

## THE FUTURE OF FORESTS IN SOCIETY <sup>1</sup>

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All of you have probably heard Clemenceau's epigram about war being too serious a business to leave to generals. Recently our profession has had the rueful experience of hearing opinions that seem to say: The future of forests is much too important to leave to foresters. Many of us, at least in the United States, have instinctively responded with an angry denial. But, in reality, we should welcome the fact that more and more people are moved to speak and write about how they expect forests to help them satisfy some deeply felt need. This is the best possible assurance we could get that forests can significantly increase not only the material well-being, but also the quality of life in our emerging society.

This rising tide of interest is seen by many people as a golden opportunity to enhance their influence over the future of our forests. Whether foresters will be nimble enough to take full advantage of the situation remains to be seen. There is little doubt in my mind that as a technical group we have more skill and experience with managing woodlands than any other. However, I am less confident of our capacity to cope with the formulation of policy, and it is here that the really significant decisions are made to match important ends with appropriate means. Although there is considerable satisfaction, and even security, in being effective operators, there is far more to be gained from becoming adept at deciding what shall be done. In order to do this I believe we must become more skillful at reconciling conflicting demands, more agile in avoiding the restraints imposed by limited resources, and more flexible in our preparations to meet the uncertainties that lie ahead. The inevitable stimulus this will give to the intellectual force of our ideas should make a decisive increase in the satisfaction society will get from the use of its forests in the years to come.

In order to get some new insights on how our own forest policy decisions can be improved I spent three months this spring traveling in Western Europe talking to people about forest and land problems. Altogether, I interviewed over seventy-five people in ninety days; including public and private "dirt foresters" and higher administrators, local and regional planners, industrial people, nature conservancy folk, park planners, educators, research people, and others having to do with the use and development of wild land. Admittedly I didn't have time to understand fully the present situation, but certain impressions and ideas can be used to illustrate how we in Canada and the United States may go about strengthening the forester's contribution to policy.

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## GERMANY

One of the most interesting revelations came to me from a discussion of the origins of German forestry. Because so many of us on this side of the Atlantic have borrowed ideas from Germany and think of it as the stronghold of traditional forestry the development of policy there makes a good case. I had always heard that forestry in Germany had deep professional roots in the management of feudal estates for hunting, and this seemed to me a puzzling occupation to produce ideas about intensive management for a sustained yield of wood. It is true that game managers were the first to be involved with the forest resource, but concepts of silviculture and sustained yield developed much later. In fact, this policy package did not initially gain nation wide acceptance as an appropriate way to manage forests, nor did implementing it become a major public function affecting a large area of woodland until about 1800. By this time high-level sustained yield seemed a practically perfect solution to the economic problems raised by mercantilism.

To explain this we must recall that the feudal system gradually gave way before the forces that created a dynamic, positive, and strong central state. This new social order not only ushered in the modern era, but also introduced the idea that manufacture and trade, rather than land, were the basic sources of national strength. The doctrine of mercantilism developed as a major guide for creating a strong central government.

In barest outline, mercantilists thought that the touchstone to success was money, and that the way to get a large share of the world's gold and silver was by manufacture and trade. If a nation exported more than it imported it could take the balance in precious metals and as a corollary, it was the legitimate activity of a wise central government to take any steps necessary to foster manufacture and exports and to limit imports to the bare essentials. Parenthetically, we are hearing an interesting revival and expansion of this theme from the developing nations in their discussions at the various world trade conferences.

Mercantilism also encouraged the first steps toward urbanization as people moved from rural areas to factory and trade centers. Much of the early industrial success of the 17th century was based heavily on timber for construction of all kinds and vast amounts of fuel wood were used to power such industries as glass and iron. Large quantities of wooden pit props also quite literally supported the mining industry. During the 18th century such inroads had been made on some local forests that they were exhausted and, considering the poor technical state of overland transport, a fear developed that this could happen on a national scale.

Some change seemed in order if widespread wood famine was to be avoided. Although timber might be obtained from abroad it would be costly, would increase imports, and probably would reduce exports by raising the cost of manufacture.

According to mercantilists this change could not help but lessen the favorable balance of trade, reduce the rate of gold accumulation, and weaken the nation.

