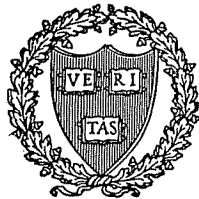


HARVARD FOREST PAPERS

FORESTRY AND RECREATION

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FORESTRY AND RECREATION

Introduction

The forces that change our attitudes toward natural resources are relatively easy to see in retrospect, but at the start they are often obscured by the rush of daily events. Even when we recognize that an innovation is important, we usually have difficulty in assessing its ultimate impact. Therefore, I would like to spend a few minutes speculating about one such force: the great increase in outdoor forest recreation. The flood of forest visitors is already affecting management practices greatly. Eventually it may radically change the theories that guide forest policy.

To gain some perspective, we might take a Madison Avenue approach and see what public image the forester has projected of himself and his work during the past half century. The average easterner probably thinks of him as a man wearing Lincoln green and a "Smokey Bear" hat, who alternately puts out forest fires, combats waste and other forms of evil, and plants little trees to insure a bountiful future. Everyday experience does little to dispel this romantic notion of the "good shepherd," because foresters control only a minor part of the eastern landscape and have limited contact with megalopolis. At the moment, the role of forestry in a heavily populated region like the Northeast is far from clear. Whether foresters will play a significant part depends on how well they handle the new issues of wild land management created by the dynamics of urbanization.

Paper read by Ernest M. Gould, Jr., Forest Economist at the Harvard Forest, before the Joint Meeting of the Western Farm Economics Association and the Committee on the Economics of Water Resources Development, at Reno, Nevada, August 1962.

In the West, I believe, the situation differs in several essentials. Here many people have considerable contact with foresters, and seem to think of them as hard-working, solid citizens. To be sure, foresters make most of their headlines fighting fires; but they also mark, price, and sell timber on a rapidly increasing scale; build dams and roads; check erosion and control the use of watersheds; issue permits for grazing, summer homes, and businesses; run recreation areas of all kinds, and engage in a hundred other enterprises that significantly affect the well-being of the region's people. Foresters are so firmly in control of vast stretches of public and private land that there is little question about their having an important impact on the development of the natural resource base of the West.

It may comfort foresters to know that they are virtually assured an important place in the future of the West and will not have to fight like their eastern brothers to establish themselves in a position of influence. But as urbanization stimulates rapid change, they and other citizens would also like to feel that the foresters' job will be well done. Success in the long run will depend only in part on foresters' well-demonstrated honesty, good intentions, and capacity for hard work. The adequacy of the intellectual concepts that they bring to bear in solving wild land management problems will be even more important. If this is so, let us briefly examine the ideas currently in vogue.

Basic Theory

From the first, forestry has been concerned with the continuous production of a variety of goods and services: wood, water, forage, and more recently recreation. At this level of abstraction forestry is merely a coverall term indicating a concern with woodland as a renewable natural resource that man can use in many ways. There

seems to be room under such a wide umbrella for several management theories. However, the European concept of sustained yield has so dominated the field, that it has almost stifled the development of other ideas. In a sense, this "elegant" theory has filled the same niche in forestry as did the classical competitive theory in economics, the peneplain theory in geomorphology, and the climax theory in plant ecology. With minor adjustments, sustained yield has become the core of forestry thought, governing the use of wild land not only for wood, but also for forage, water, and recreation.

There are a number of implicit assumptions underlying sustained yield, and four hypotheses -- stability, land scarcity, certainty, and a closed economy -- are basic supports of the theory. The first hypothesis assumes that a stable flow of forest products is required, ad infinitum. This has generally been expanded into the dictum that consumption should equal the rate of inventory replacement. Thus timber growth should ideally regulate wood use. The second hypothesis, land scarcity, takes the argument one step further and assumes that forest products are so scarce, relative to labor and capital, that land must be used with maximum efficiency. Growth should therefore be at or near the biological ceiling so that the largest amount of desirable products is grown on each acre. The certainty hypothesis states that production techniques, consumption patterns, and values are all known, so that sustained yield can be planned five or ten decades in advance. If this seems too strong a statement, an alternative reading of this hypothesis would be that managers should act as though they had perfect knowledge, even though they may have some qualms about the future. Finally, the hypothesis of a closed economy indicates that it is desirable for each operating unit, region, and country to equate

internal consumption and production and ignore the possibilities of an outside supply of forest products and alternative uses for land, labor, and capital.

