and the balance in order of importance as follows: Corsican pine, Maritime pine, Western Yellow pine, the Southern pines, Lodgepole pine, Northern white pine, Douglas fir, Sitka spruce, and European larch.

Two things are already very apparent in which forest practice may differ from the customary general procedure in other countries. One is

that artificial regeneration in the form of planting is relied upon almost wholly, and the other is that virtually every tree from which future forest crops are expected is an exotic species. The fact that some of these trees are doing even better than in their native habitat is surprising. For instance the history of Monterey pine is of interest. It has probably been in those countries for a hundred years or more. No doubt seed was first brought in by some whaler or in ships ballast. Eventually it came to be noticed as being a rapid growing thrifty tree, altogether desirable for the production of forest products. This particular tree reaches relatively large dimensions. One tree measured was 150 feet high, 40 inches in DBH, carrying a merchantable volume inside the bark of 2000 board feet. Sargent states that in the U.S trees from 60 to 90 feet in height and 16 to 24 inches in diameter are common, but a height of nearly 100 feet and a diameter of $3\frac{1}{2}$ to 4 feet and occasionally 5 or 6 feet is sometimes obtained. From these figures it may be seen that the Monterey pine reaches greater proportions in the Antipodes than it does growing in its native habitat in the U.S. It has been said that a lack of knowledge of silvics and silviculture of the native trees is the principle reason for the artificial propagation of exotic conifers and the resulting retarding of the development of forest wealth from native species.

A rotation of 30 to 35 years for Monterey pine and 40 to 50 for most of the other species has been set. An average annual increment of 250 cu. ft. per acre may be attained under the better conditions with Monterey pine. (2) The quality will compare favorably with the grades milled from natural 2nd growth timber in the U.S. and more than favorably with wood goods produced in Scandinavian countries.

It will be interesting to observe the progress of the forestry

movement in these countries under such conditions. Incidentally it might be added that a trend seems to be developing recently to emphasize the handling of the indigenous forest in a better manner.

SITUATION IN RUSSIA

Forestry in Russia is worthy of consideration, not because of any fine examples of forest practice or utilization, but rather for the effect they will have on the future practice of forestry in the other countries of the world.

The British Society of Foresters have gone on record as fearing for the future of timber growing in England because of the import of Russian lumber at prices so obviously uneconomical from the standpoint of production. (21) Virtually all the countries interested in establishing a sound system of forest practice have evidenced a feeling favoring legislation that will protect their interests against importation from Russia under present conditions of wood production. It is very much to the point to consider the serious menace to the forest industries of the United States.

The Russian forests are tremendous in their area. So much so in fact that actually they have little idea of the exact condition of much of the forest wealth. A good portion of the forest land is even referred to as being unexplored. (23) However estimates have been made that the total Russian forest area is at least two and one half times that of the U.S. with Alaska included. Pine and spruce preponderate among the conifers which are more important than the hardwoods. The conifers comprise 70% to 90% of the stand in the North and only 20% in the South. River driving is the principle means of transportation, with forms of sledding being of importance in the North. (20) In general, though, the location of the Russian forests for utilization is not favorable.

Before the Social Revolution 25% of the forests belonged to the states, and the remainder to the communes, to large private owners, and various institutions. (23) There was no regular system of forest management and individuals exploited their forests to an exaggerated degree. Hence the Soviet government inherited a silviculture that was practically ruined. From this period a marked difference of opinion seems to prevail as to the effect such a change in government had upon the forests. One writer, an important official connected with the Russian forests, states that the year 1923 (4 years after the Revolution), marked the beginning of a new era for the Russian forests. (23) Since he did not present many conclusive arguments in support of his contention it might seem that most of the other writers are more nearly correct when they state that such a change in forest practice actually extends only so far as provisions made on paper for more intensive silviculture in the five year plan. They hold that exploitation in relation to the constantly rising requirements of the industry is on the upgrade; that since 1929 when the state forests were placed under that department of the government responsible for the execution of the five year plan, the welfare of the forests have been completely subordinated to the industrial program. It is due to the practices arising from this situation that the attitude of other nations previously mentioned may be accounted for. The chief gripe being that Russian forest goods can be put on foreign markets at such low prices because the goods are produced by men suffering the lowest scale of living, and produced from confiscated natural resources carrying no capital charge for interest, taxes of depreciation. (21)

Methods of supervision are in such a low state that during a recent year over 33 million acres of land was so devastated as to be practically unproductive. (20) Despite the fact that exploitation

without regulation is the fact today in Russia, the area of forest is so huge that the total growth still more than equals the cut.

Lest the idea be implanted that there is no good in Russian forestry, may it be added that such is not the case. They have turned out remarkable work on several aspects of forestry, but on the whole are handicapped in the matter of incentive by being blessed with such an abundant natural resource. They are the outstanding nation as far as experience with shelter belts is concerned. They have been working with shelterbelts comparable in size to our proposed midwestern project since 1880 or before. (22) Their systems of shelterbelt planting seem most nearly applicable in scale and other conditions to a similar undertaking in this country, so that an intensive study on the part of our foresters would be quite appropriate.

So, whether out of her forest chaos will come order, and if so what kind of order is a question of the first magnitude to foresters all over the world.