The over-all policy we have come to think of as forestry seemed an ideal answer to this complex of economic problems, especially when viewed in the context of growing optimism that through science man could control nature. As a first step, growing stock regulation would remove the fear of timber famine by making future harvests predictable. And second, every acre would be brought to a high state of productivity by intensive silviculture. This would be done by the use of cheap, under-utilized farm labor, thus contributing to the net productivity of the nation. Best of all, some highly placed foresters had well developed concepts of how they would apply science to regulate forests and intensify silviculture—and they were eager to expand their area of activity and influence.

The ends and means seemed a perfect match, and intensive sustained yield came to dominate forestry. Of course, a large scale effort like this soon exposed gaps in foresters' knowledge, but luckily empirical research and more sophisticated experimentation were both available to help develop a fuller understanding of how forests became established and how they grew. Foresters, understandably enough, became almost totally absorbed with the engineering and biological problems of implementing their accepted policy.

Intensive management and sustained yield, incidentally, created a bigger growing stock than had previously prevailed. This large inventory of trees provided another asset that was valuable to the nation at a point in history when war was a legitimate and much used method for achieving national goals. Having a large supply of wood within the country at all times to meet accelerated wartime demands/gave more flexibility to foreign policy.

It probably seemed unnecessary to review the relevance of a forest policy based on such apparently enduring national goals. Circumstances seem to have conspired to equate forestry with the policy of high-level sustained yield management primarily for wood, and to keep foresters preoccupied, like Voltaire's *Candide*, with cultivating their own garden.

Reinforced by the elaborate educational programs and the planning and control systems that have been built up over the years, this policy is firmly entrenched in Germany. Unfortunately, however, the world has changed a good deal since mercantilism was the only guide for social action. Urbanization, population mobility, rising affluence, widespread higher education, freer world trade, and technological innovations are all facts that shape German society today—and these forces are changing the demands made on woodland, along with the relative values attached to each of the various satisfactions realized. Although forestry is a highly respected enterprise affecting a large part of the landscape in Germany, it nevertheless constitutes only a small percentage of the economic activity of the nation. Moreover, a large amount of wood and wood products must still be imported. It is difficult today to protect local forest markets from the competition of world prices without endangering other more important trade.

What the present situation has done to forestry is best illustrated by the fact that since 1955 the wages of woods workers have increased 254 percent, while at the same time, beech logs have dropped to 60 percent and spruce to 85 percent of their former value. This "cost-price scissors" is

beginning to pinch so much that annual net returns in the south are dwindling, and many dominantly beech forests in north Germany are currently operating in the red. When I asked the manager of the Baden-Baden city forest what would happen when he turned in a deficit rather than the traditional surplus, he summed it up in one word: "Alarm."

If "alarm" is not yet general there is certainly a great deal of serious and careful thought being given to present and future needs in Germany, and the various ways to meet them. From this it is likely that new and varied forest policies will gradually emerge. Already certain lines of change are discernible in the powerful drive to reduce the cost of getting wood from the stump to the mill. However, in many places steep terrain and varied stands will place technical limits on the gains of merchantization and organization. Serious consideration is also being given to the economic health of the small mills that dominate much of the lumber industry, and special steps may be taken to insure that local sawtimber markets continue for at least a fraction of the annual cut.

Lumber is being rapidly displaced by a wide array of panel products made from wood reduced to homogeneous particles by chipping or chemicals. If the form and size of raw material thus lose their relevance because of technical innovation the whole silvicultural structure will be up for serious review. But any move to lower costs by reducing the intensity of management or by shortening the length of rotations will be reluctant last steps. However, some changes are already being forced by market conditions. For example, early thinnings that yield only fire wood are frequently considered too expensive when the wood cannot be sold.

So far the rising demand for forest recreation has taken a form that requires few significant changes in management policies. However, expenditures for parking lots, sanitary facilities, and the like are probably not far off. However, I saw some places where beech was being reproduced on selected sites and the operation partially justified to help the aesthetic appearance of the landscape. In the light of fact that beech is less valuable than spruce and if planted costs about three times as much to get started these foresters were apparently assigning a rather high value to amenity.

