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Forestry in a Changing World

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THE OUTSTANDING CHARACTERISTIC OF THIS FIRST half of the 20th century is change. Change in the relatively stable social and economic ideas of the early 1900's. Change in our concept in international outlooks and relationships. Change in our appreciation of the significance of the renewable natural resources of the world and their relation to human welfare. Perhaps, in North America, no change is more noteworthy than the one that has taken place in the public attitude towards forests.

At the turn of the century people on this continent thought of the forests as limitless, if they thought of them at all. There were, indeed, farsighted men who understood that uncontrolled logging and the unchecked ravages of forest fires would lead inevitably to destruction of the forests and to shortages of forest products. But these men were few, and the majority took little heed of their warnings.

In the North America of today the situation is very different. Public interest in the welfare of the forests has been aroused and has expressed itself in an impressive volume of forestry legislation. In the United States a great system of national forests has been established, and in Canada logging operations on publicly-owned forest lands are being subjected to constantly increasing supervision. In both countries great strides are being made towards protection of publicly and privately owned forests from destruction by fire, insects, and tree diseases. An immense amount of research in forestry and forest products is being carried on. Public forestry administrations are being supported in their efforts by voluntary private associations. A strong corps of professional foresters has been built up and is constantly reinforced by graduates from many excellent forestry schools. Although much remains to be done, all this constitutes a vary notable change from the attitude prevalent in the year 1900.

FORESTRY

Mere exploitation is giving way to forestry. But what is forestry? In a word, it means the deliberate management of existing forests, and the establishment of new forests when necessary, to insure that the people shall receive in perpetuity the greatest possible benefit from all the forest lands at their disposal. Historically speaking, the practice of forestry does not commence until it becomes apparent that current methods of use or abuse are endangering the forest resources. You will recall Professor Toynbee's thesis to the effect that the continued existence of any civilization depends upon its successful response to a series of challenges. Adoption of proper forestry measures, in time to prevent dangerous forest devastation with all its incumbent evils, constitutes just such a response. The consequences of failure to meet this particular challenge are illustrated with awful clarity in the valleys of Jordan, Tigris and Euphrates.

There are records which show that some form of forestry existed in China long before the beginning of the Christian era. In Europe the practice of forestry on an empirical basis appears to date from about the 15th century, although the modern development of forestry as an applied science may be dated from the first quarter of the 19th century. Introduction of forestry into North America can be set, for practical purposes, at the beginning of the present century when such leaders as Fernow and Pinchot succeeded in laying foundations on which the American concept of forestry is still being built. To

the foresters of Europe, America owes a great debt, but progress on this side of the Atlantic has been rapid and, in some respects, useful ideas can already be sent back across the ocean.

FUNCTIONS OF FORESTS

The functions of forests in a national economy are protective as well as productive, and no greater mistake could be made than that of assuming that the former are less important than the latter. In certain situations the exact opposite is true. Forests are essential to the protection of headwaters of the streams and rivers upon which agriculture, inland navigation and hydro-electric power must depend for their very existence. In mountainous country forest cover gives the best defense against avalanches and "flash" floods. Even within predominantly agricultural districts, a reasonable proportion of forest cover has been found necessary to give protection against wind and to help maintain underground water tables at satisfactory levels.

Forests also provide the habitat of many game birds and game and furbearing animals. Again, the forest provides ideal conditions for relaxation and rest from the tension and turmoil so characteristic of modern urban life.

FOREST PRODUCTS

All these functions of the forest are important but this chapter will be devoted to discussing the forest as the source of forest products—products which have been in such short supply in so many parts of the world during the past few years.

It seems probable that wood was the first "raw material," other than food and skins, which our primitive ancestors put to use. Certainly, wood was commonly used for fuel and for building shelters tens of thousands of years before the commencement of recorded history. The important point for us is that the same material is serving the same purposes today. About one-half of all the wood cut each year is used for heating and cooking, and logs destined to be sawn into lumber still constitute the largest component of the other half. But not all the sawn lumber is now used in building and new uses for wood are constantly increasing in relative importance.