How have these hypotheses stood the test of time, and how successfully do they relate the facts that managers must rationalize? For wood, the long-run picture disturbs anyone who bases his thinking on the need for a stable flow and on an increasing shortage of raw materials. During the past half century, while our population has doubled and the gross national product has quadrupled, the consumption of all industrial wood has hardly increased at all. Total use actually decreased after a peak in 1910 and did not recover until the late '40's. ^{1/} Even now it is only slightly higher than in 1910. Lumber use has declined considerably, and the small increase in total wood consumption has been due to the rise of pulpwood, plywood, fabricated boards, and the like. Fluctuation in year-to-year demand has been the rule rather than the exception.

It appears that the use of wood has not kept pace with our expanding economy, and the challenge of change has not been met in such a way as to maintain timber's relative usefulness. Although about as much wood is used by us as by our grandfathers, it has dropped from 4 percent of gross national product to less than 1 percent -- over twice the relative decline of all extractive industries. ^{2/}

It is hard to attribute this pattern of consumption to any idea of an absolute scarcity of raw materials. The amount of standing timber on hand in this country has probably always been enough to satisfy the economy for at least 150 years. ^{3/}

^{1/} Historical Forestry Statistics of the United States, Statistical Bulletin No. 228, U.S.D.A., Forest Service, October 1958. Table 19.

^{2/} Measurement of Change in Natural Resource Economic Scarcity and the Economic Effects, H. J. Barnett, Resources for the Future Reprint No. 26, March 1961.

^{3/} Timber Resources for America's Future, U.S.D.A., Forest Service, Forest Resource Report No. 14, January 1958. Tables 7, 12, and 14.

What has happened is a rapid substitution of other materials for wood, coupled with modest innovation in the way we use trees. Thus consumption has been dynamic, shifting in both kind and quality over the years in response to the state of the arts for using available trees, supplies from non-forest sources, relative prices, and the tastes of the public.

The importance of the forests for forage has fallen even more dramatically, if the experience of the National Forests is any criterion. The number of livestock permitted to graze has dropped from over 9 million in 1910 to less than 4 million. ^{4/} This fall is largely the result of improved technology in the production of meat and wool. Here is a clear case where none of the four hypotheses of stability, scarcity, certainty, and a closed economy seems to have worked out in practice.

By way of contrast, the use of water in the West -- and even in the humid East -- has been increasing at an enormous rate. Foresters in the West control the watersheds that collect most of the rainfall; but, to date, manipulation of watershed vegetation has played only a minor role in meeting increased needs. The engineers seem to be making the largest contribution toward full use of available water. Although research is under way, foresters as yet must be content with preventing degradation of the watershed and with having a relatively minor impact on the quality and timing of runoff. It would seem that an increasing rather than a stable flow of water is needed, that land for collection is not as scarce as capital for improvements, that a changing technology makes the future very uncertain, and that the economy of water is anything but a closed one.

The same conclusions seem to apply to outdoor recreation. Foresters are managing their lands for recreation on an ever expanding scale. National Forests,

^{4/} U.S.D.A., Statistical Bulletin No. 228.

as an example, have shared in this ballooning use at an astonishing rate. Visits in the last 15 years have gone from about 10 million annually to over 100 million, ^{5/} and the end is clearly not in sight. Even the most narrow-minded "timber beast" in public or private employ is finding it hard to ignore the problems created by this hoard of summer and winter forest users. The impact of expanding recreation on the plans, budgets, and conceptual schemes of foresters is hard to overestimate, and I suspect that this change will have more to do with shaping new forest theory than any other development taking place today.