The Frankfurt City Forest suggests how woodland can be skillfully used to meet the needs of urban dwellers. Director Ruppert and his staff have shown great imagination and enthusiasm in coordinating the management of an 11,000-acre forest to satisfy the desires of their 600,000 neighbors. Visits average about 40 thousand a day, and surveys show the man on the street is well aware of how he benefits from his forest.

The whole area is managed to promote percolation of water into the underlying aquifer that feeds the city's water supply. Two thirds of the land is also devoted to the production of wood, and the other third is oriented primarily to recreation and amenity. Careful coordination is used to avoid conflict between these several uses.

The forest itself immediately adjoins the south side of the city and is connected with the urban heart by "green bridges" of tree-lined streets so that public roads and transportation lines make the recreational part of the forest readily accessible to all citizens. Six playgrounds and parks have

been designed by foresters to serve as centers for such activities as water play, ping pong, roller-skating, miniature golf, sliding, swinging and the like. Outdoor space also is provided for quieter activities such as chess and checkers. Nearly 250 miles of paths tempt hikers and cyclists into a more intimate contact with the forest. Restaurants are scattered through the woods in old buildings left from the early days when swine pasturing was a primary use. Five thousand riders use 400 horses on nearly 50 miles of bridle trails and the stables are partially subsidized by the city.

In all this a distinct effort is made to lead the interest of young and old toward nature—even the obstacles on the miniature golf course are beautifully carved replicas of native animals. An information program includes lectures to civic groups and formal nature courses are given children at well-equipped study centers. The annual cost of this recreational "package" is about \$375,000.

I can't stop this brief description without mentioning one other use of the Frankfurt Forest. A city of this size produces a tremendous volume of trash and since 1925 it has been placed in a dump organized on the forest. Today such a mountain of junk has accumulated that it is the highest viewpoint near the city. This "Monte Scherbelino", or mountain of broken glass, is being phased out as a dump because the city soon will switch to burning its trash for disposal as well as power generation. The old dump will then be a problem, but the Frankfurt foresters have converted it to an opportunity. After special study with aerial photographs and various scale models, they now have a plan to convert this eyesore into a recreational asset. The city has already authorized expenditure of up to one million dollars for improvements, including a first class hotel and restaurant on the top and winter ski slopes on the sides of this remodeled junk pile.

Perhaps one of the most significant gauges of the state of flux in German forestry is seen in the Universities. Three of these train foresters, and at Freiburg, München and Göttingen I found staff members willing and anxious to discuss new forest problems and how to generate policies to cope with them. Several academic people are already deeply involved in an advisory capacity, and everyone I met had ideas about curriculum changes. Interest is focused especially on the opportunity to educate men from the developing countries of Africa, and the need for programs better suited to training these overseas foresters is stimulating a critical attitude toward all school curricula.

#### BRITAIN

The development of forestry in Great Britain offers an interesting contrast to that in Germany. Back when the industrial revolution was in full swing Britain faced many of the same needs for wood as did people on the continent. However, the opportunities for satisfying their urgent requirements were different, and other solutions were adopted.

To begin with, about eighty per cent of the British Isles was already being used for crops and grazing. The small residual of forest and waste land was dominated by hardwoods and, because of the prevalence of coppice and pollard, little of this was in high forest. Although the advance of the enclosure system was creating a class of landed gentry who did a great deal of tree

planting, these new forests were generally immature. Consequently, no system of management seemed capable of producing timber needed in time to satisfy the expanding economy.

Records show that as early as 1170 sawn softwood lumber had been brought from Norway to London. The chance for ocean going vessels to bring wood from overseas and satisfy the growing demand of coastal areas cheaply was a very attractive alternative to home grown forestry. Expanding the import of raw materials was also consistent with the ruling doctrine of colonialism.

Thus the British response to the demands of mercantilism was to take the quickest and cheapest way out, and import forest products from the abundant supplies already in existence elsewhere. With such a policy there was no need for a large scale public effort to manage forests at home, although some special steps were taken on a relatively small scale to insure supplies of oak for ship building.