Looking backward, we can see that a turning point in the wood-using habits of the western world was reached at the beginning of the Industrial Revolution. The invention of the steam engine, the

mechanization of industry, and the scientific discoveries of the 18th and 19th centuries led inevitably to a whole series of new demands for wood and its derivatives.

The railroads of the world require many millions of cubic feet of wood annually in the form of crossties, and more millions for the construction of rolling stock. Each ton of coal mined entails the consumption of a certain volume of pitprops. During the last war years more lumber was used in the United States for making crates and boxes than for any other single purpose. Most important of all, the wood pulp industry—whose products were unknown less than a century ago—has become a major source of wood consumption, and provides raw materials for most of the world's paper and an increasingly large proportion of its textiles.

Furthermore, engineers are constantly finding new ways and improving old ways of using wood, and chemists are deriving entirely new products from this most adaptable of raw materials. It is true that many of these new products will never result in additional massive demands for wood; but it would be reckless to assume that some one of them may not create a new market comparable to that opened up by the invention of the pulping processes.

It is evident that the progress of civilization has increased rather than decreased the demand for wood, and that this tendency is likely to continue. But there are other forces at work in the same direction. One of them arises from the rapid increase of the world's population; another, from the urgent desire of people everywhere to attain improved standards of living. Evidences are multiplying that the vast populations of Asia are no longer content with the poverty and hardship which have been their lot.

It is not difficult to demonstrate that attainment of a better way of life for increasing numbers of people depends, to a considerable degree, on the provision of increased quantities of forest products—more fuelwood, more building timber, more railway ties and more paper for the dissemination of education and news.

SHORTAGE OF FOREST PRODUCTS

We arrive, then, at the conclusion that the future demand for products of the forest is likely to be larger—and very substantially larger—than it is today. But we reach this conclusion at a time when most of the world is suffering from more or less severe shortages of forest products. These shortages have delayed reconstruction in the war devastated regions of Europe and Asia, they have contributed

to the shortage and high cost of housing in the United States, and they are a direct cause of a great deal of human suffering in many other lands. It is very important, therefore, to determine whether existing shortages arise from a lack of forests and whether there is any possibility of meeting the increased demand which we foresee for the future. At first sight, it might seem that the mere fact that shortages exist now carries with it the implication that prospects for larger supplies in the future are poor. Further examination, however, may show a different picture.

Present or recent shortages may be divided into three principal classes. First, there have been relative shortages in the United States and Canada, which arise in large part from the extremely high level of general economic activity. Second, there are the shortages existing in Europe which, it is to be hoped, will be overcome when war damage has been repaired and the existing dislocation of normal trading channels corrected. Third, there are extreme shortages of long standing such as are characteristic of the Middle East and of large parts of Asia. These shortages are very severe, and but little prospect for early improvement is in sight. Perhaps we should also recognize a fourth category of purely local shortages, such as are found in some cities of Latin America because of excessive denudation of the forests in the immediate vicinity of these centers of population.

It will be convenient to discuss separately these different kinds of shortages and the prospects for overcoming them. First, however, it is necessary to define a few terms.

The first term is "productive forests." In a survey recently completed by the Food and Agriculture Organization of the United Nations, each country was asked to distinguish between "productive" and "other" forests. "Productive forests" include all forested lands capable of bearing recurrent crops of usable wood; in other words, lands where growing conditions are good enough to permit systematic forest management. "Other forests" include lands which bear trees but where site conditions are so difficult and the trees are of such poor form and slow growth that management would be impossible. Less than 8 per cent of the total forest area of the United States falls in the unproductive category; but, on a world basis, recognition of these two categories has proven to be extremely important, since more than one-third of the total forest area is found to be in the unproductive class.

When discussing the needs of a country for wood, we think of many different products—sawn lumber, fence posts, mining timber, paper, paperboard, veneers and plywood, and so forth. Quantities

of these different products are ordinarily described in different ways, such as thousands of board feet of lumber and tons of paper. Obviously, it is impossible to add together quantities expressed in different units of measurement in order to determine total wood requirements. The problem is solved by computing the average volume of roundwood needed for the production of each unit of volume or weight, and making the necessary substitutions. Then it becomes possible to calculate production or consumption totals.