The reasons for this belief are many and, I think, persuasive. First of all, the problems of recreation exist on a large enough scale to demand attention. Second, they are persistent and are expanding at such a rapid rate that past efforts have been inadequate and a new approach is obviously needed. Third, so many agencies are involved that coordination is needed to prevent wasting resources on a significant scale. Fourth, the fact that people are intimately involved is leading foresters to seek the aid of social scientists in coping with recreation, and this may broaden the base of forest theory beyond the natural sciences. Finally, foresters have less commitment to any past theoretical position in the realm of recreation than they do in wood production. The lack of accepted theory and the obvious need for a guiding rationale should facilitate the development of new concepts.

J. S. Mill once said that ideally, theory is made by induction from experience. Textbook forestry, on the other hand, has been based largely on deduction; but field foresters have had to accommodate their policies to such hard facts of life as instability of demand, surplus supplies of raw materials, uncertainty about the future,

^{5/} U.S.D.A., Statistical Bulletin No. 228 and Annual Reports of the Chief of the Forest Service, U.S.D.A.

and an open economy. There is good evidence that working foresters have succeeded in developing ad hoc guidelines: the supply of forest products has, after all, been varied to the needs of the economy without precluding future production possibilities; management intensities have generally been kept within the bounds of investment sanity; and the conflicts between users have been kept to tolerable limits. It would seem that practice in the field has far outstripped theory, and perhaps it is time to see whether inductive processes can provide more useful insights.

New Factors

If recreation is playing a pivotal role in the development of inductive forest theories, what are some of the forces that will shape these new concepts? The first need is for foresters to psychologically adjust to the fact that they have a really legitimate cause for concern. Only after recreation has been accepted as a respectable use of the forest -- commensurate with wood, water, and forage -- can much progress be made. Recreation is tainted with the old puritanical view that it is somewhat sinful, and the business of earning a living by producing physical goods is still thought to be somehow better than improving the amenities that make a productive life more worthwhile.

This fact is reflected in the way many foresters view the recreation problem as one of grouping people together in the forest to reduce fire hazard -- obviously a good way to prevent wasteful loss of standing timber. Another formulation of the problem, as one of sanitary engineering, has the same roots in health protection -- a good enterprise, worthy of serious attention. 6/ A society existing on the ragged edge of

6/ Whereas during the last war we used to be concerned with the morale of the "man behind the man behind the gun," many forest administrators seem primarily concerned with "the man behind the man who's in the john." I was recently told by an assistant district ranger that he needed really professional help with recreation. He could no longer turn just anyone loose to work, because he needed men who knew something about outhouses!

subsistence may justly take the attitude that using resources for outdoor recreation is undesirable, but our current affluence suggests that this view no longer applies. Ambassador Galbraith and others have made this point most persuasively, but the full import of the idea has not seeped through to many land managers.

Consumer Goods

This problem of the mental adjustment of foresters to recreation is aggravated by their traditional concern with producers' goods. They have seldom had direct contact with consumers. Rapid changes in consumer demand and tastes have come to them in a much watered-down version, through limited contacts with primary product buyers -- who themselves have considerable sympathy with the foresters' problems of production on the land. The recreation game is entirely different; in a very real sense foresters actually do not produce recreation at all, they merely maintain an environment within which the consumer himself creates recreation, instantaneously and on-the-spot.

The manager of the forest recreation environment is thus directly subjected to all the pressures of the consuming public and is constantly against the cutting edge of changing tastes and innovations. This can be a frustrating experience for men trained to handle the slow processes of tree growth and to produce primary raw materials. However, the forester in this situation is not simply a weather vane responding to every vagrant breeze, because he inevitably helps create and shape demand by the kind of facility and service he furnishes and the "recreation complex" he maintains. This is a new and challenging responsibility which, if properly handled, can go a long way toward relieving some of the uncertainty about future needs. However, he will need considerable sophistication to exercise desirable control without falling into the trap of blatantly dictating to the public.