This policy of reliance on trade continued substantially unchanged until World War I when a new technology of warfare highlighted an entirely new set of problems. The U-boat became so effective that it now seemed prudent to have a strategic supply of wood available at home to relieve the strain on shipping in any future war. Although the plantations put in during the enclosure movement had matured in time to be useful, private investment in afforestation had slacked off markedly. At the same time a good deal of land had become submarginal for farming because of changes in the technology of agriculture. Under this combination of circumstances a decision to create a new public forest enterprise, and take steps to encourage private forest practice seemed an appropriate policy response to strategic needs.

The Forestry Commission was, therefore, set up in 1919 to expand the supply of home grown wood by acquiring and managing suitable land. Because most of the available area, outside of the old Royal Forests, was either abandoned agricultural land or heath the Commission had to focus on afforestation as the only means of significantly increasing wood supplies in an acceptable period of time. Success depended to a very large extent on developing effective means of planting trees on a wide variety of rather difficult sites. Thus acquisition of land and devising suitable planting techniques became logical preoccupations of management.

Subsequently, the pace of year to year operations fluctuated with the size of available public funds for investment in growing of forests so that a second objective of management became that of using budgeted resources efficiently. All this has led British foresters to be far less concerned with growing stock regulation than German foresters, because this complex of problems could safely be postponed until a significant amount of woodland had been brought into being and sufficiently matured. In fact, it can be argued that sustained yield precepts aren't particularly relevant if the main objective is to get a strategic supply of wood for war emergencies—the quicker and the larger the supply built up the sooner war reserves can serve their purpose.

The Forestry Commission logically concentrated its effort on planting conifers because this wood serves the widest variety of needs. However, most

of the native forests were hardwoods so extensive plantations introduced a new appearance into the British landscape. This was doubly apparent because much of the area had been heath and had not supported trees for generations. Changes of this magnitude in the landscape did not go unnoticed in a country as crowded as the United Kingdom, and many people reacted against such an "unnatural" appearance. Thus the more effective the Commission became the greater was the outcry from people interested in nature, landscape amenity, or in just keeping things the way they had always been.

The resulting conflict of interest is in sharp contrast to the general situation in Germany where conifers were an indigenous part of the forest cover. Probably there is also an element of cultural difference, in that the British seem less apt to accept the doings of experts without question. But whatever the source, British foresters have come to realize that forest amenity values are widely recognized by the public, and must be taken into consideration in management policies.

A typical case is illustrated by the situation in the New Forest. Much of the area is open heath, used by local people for grazing the ponies that at one time supplied work stock to the mines. The high forest is dominantly hardwood that was pollarded over two hundred years ago and has since grown up into gnarled and twisted giants. These trees apparently have tremendous aesthetic appeal, but very little use for wood products. In addition, regeneration has been kept down by deer and pony browsing so that the stands are becoming moribund, and are likely to disappear.

Foresters, focusing on useful wood production, were interested in replacing this decrepit forest with coniferous plantations, or at least with better formed hardwoods; but public interest focused on preservation of the old trees for their amenity value. A compromise was finally worked out whereby foresters recognize the aesthetic values of the "Ancient and Ornamental" forest, and preservationists recognize the need for rejuvenation. An agreed percentage of the land is reproduced to hardwoods by irregular blocks; and conifers are planted only on other parts of the area. Present policy is to bring about a gradual change that will increase wood production and at the same time preserve the character of this unique bit of landscape. Forestry has been tailored to meet the felt needs of both interests.

The most recent major event in British forestry arose when the Government decided that any future world war is likely to be atomic, short, devastating, and most important for foresters, survival will not be significantly improved by a home supply of wood. The implications of this position for the Forestry Commission were traumatic. The whole concept of the value of a strategic supply of wood went glimmering over night, and a new look at current needs and appropriate action was imperative.

I believe it is a great tribute to the astuteness of British foresters that they were able to assess the value of the resource they had created in a wholly new light and come up with a new policy. A cabinet working group reviewed current problems and possibilities and recognized that plantations, initially put in to meet old strategic needs, were now chiefly valuable because they provided new opportunities to solve some very different but perplexing problems.