SHORTAGES IN THE UNITED STATES. As has been said, such shortages of forest products as have existed in the United States have been relative rather than absolute, and they exist in spite of extremely high levels of production in practically all branches of forest industry. Should there be any slackening of the tempo of economic activity, they might quickly be replaced by temporary surpluses. The problem, then, is to estimate whether domestic forest resources, together with available imports, can continue to supply current rates or higher rates of consumption in perpetuity. The United States has been for many years a net importer, rather than an exporter of forest products.

A wealth of information is available in a series of booklets, issued by the Department of Agriculture, which contains analyses of the forestry situation as revealed by a reappraisal made by the United States Forest Service during the years 1945 and 1946. Drawing upon these and other sources, it is possible to summarize the position in this country with some confidence.

The chief forest product in the United States is sawn lumber. During and since the war it has been produced and used at an average rate of about 36 billion board feet annually, a figure which may be compared with the record production of 44½ billion board feet in 1909. It is estimated that potential annual requirements during the period 1950-55 will be about 42½ billion board feet, with a long-term future demand averaging about 39 billion board feet. The rate of lumber consumption per capita, ranging from 250 to nearly 300 board feet, is among the highest in the world. The short-term forecast envisages use of nearly 75 per cent of all lumber for construction purposes, including railways and mines. In terms of drain upon the forests, sawn lumber is expected to account for from 50 to 60 per cent of the total.

Short-term consumption of fuelwood, averaging about 63 million cords annually, will account for about 12½ per cent of total drain on the forest, since only 27 million cords will come from sound, living trees.

Production of pulpwood from domestic forests, currently running somewhere in the neighborhood of 15 million cords, is expected to rise to 20 million cords after 1950 and to 40 million 50 years hence. The short-term forecast indicates that pulpwood will account for about 11½ per cent of total drain. Allowance is made in the estimate of over-all consumption for continued imports of pulp and paper. All other forest products, excepting the three just mentioned, account for only 16 per cent of total commodity drain.

In 1944 drain on the forests of the United States amounted to 13.4 billion cubic feet, of which 9 per cent was caused by fire, insects and other natural enemies. Current growth, in terms of timber of all sizes, just about balanced current drain, although a deficit of 1.4 billion cubic feet of softwoods was offset by a surplus of hardwood growth. With respect to timber of sawlog size, however, the situation was not satisfactory, since growth was established at 35.3 billion board feet against a cut of 53.9 billion board feet, including an over-cut of 50 per cent.

The estimates of potential future demand require the provision for domestic consumption of 14.6 billion cubic feet annually, which would include 61 billion board feet of timber of sawlog size. In addition to this commodity drain, allowance must be made for natural losses.

To sum up, potential future requirements will demand a 20 per cent increase in total growth, but this will have to include an increase of 80 per cent in the growth of sawtimber.

The Forest Service estimates that these growth goals not only can be reached, but can be exceeded by a comfortable margin—25 per cent in the case of total growth, with a smaller margin of safety for sawtimber. This estimate implies an average annual growth rate of about 44 cubic feet per acre, as compared to a current rate of 29 cubic feet.

It is permissible to ask whether the estimate of possible future growth is realistic. Fortunately, there is now available a considerable amount of information respecting growth of forests in many countries where intensive forestry has long been practiced. For example, Switzerland and Germany show national averages of about 57 cubic feet per acre, and Denmark nearly 100. Other European countries show lower rates, but competent authorities believe that improved forestry can make possible a continental average of at least 43 cubic feet per acre, practically the same as the future rate assumed for the United States. But, when one considers that the United States possesses the finest forests of any country in the world, taking both

variety and extent into account; when one notes its favorable position in the southern part of the North Temperate Zone; and when one recalls general impressions of forest conditions in Europe and in this country, it passes all belief that this country cannot eventually reach average rates of growth and yield not only equal to, but considerably higher than, the possibilities which exist in Europe.