SITUATION IN ENGLAND

As was the case with Australia, the war period brought England face to face with their dependent position as regards timber supplies. With timber imports being practically shut off from other countries they were forced to depend on their own limited resources. After the war there was great feeling that steps should be taken so that they would not be caught in a like predicament in the future. Natural reproduction is difficult to obtain and the tendency is all towards artificial reproduction. Actually the forestry question in Great Britain resolves itself largely into a matter of afforestation. (12) Almost every article published in America about English forestry deals with the question of afforestation.

In considering British forestry about the first thing ordinarily thought of is that the rest of the British empire will be able to supply England with forest products, but actually to state that the British Empire is self supporting as far as timber products are concerned is an error.

Forest conditions are somewhat different in England than in most of the other European nations. An unfavorable factor in time of peace is the difficulty in marketing softwood lumber on account of importations from the Scandinavian countries and from Russia. English lumber is inferior due to growth and to poor manufacturing methods.(8)

Originally the reason for maintaining the forests was for the protection of game, and today game is still about the most important part of the forest. Forest fires are not a problem in England except in the Scotch pine plantations, but protection against rabbits constitutes the same problem to them as protection against forest fire is to us.

Douglas fir, Sitka spruce, and Western red cedar are the American trees doing well in England. Most of the forests as was previously mentioned have been planted rather than depending on natural reproduction. Probably the greatest use of timber grown in England is for pit wood in their numerous mining operations. Such use does not require lumber of high quality, so it fits in nicely with the rather poor quality produced. It is thought, that for some time to come at least, the higher quality woods will be imported in view of its low price and abundance.

COMPARISON OF POSSIBILITIES OF FOREST PRACTICE AS A PRIVATE ENTERPRISE

It may be safely said that one of the foremost questions in the minds of foresters in America today is whether or not it will be possible for private forestry to pay its way financially. Perhaps the best argument advocates of forest practice have had is to point to the success of private forestry in Europe. However, analyzing the situation in Germany we find that the success of private interests is largely due to unique conditions which do not yet prevail in the U.S. --namely markets for lumber a few miles from the source, and markets for fuel and forest litter. If fuel wood did not bring a fair price many of the German forests would be worked at a loss. From this it would appear that a market for that part of the tree not manufactured into lumber may be a good part of the solution to successful private forest practice.

One of the most outstanding factors that favor forestry as a business in Sweden and Europe is the climate. As soon as the word forest is mentioned to the average American investor, he at once thinks of fire and the long period of risk. In northwestern Europe such a psychology does not afflict the forest owner or investor. In fact, he looks upon woodlands as a most stable form of property constantly tending to increase in value. From a forestry standpoint Sweden possesses in her climate a great advantage over North America in that she is blessed with practical immunity from forest fires if ordinary precautions are taken. (14) The direct reason for this immunity is the luxuriant growth of grasses, and mosses on the forest floor everywhere, together with constant high relative humidity, which keeps this vegetation and the underlying soil perennially moist. In view of these facts it is surprising to note the average annual precipitation in Sweden is less than 20 inches.

An interesting observation made by E. C. Richards on a tour of some 6000 miles through Europe was that in all that distance only one area of forest was passed that had been freshly burned and this area was only about 100 feet across. (9) There are many reasons including damp weather and fairly regular rainfall, with an absence of prolonged droughts, but this does not tell the whole story. The European people have a mental attitude different from ours toward fires. Somehow it has been impressed upon them that forests are valuable and important, and that they belong to someone, and that such being the case they are not to be destroyed, abused, or burned up. With this psychology in the mind of the general public, the forester has a much easier time of it than in America where too many people do not consider the forests to be of any value.

The private owner contends that labor costs are much higher in the U.S. which is true enough. On the other hand as an offset, is the fact that taxes are ordinarily higher in most foreign countries. Contrast this to the fact that our taxes are considered to be one of the outstanding hindrances to sustained yield, and yet foreign operators seem to get along with even a higher tax. Fernow contends that such higher costs as taxes should drive the owner to more intensive forestry to offset the burden. In addition it has been estimated that our lands are undoubtedly of higher average productive capacity per acre than that of European nations--possibly one third greater.

European bankers rank timber investments among the highest of all forms of investment. They look upon forest practice as a sound private investment, an investment that will yield a reasonable return consistently. In the field of non-speculative investment, which is what most people are interested in, they consider that forestry in the long run probably pays about the same returns as any other sound investment--from 3% to 4%.

Reviewing the situation we find that the cost of growing timber is some where near the same level in the U.S. and in Europe with the balance, if any, in favor of this country. In addition, our lands are potentially more productive. But the European countries hold the edge from the market standpoint. They have a more complete utilization as well as a market within their own country for all the forest products they can grow. Add to this the safety factor of freedom from fire, and it is apparent that as these conditions now stand private foreign foresters have a much better set up.

Another feature of difference between our country and those of Europe that may have a profound effect on the practice of private forestry, and one that is ordinarily barely thought of, is that of the family. Over there the many estates have been in the same families through countless generations. The tendency seems to be for the sons to follow in the fathers footsteps generation after generation. Due to this factor it is possible to follow the same forest practices and plans over the long period of time necessary to produce a forest crop. In this country the reverse seems to be true. The family ties do not seem to be as strong, and so far at least the incentive to build up a lasting family estate has been lacking. Since such family estates ordinarily comprise from one fifth to one sixth of the forest area of the European countries, they make up a worthwhile portion of the total.

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