First of all, the British keenly feel the need to use their investable resources wisely to create the most productive economy possible. Second, the obverse of the move toward urbanization is the depopulation of rural areas, and it is believed that in a nation with so little living space this situation aggravates urban difficulties. And finally, the increasing mobility of city dwellers is bringing greater need for outdoor recreation opportunities and effort to maintain the aesthetic values of rural landscapes.

The Ministry of Agriculture has recognized that continued Forestry Commission activities, guided by proper policies, can reshape old investments to help solve these modern problems. The Commission is now guided in its operations by a commitment to the Treasury to make its forests generally earn a return of about 5 per cent from the production of wood. To help in this effort a good deal of attention is being given to enticing capital into new plants capable of utilizing the small roundwood now available as thinnings from the large acreage of middle-aged plantations. If properly located, it is hoped that these pulp, paper, and chip board plants will contribute not only to national productivity, but will also create jobs to help stabilize depopulating areas. Continued silvicultural operations will also provide useful woods work to relieve underemployment. Where forest management is done primarily to provide employment, a lower rate interest will be accepted.

In addition, the Forestry Commission is preparing to expand its recreation facilities in anticipation that direct investments will be liquidated from charges paid by users. However, the indirect cost of any adjustments made in forest management to enhance recreation and amenity values may have to be recouped from higher prices of wood.

Forestry based on this new policy opens up a series of problems that have not been fully assessed. The necessity of repaying all the money spent since 1920 plus interest, creates a powerful drive for mechanization and economy in the use of labor. However, this force can conflict directly with the desire to stabilize employment in rural areas.

The related problem of attracting capital for new industry has also raised some interesting new challenges for foresters. One of the first needs is for better information about the probable future flow of forest products. In addition it is obvious that any new planting should round out supplies within reasonable transportation distances of wood-using industries. Also plantations are now managed on sawlog rotations, but perhaps some should be on shorter pulpwood rotations to supply wood for the new industries.

The Commission has already abandoned its old policy of providing housing for its woods workers on part-time farms scattered throughout the forest. Such farming is no longer economically desirable, part-time labor is less efficient than full-time, and living in remote areas doesn't attract and hold young workers. In fact, jobs are only part of what is needed in depopulating areas. In addition a rural society must be viable enough to prevent young people leaving for the enticements of the city. Otherwise forestry only generates a working group made up mainly of older men. Foresters in the future are likely to be as concerned about the age-class distribution of their laborers as they once were with that of their trees.

The whole problem of the form that future outdoor recreation will take in the United Kingdom is still being clarified. About the only probability is that the facilities furnished by foresters can have considerable influence on future demand, because experience has a good deal to do with creating taste. One interesting point where the solutions to two problems have happily met is in renting the cottages vacated by woods labor to city people as summer homes. The drive for a place in the country seems as powerful in Europe as it is on this side of the ocean.

The inducements offered private owners to practice more intensive forestry are another interesting facet of British policy. Assistance takes two major forms; direct payment of subsidies to defray selected management costs, and favorable income tax and death duty treatment. Together, these subsidies can give rather generous help. Interestingly enough yearly tax savings increase with the size of the owner's personal income, and death duties can be greatly reduced if capital is shifted into forest enterprises. Gains have reached such proportions that companies now stand ready to provide well-to-do individuals with forest holdings of a character best suited to their age and affluence, and even tailored to the age and life expectancy of their heirs. Forestry of this kind is becoming an extension of capital portfolio management and whether or not the public gets the increased production it pays for may well be questioned. But it is very difficult to arrive at any hard and fast answer.

Altogether, if they are to meet their commitments and implement present policies, British foresters are being called on to show their skill in much more than afforestation. Knowledge will be needed of the ways to induce desirable industrial development—by the way, solutions will also have to be coordinated with foreign policy trade commitments to other countries of the Commonwealth and to E.F.T.A. nations. Skill will be needed also to develop a viable rural society and at the same time to provide the amenities needed by urban dwellers. In addition, the problems of large capital management will have to be solved to promote adequate returns on treasury investment in public lands and private forests. Success will indeed be a challenging intellectual tour de force, especially as competing planning agencies must be dealt with.