The goal, then, is definitely attainable. It is true that much time and effort must be devoted to its achievement because great improvements in forest management are needed; but Americans are fortunate in that the effort can be made with the confidence that they are not chasing a will-o'-the-wisp.

SHORTAGES IN CANADA. A similarly bright future for forestry exists in Canada. Already the world's largest exporter of forest products and largest producer of newsprint paper, her maximum potentialities have by no means been reached. Improved methods of forest management, now being gradually developed, and the opening up of forests as yet inaccessible, may eventually enable her to double her present output.

SHORTAGES IN EUROPE. We may now pass on to the current shortages existing in Europe, exclusive of the Soviet Union. Before the war, Europe, with a population nearly $2\frac{1}{2}$ times that of North America, and with little more than one-third of the forest area, was nevertheless almost self-supporting in forest products. Net imports amounted to less than one-third of one per cent of total consumption. There were, however, great differences between conditions in different countries, with the result that international trade within the continent accounted for two-thirds of total world trade in forest products. The approximate balance between exports and imports depended on the offsetting of net imports of lumber, largely from the Soviet Union and North America, by net exports of pulp and paper to other continents. Furthermore, there were, even in 1937, evidences of approaching shortages.

After the war the situation had deteriorated seriously with respect to lumber, chiefly because of disturbance of former trade channels. Also the quantities of lumber formerly available to deficit countries from exporting countries have been reduced, partly because of reduced production and partly because of increased domestic consumption. The change in the position of the Soviet Union, from that

of a larger exporter to that of a net importer of lumber, has had particularly serious effects in western Europe.

With respect to pulpwood and pulp products, Europe is even today exporting more than she imports; but many European paper mills are idle, partly for want of pulp.

For pitprops, so essential to coal mining, Europe is practically self-sufficient, except for imports from Canada into the United Kingdom. The prospects for the future, however, are occasioning a good deal of concern.

Some countries of Europe already have surplus supplies of fuelwood, although others are short. This situation is difficult to correct, because fuelwood is the cheapest of forest products and cannot be transported profitably over long distances.

Europe's serious shortage of lumber comes at a time when the real need is exceptionally great, because of war damage to homes and factories. Prospects for increasing supplies from outside sources are slim. Arrangements have been made to increase temporarily the output from Europe's own forests, but this cannot be continued indefinitely under existing conditions. The long-term solution must lie, therefore, in improvement of the condition and output of Europe's own forests, and the prospects are that this can be done, given time. It will involve extensive reforestation, such as is being undertaken in the United Kingdom; conversion of coppice forest to coniferous high forest, now under way in France; and improvement of the degree of stocking in the forests of the northern countries. But there is little prospect that Europe can substantially increase the average per capita rate of consumption she enjoyed before the war from her own resources. If and when the Soviet Union resumes her former position as an exporter, the situation will be greatly improved.

Conditions in the Soviet Union are difficult to assess because of the lack of definite information. In brief, the reconstruction problem is still very great, and all domestic wood available, plus substantial imports, is likely to be needed within the country for a long time to come. Possibilities for the future, however, are very great because of the immense size of the forest resource, a large proportion of which is not yet accessible. Prewar consumption of wood per capita was estimated to be about 50 cubic feet annually, and is probably not much different today.

There is no question that current difficulties in North America and the USSR can be overcome eventually, and Europe can probably

re-establish relatively satisfactory supplies of forest products, perhaps with some help from outside.

SHORTAGES IN THE FAR EAST. The situation in the Far East is far more serious. There are extensive forest resources in such countries as Burma, Siam, and the Netherlands Indies; but in India and China, with more than 40 per cent of the world's population, the average quantities of forest products available per capita are very, very small. Even if the well-forested countries of Asia are included, average consumption per capita is only 10 cubic feet and in the two large countries the figure is much lower. Millions of people have virtually no wood at their disposal. Time does not permit outlining the consequences that follow, but they are serious indeed. In the areas of India and Pakistan formerly included in British India, there is hardly one-fourth of an acre of accessible productive forest per person; in China less than one-tenth of an acre, although inclusion of inaccessible productive forests brings the average up to about one-fourth of an acre.