One thing that makes it very difficult to anticipate total requirements for outdoor recreation in the future is the tidal-wave character of the increase since the end of World War II. Never before have so many of our citizens had both the leisure and the income to enjoy outdoor recreation; and perhaps the need to get out of the urban environment has never been so widespread or so intense. Thus most annual use estimates show a rate of increase on the order of 10 percent a year, which, if continued, suggests about 45 times more participation by the year 2000. However, this has been a period of initial trial for many people, and there are good reasons to think that it has also been a period of rapidly changing tastes. Under these conditions the past may be a particularly poor guide to the future. The Outdoor Recreation Resources Review Commission apparently recognized this difficulty and suggested that needs might triple by the end of the century. The difference between an increase of 3 and 45 times present use is one measure of the degree of uncertainty about future needs that land managers must be prepared to cope with.

Most important of all is the fact that outdoor forest recreation is radically affected by the other things that can be done with leisure. People in California, for instance, may spend a lot of time landscaping their homes and enjoying their patios, time that others elsewhere might use to enjoy city parks. The need for outdoor recreation facilities is also affected by the increments in which leisure time occurs. Shorter work days may throw a load on local picnic areas, while longer week ends or vacations may increase the use of distant campgrounds and hiking areas. A study of the way people budget their leisure time might give very useful insights on the interrelated nature of recreation activities and lead to creating a more desirable array of recreation opportunities. I suspect that fewer mistakes will be made if

development plans are oriented toward creating a broad "recreation complex," ^{7/} rather than a series of completely independent facilities.

In light of our imperfect knowledge about changing tastes for forest recreation, about shifts in preferences for component activities, and about our capacity to shape these factors by offerings of recreation opportunities, the needs of the future seem hazy indeed. This does not mean that nothing can be done, but it does indicate that any inductive forest management theory must be predicated on a significant degree of uncertainty and change rather than on absolute certainty and stability.

Time Values

Another difficulty raised by the acceptance of recreation as a legitimate forest problem is the changed role of time. Foresters take a more cavalier attitude toward time than most people because they deal with such long production periods. They can speak of shortening a 150-year rotation to 100 years, with the same equanimity that other people use in changing a lunch date from Tuesday to Monday next week. Acquiring this attitude is no mean feat, and it is difficult to retain it along with a sense of time appropriate for recreation. As noted earlier, the production period for recreation is practically instantaneous, and a few days, hours, or even minutes of adverse conditions may not only prevent the normal creation of more recreation, but also may offset to a remarkable degree the accumulated production of a whole trip.

The difficulty of simultaneously accommodating two such radically different value scales for time is well illustrated by a recent editorial in the JOURNAL OF FORESTRY. A famous wilderness advocate was taken to task for criticizing a

^{7/} Planning a Recreational Complex, E. M. Gould, Jr., American Forests, August 1961.

Forest Service range improvement area as permanently devastated. The writer was quick to point out that the landscape would be attractive again in the brief span of five years -- surely an inconsequential time for vegetative recovery compared to a production period of 8 to 10 decades for sawtimber. What the editor failed to grasp was this: five years may be a very long time to lose a recreational environment. Certainly a hotel owner would think so if his landscape architect told him he would have to close down for five years until his grounds were ready to receive guests!

The point is not that foresters will have to think exclusively in either short- or long-run terms, but that they will have to handle both simultaneously, if they are going to practice multiple use successfully. Their conceptual schemes must recognize that different values for time are legitimate. And continuous balancing of these value scales must be facilitated to keep the conflicts between forest users within manageable bounds.

Land and Capital

The final adjustment in thinking required by the rise in recreation that I wish to mention is the changed importance of land and capital. Land is the central focus of the sustained yield theory developed for wood. Generally the objective is to get the greatest volume per acre per year, and little is said about the use of capital and labor to achieve this goal. The assumption seems to have been that land is the scarcest resource and that its use with utmost efficiency will automatically economize on all other resources. Capital and labor have not exactly been ignored, but land has been set up as the key integrating resource. This line of reasoning has been subject to considerable attrition for a long time and shows evidence of breaking down before the more persuasive approach of the investment and risk concepts that have been proposed in recent years.

The problems of recreation so obviously center around the improvements created by capital and labor that increasing emphasis on them is likely to be accelerated. The ease with which land can be tailored to recreation needs in city parks is, of course, widely recognized -- all that is needed is capital and talent to use it. That most forest outdoor recreation also requires capital in the form of roads and other improvements has not been so widely recognized. Because the amount of recreation sustained per acre can be greatly enhanced by judicious investment, the responsiveness of forest land to recreational investment is central to management.