The Nature Conservancy has a vital stake in research into natural vegetation and the problems of preservation. The Ministry of Housing, through the National Parks Commission, is also concerned with zoning important recreation areas that include forests, and other government agencies are charged with promoting industrial development. With all these colleagues willing and anxious not only to help, but also to take over, the future role of foresters in land management is likely to be an exciting one. Whether they end up as "chairman of the board," drawing information from a wide array of experts as needed, or as one of the several experts being drawn upon by another planning director, remains to be seen. I suspect that the final division of influence depends on how useful forester's ideas are in competition with those of their co-workers in the land planning field.

## SWEDEN

Sweden offers another illustration of the idea that forestry is a policy response to meet human needs. The economic health of Sweden, like that of Britain and Germany, depends heavily on maintaining a profitable export business. The main difference is that forest products, rather than being a negligible factor, make up over a third of Sweden's overseas trade and this escalates the urgency of forestry matters to a position of high priority. The necessity of maintaining an adequate share of the world market focuses the attention of forest managers on production cost factors. And the presence of a large timber reserve provides opportunity for expansion.

A few simple geographic and social facts help explain the forest policies that have appealed to Swedes as appropriate answers to their problems. First, most of the country lies far enough north to be dominated by comparatively simple boreal forests so that Sweden has a large supply of the softwoods needed by western Europe. Incidentally, they have rather good information about their forests because a systematic national forest survey was started in Sweden as early as 1911. Second, much of this vast conifer covered terrain is level and smooth enough for woods machinery. In addition, drivable rivers connect much of the area with tidewater industrial plants, thus facilitating overseas shipment. Third, the national penchant for group organization has created conditions that favor vertical integration and achieving economies of large scale operation.

A visitor from the United States or Canada probably has little difficulty understanding the forests and wood-using industries of Sweden. But I found it very hard to understand the workings of society because the institutional setting was so different from anything I anticipated. Instead of the neatly organized hierarchy one might expect of socialism, Sweden has a peculiar blend of private capitalism, cooperatives, and unions, laced with liberal doses of government participation in economic activities of all kinds. This whole system appears to have grown like Topsy with each node of power spawning another group to oppose it. Thus, the success of labor unions, generated associations of industries to bargain with them, and public agencies to referee their discussions. The farmer's union grew up at the same time that buying, selling and credit cooperatives for farm operators were also expanding. And another galaxy of more or less competing cooperatives developed to look after the interests of consumers.

Altogether, this welter of social institutions appears very confusing to an outsider, and judging from some of my discussions it is often hard for the Swedes themselves to untangle the mixed motives that make the whole system work. The important point, however, is that it does work well, and from our point of view at this meeting the set-up has created a favorable environment for solving forestry problems.

In broadest outline, Swedish forest land is owned by three main groups; the public forest service, the wood-using industries, and the farmers. The public owns about a quarter of the area, with holdings concentrated in the north where the land is least productive. Industries have about another quarter, mostly in the midsection, and these holdings are stabilized because it is

now illegal for stock companies to buy any more forest land. Farmers own about half the woodland and dominate the most productive southern third of the country.

Each of these groups of land managers either owns, or is in close association with, industrial plants. The forest service acts like a business and at one time operated the mills which are presently controlled by another public agency. But it is rumored that public land and public plant capacity will again be joined under a kind of super holding company. The private industries, of course, own and operate both land and processing plants. Most farmers belong to forest product selling cooperatives which have owned saw-mills for a long time, and about 10 years ago started branching out to acquire other kinds of plants. Co-ops now control about 15 per cent of the pulp capacity of the country, together with chipboard and other wood panel plants. This move was originally undertaken partly to get a yardstick to guide bargaining with private industry over the price of round wood; partly to fill in geographic "holes in the market"; and partly for power and strategy purposes.

These institutional associations knit forest land management together with manufacturing and sales, a situation in sharp contrast with that in Britain and Germany where the ownership of forests is almost universally separated from processing plants. With vertical integration the Swedes have a better opportunity to identify a "soft point" anywhere in the system of activities that links the forests to consumers, search for and implement new efficiencies, and pass the saving around to appropriate points in the system. This may prove to be a decisive long-run advantage to forest policy makers.