For Asia as a whole, area of forest per person is nearly three-fourths of an acre, nearly the same as in Europe; but one-half of the total forest area of Asia is still inaccessible. How much can be done in the future by way of shipments of wood and its products from Asia's well-forested countries into India and China remains to be seen; in the meantime, large-scale planting projects within the two larger countries should be undertaken as soon as possible.

In the Near East and Middle East the stringency is even more severe. Prewar average consumption of wood was only 3 cubic feet per capita and most of that was imported. In Egypt there are no forests, in Saudi Arabia practically none, and in Iraq the forests that exist are remote from the dwellings of most of the people. Over much of this region soil degradation has progressed so far, and climatic conditions are so severe, that reforestation programs will be very difficult and very expensive.

Shortages of various kinds also exist in other regions but time does not permit examination of all of them.

FUTURE OF WORLD FOREST RESOURCES

We have reviewed present difficulties. Now we may examine future possibilities on the basis of the latest information respecting world forest resources.

In approaching this question from a world-wide point of view several facts must be borne in mind. First, there are great differences between the geographical distribution of forests and of populations. Second, wood in its natural state is a bulky material of relatively low value, and considerations of cost, as well as of supply, limit its transportation over great distances. For the more highly manufactured forest products the cost factor becomes of less importance. Third, differences in climate and in ways of living combine to ensure that an absolutely uniform distribution of available supplies will neither occur nor be needed.

In 1937 world consumption of forest products was estimated to be equivalent to 53 billion cubic feet of roundwood, and that figure is probably close to the rate of consumption today.

The problem is to determine whether productive forests now in existence could, if they were properly managed, provide that amount of wood, or an even larger amount, in perpetuity.

Total world forest area is estimated to be 9.9 billion acres, of which 6.4 billion acres are classed as productive. Of the productive forest, 2.3 billion acres are coniferous or softwood forests and 4.1 billion acres are broad-leaved or hardwoods.

After careful study it is estimated that, if the softwood forests now accessible were properly managed, they could yield more than 40 billion cubic feet annually. Forests as yet inaccessible should be able to produce an additional 20 billion cubic feet, giving a total of 60 billion cubic feet. Thus there appear to be possibilities for obtaining more wood annually, in perpetuity, from coniferous forests alone, than is now taken from all forests. This conclusion was not reached by assuming an over-all average rate of yield; but, when results are examined, it works out at an average of 31 cubic feet per acre. Many authorities would consider this average figure far from optimistic.

When we consider that the conclusion just outlined makes no allowance for the productive broad-leaved forests, which are nearly twice as extensive as the coniferous forests, it is evident that the forests of the world are potentially capable of a total production vastly greater than in the past. But it cannot be emphasized too much that this result depends on proper forest management. Unless such management is established, increased drain on the forests will merely result in their progressive devastation.

On the whole, prospects for the future are encouraging; but man's treatment of the forests up to the present, as seen from a world-wide

point of view, has been far from satisfactory. National forest policies are still lacking in many countries and are far from adequate in many more. For example, the United States and Canada have only progressed to a stage of transition from uncontrolled exploitation to forestry. Regional policies, particularly necessary where the forests and forest industries of different countries are naturally complementary to one another, have never been formulated.

Here again an encouraging change has become evident in the past few years in the adoption of an international approach to major forestry problems.

DIVISION OF FORESTRY AND FOREST PRODUCTS, FAO

In 1945 forty-two governments signed the constitution of the Food and Agriculture Organization of the United Nations and the number of adherents has now risen to 58. This organization is responsible, among other things, for promoting better use of forest resources and increased production and improved distribution of forest products. In order to carry out these functions, the organization includes a Division of Forestry and Forest Products, of which M. Marcel Leloup of France is director.

It is not possible, in the time at my disposal, to review all the activities of the division, but it will suffice to draw attention to some of the most important ones.

Working on the principle that a situation cannot be dealt with until the facts are known, studies of world forest resources were promptly undertaken and a world-wide program of annual statistics on forest products was established.