Within the context of Swedish problems and possibilities policy has several major facets. First, a drive to reduce raw wood exports in favor of finished or semi-processed goods, in order to increase employment at home and keep as much of the benefit of manufacture as possible. Second, to improve the process of selling to capture or maintain overseas markets. Third, to decrease the cost of production especially by rationalizing stump to mill operations. Fourth, to increase forest yields by planting genetically superior stock. Fifth, to improve efficiency by encouraging larger farm-forest holdings and help create viable rural societies that will keep an effective labor force available for woods work.

The emphasis on increased labor efficiency is shown by the fact that the Forest Service assembles data on labor input per cubic meter of harvest. Sweden was the only place where I heard such figures discussed so prominently. As an indication of progress, in ten years the work performance rate has gone down from a high of nearly nine-tenths of a man day per cubic meter to about four-tenths.<sup>3</sup> Ultimately, a floor of about four-hundredths of a man-day per cubic meter is anticipated. Then approximately 5,000 board feet of wood could be laid down at the roadside per man-day. This figure includes all the work needed for large scale, single product, clear-cutting and replanting. Present experience suggests that trees will be cut and yarded full length to a portable machine that will remove and chip branches, debark trees, buck to length, and load the products. It is assumed that genetically improved planting stock will make extensive monocultures successful, probably

<sup>3</sup> All manual woods labor, except that used on road work, divided by total volume cut.

with little if any silvicultural treatment between planting and harvesting. Present research suggests that the labor efficiency gained by such a streamlined system will reduce costs enough to more than offset any net gain likely from the more complex and intensive silviculture needed to raise the productivity of land.

Incidentally, when the present seed orchard program is completed and tested all the forests of Sweden may someday come from about 3,000 selected trees. There is some disagreement among geneticists about how to solve the problems raised by such a massive conversion, but work is none-the-less well advanced.

One of the most interesting examples of vertical integration that I saw was a plant turning out prefabricated houses. About 2,500 units are produced each year, supplying about 10 per cent of the houses of this size built in Sweden. Technical innovations in the use of wood were very evident. Walls were made of a specially designed "plank" that eliminated customary framing and at the same time provided excellent insulation. The basic material was a panel containing 15 per cent straw, 15 per cent reclaimed newsprint, and 70 per cent wood pulp. Chip board and other wood based panels were used for cabinet work and wall finishes, parquet for living room floors, so about the only conventional dimension lumber was in floor joists and roof trusses. Even here an automatic fastener was being installed to further reduce the labor cost of trusses from about 20 minutes to one minute per truss.

In the future, the company hopes to expand its activities and export whole houses to Europe. Other developments include specialized crews to assemble houses on the site, and possibly an institution to finance construction. This whole operation was owned by farmers, as part of their selling co-op and the wood used came from co-op owned mills, so the whole sophisticated complex could be coordinated from stump to cellar hole.

In common with most highly developed countries, Sweden is experiencing a movement of population from rural to urban areas. The present policy of rationalizing extraction is helping to stretch available woods labor, but it is realized that more than this will be needed in the next decade or so. As previously noted, the average age of woods workers is signaling future troubles unless a viable rural society can be created. There is considerable talk now of having cities, towns and villages joined in a system of satellites to provide metropolitan services within easy reach of the smallest units, these in turn to be within commuting distance of woods work. This plan seems to be mainly in the talking stage of defining A, B, and C sized communities, but the outlook for action seems promising. At least the problem is recognized and defined sufficiently to suggest possible solutions.

One last comment on trends in Sweden concerns efforts to upgrade forest management planning. The people in agriculture have been exploiting with considerable success a technique of farm planning that is a compromise between operating unit, budgetary analysis and linear programming. Data from traditional sustained yield plans have been used to explore farm and forest management opportunities but the information has some sharp limitations. A joint committee of people from the agricultural economics department

at Uppsala University, the Royal College of Forestry in Stockholm, and other interested foresters has been set up to study how forest information can be improved to facilitate farm planning.