An international journal covering the fields of forestry and forest products, under the name "Unasyuva," is being published. It serves as a medium for disseminating information and news throughout the world.

At an early stage it became evident that problems characteristic of different regions varied so greatly in kind and relative importance that a regional approach was essential.

Since Europe's post-war difficulties appeared most acute, first attention was directed there. FAO is now providing the secretariat and actively cooperating in the work of the Timber Committee of the Economic Commission for Europe. This committee is particularly concerned with finding solutions to urgent short-term problems regarding supplies of softwood lumber and pitprops. Good progress has been made. The committee has succeeded in ensuring the fairest

practicable distribution of available supplies, and steps which have been taken to secure additional forestry equipment for certain exporting countries are expected to result in increased supplies in the future.

A European Commission for Forestry and Forest Products has been created, under the aegis of FAO, where representatives of member governments can discuss their medium and long-term forestry problems, and seek means for their solution. This commission, and some subsidiary bodies, are served by the working group of the division established at Geneva.

The first Latin American Conference on Forestry and Forest Products, organized by FAO, was held in April, 1948, at Teresopolis on the invitation of the government of Brazil. This conference adopted a series of constructive recommendations which will be the foundation of future progress. A working group of the Forestry and Forest Products Division has since been established at Rio de Janeiro, and the Latin American Commission for Forestry and Forest Products held its first meetings this year.

A similar conference for Asia and the Far East was held at Mysore, India in the spring of 1949. A forestry representative of FAO is established in Bangkok, and organization of a commission is under way.

Further extension of the work to the Middle East and Africa is also planned.

The system adopted ensures that governments themselves will determine, through mutual discussion, the most urgent regional problems and the manner in which they should be tackled. At the same time, FAO is able to serve its members by acting as a coordinating agency. In the long run, the ideal of a world forest policy may emerge. The estimate of the ultimate possibilities of the world's forests points to the great advantages which might flow from such an outcome.

Meanwhile, FAO is endeavoring to bring technical information and advice within the reach of countries who need it, particularly the underdeveloped countries. Studies of means for reducing excessive wastage of wood are being pursued. Establishment of integrated forest industries, capable of using to best advantage all the products of the forests at their disposal, is being promoted. Not least in importance, FAO loses no opportunity to stress the fact that forestry and the utilization of forest products are one indivisible subject, and that the needs of the silviculturist and of the forest industrialist must be

considered jointly. To this fundamental concept too little attention has been given in the past.

To sum up the forestry situation, the world is now suffering from shortages of forest products, but the forests are inherently capable of producing far more wood annually than has ever been taken from them.

If the future possibilities are to be realized, all productive forests must be brought into use and haphazard exploitation must give way to orderly management.

Improved management of the forests of each country must be undertaken by that country, and great efforts will be required.

Finally, regional and world-wide cooperation between nations offers the means for faster progress.

SELECTED REFERENCES

- A Reappraisal of the Forest Situation* 6 Reports. Govt. Print. Off., Washington, 1946-47.
- Forestry and Forest Products, World Situation 1937-1946* Report of Food and Agriculture Organization of the United Nations. Stockholm, 1946.
- GRAVES, H. S. AND OTHERS, *Problems and Progress of Forestry in the United States* Report of Joint Committee on Forestry of the National Council and the Society of the American Foresters. Washington, 1947.
- ISE, JOHN *The United States Forest Policy* Yale University Press, New Haven, 1920.
- National Resources Board Report* pp. 135-43, 206-16. Govt. Print. Off., Washington, December 1934.
- PARKINS, A. E. AND WHITAKER, J. R., (Ed.) *Our Natural Resources and Their Conservation* 2nd Edition Wiley. New York, 1948.
- PINCHOT, GIFFORD *Breaking New Ground* Harcourt Brace and Company, New York, 1947.
- A National Plan for American Forests* Senate Document 12. 73rd Congress 1st Session. Vols. I and II. Govt. Print. Off., Washington, 1933.
- Timber Shortage or Timber Abundance* Annual Report of the Chief of the Forest Service. Govt. Print. Off., Washington, 1946.