#### SUMMARY

My trip abroad left me with the following impressions: High-level sustained-yield was accepted in Germany because, among other reasons, it was the policy thought most likely to avoid an anticipated timber famine—a shortage that according to mercantile theory would seriously weaken the country. At about the same time the United Kingdom developed a vigorous trade to import timber because this was a more effective way to solve similar wood supply problems. At a later date, a reserve of wood safe from the depredations of submarines seemed more desirable, and the British decided to promote extensive afforestation at home. The value of this strategic reserve has recently been downgraded, and still different policies have been designed to use forests in an attempt to solve a new complex of social problems. The organization of society in Sweden seems to encourage an awareness of the whole system of interlocking activities that connect land management, on the one hand, with consumer satisfaction, on the other. And the urgency of maintaining or increasing foreign trade has produced forest policies with a major emphasis on rationalizing management to reduce production costs and increase labor efficiency.

Although it has been popular to equate forestry with a single text-book policy of “high-level sustained-yield”, such a simple summary doesn’t do justice to the variety of plans that have been used in Europe, or on this side of the Atlantic. It is also apparent that forests are being used to satisfy an ever broadening spectrum of human wants. We are all aware of how much commercial forest products have contributed to physical standards of living. A great deal has also been said about the beneficial effect of trees on water runoff and soil stability. It hardly seems necessary to expand on these familiar topics.

However, experience shows another set of power and strategy values have also been very important. Britons planted trees to help survive a war, and we all know of woodlots that are treated like money banked against a rainy day. Companies everywhere own land, in part, to insure a continuous flow of wood to their plants, independent of any market shortage. Control of enough forest land can also give a degree of influence over wood prices — this is the strength of selling cooperatives, and it also helps companies that buy local wood. Forest control can also assist an industry to get outside funds, whenever investors think that woodland is a valuable adjunct to manufacture. And under-utilized forest land helps industrial expansion.

Timberland in most developed countries can enable private owners to qualify for tax rebates and direct subsidies. In addition, speculative gains can be made from changing values, and forests are used as a hedge against inflation. Studies show that individuals also realize intangible satisfactions from simple possession, and companies with large enough holdings no doubt gain valuable prestige.

Both here and abroad, forest land is frequently a cornerstone for public programs of national or regional economic development. Each country I visited hoped that forest policy would help remake rural societies. In addition, the ability to increase or decrease the intensity of public forest management offers a counter-cyclical device to relieve unemployment. Forests may furnish some of the capital under-developed countries need for economic growth. Although most trend analyses no longer predict an imminent timber shortage in western countries, they do suggest that regional economic dislocations are very likely. And forest policies can be devised to assist specific areas in transition.

Amenity values are also getting higher and higher priority in our increasingly technical and urban societies. The use of forest for outdoor recreation activities is growing everywhere, as I have noted. And the capacity of woodland to improve landscape beauty, as in the New Forest, and to provide the attractive open spaces so essential to pleasant city life, as in Frankfurt, is being widely recognized. This opportunity to increase the quality of congested city living by proper use of nearby and distant woodland probably affects more people than any other forest use, and solutions are being elevated rapidly to major public issues.

It seems that forest policy will always vary from place to place because realistic planning must reconcile this wide variety of often conflicting uses — the forest situation is complex and only wishful thinking can make it seem simple. However, as we have seen, foresters in the past have devised considerably more intricate plans than theory would lead one to expect, and I see no reason why this experience cannot be refined and lead to greater accomplishment.

I suspect that the first step of sloughing off old preconceptions is already started. Both here and abroad we are recovering from the "timber famine syndrome" that has dominated forestry for so long. Hopefully, shaking off the incubus of famine will release foresters' energies and start an intensive search for new and more pressing problems to solve.

On this continent as in Europe our most urgent current problems stem from the needs of urban people. In the United States 70 per cent of our citizens already live on about one per cent of the land, and sustaining this metropolitan way of life presents two major opportunities to resource managers. The first is to use our forest abundance fully to support necessary economic growth, and the second is to provide those amenities that we can to make life in megalopolis more satisfying.

To successfully relate forestry to the driving forces of modern society we must be prepared to work closely with people representing a wide variety of other disciplines and other interests. This will be done better if we recognize that forest land management is only one end of an elaborate system organized to satisfy human wants. Such a conception should make possible a more sophisticated search for those weak links that will respond best to policy changes. Forest planning within this framework will help us identify outstanding opportunities and organize the flow of information that is essential for decisive action, whether we work with farmers, industries, or public agencies.