At any rate, the problems of the U. S. Forest Service in the West seem dominated by a scarcity of capital rather than of land. In California, for example, a recent study of three National Forests suggests that the land problem of developing recreation is characterized by an "embarrassment of riches," and the budget problem is definitely one of "capital rationing." ^{8/} This study of the recreation land now used or suitable for future use indicated that less than 3 percent of the full potential was currently developed on the remote Modoc National Forest. And even on the very heavily used San Bernardino National Forest near Los Angeles, less than 20 percent of the full potential was currently developed. On the average, there was land enough on the three forests to accommodate at least 10 times as much recreation, without exceeding current design standards, and relaxation of these standards might greatly increase this potential without unduly increasing costs.

The amount of capital needed for improvements to make these recreational opportunities fully available far exceeds the value of the sawtimber production fore-

^{8/} The Possible Impact of Recreation Development on Timber Production in Three California National Forests, Amidon and Gould, Technical Paper No. 68, U.S.D.A., Pacific Southwest Forest and Range Experiment Station, 1962.

gone to create the desired atmosphere. For every dollar's worth of reduced timber production, an estimated \$25 worth of new capital must be invested to improve camp and picnic areas. Thus the big opportunities for saving lie in improving the efficiency of making capital improvements rather than striving to reduce the cost of timber opportunities lost on recreation and buffer areas.

It is worth noting that as the amount of concentrated recreation is increased on a forest, the land efficiency of the whole "recreation complex" is greatly enhanced. The current complex of the three study forests ties up about 23 acres of productive forest land for each thousand visitor-days of installed recreation capacity. If fully developed, only about 4-1/2 acres per thousand visitor-days would be required. Doubling the recreation on an area does not necessarily call for doubling the amount of land. It also seems reasonable to expect that there are economies of scale in the use of capital for construction and operation.

The main significance of this study lies in the fact that these forests have a tremendous potential for recreation that will require a large increment of capital for its realization. In addition, it is clear that less than a sixth of the productive forest land would be directly involved. Thus the possibilities for multiple use are great, provided the mechanics of resource allocation and capital management can be rationalized to allow the public to enjoy recreation while wood and other forest products are realized from the same forest.

Planning Process

Given perfect knowledge, the problem of planning the use and development of forest lands would not be especially difficult. If planners had omniscience, omnipresence, and omnipotence, they would know all about efficient production processes

and their interrelationships, and future consumption patterns and their interrelationships, and could devise a master plan to coordinate production of the several joint products. This plan could be designed to give a product mix that would best satisfy future demand in such a way that the present value of all costs would be at a minimum. This appears to be a reasonable criterion for getting the most efficient use of all resources when some of the products flow through the market system and some do not.

A certain amount of variation between planned and actual production and consumption can be introduced into this conceptual apparatus by calculating risk as a cost of production. However, if knowledge is sufficiently imperfect to create real uncertainty, as Knight defined it, the master plan becomes correspondingly less and less realistic and therefore less relevant as a system of rationalizing management. The possibility that the master plan may tie up resources so tightly that it will be very costly to reorganize them to meet unanticipated needs or to take advantage of new production techniques must be considered. Too rigid a commitment may lead to later losses greater than the expected gains from increased efficiency; but flexibility is seldom cost-free, and the amount that seems worth purchasing will be affected by the general affluence of society and budget constraints. Under the conditions of uncertainty inherent in the real world, and given present affluence in the United States, forest managers are generally faced by a considerable array of technically feasible alternatives. Although choice can be guided by such things as meeting production goals -- at least cost and with minimum conflict between users -- each plan is likely to vary in its capacity for easy change, and the balancing of possible gains and losses from this source is likely to be an important aspect of decision making.

If these are the forces that field foresters deal with, what working hypotheses seem appropriate as the foundation for a new theory of "balanced forestry"? The first might be that the one reliable characteristic of the world is change; and that when existing knowledge about production, consumption, and values is projected into the future the forecasts are subject to increasing and serious uncertainty. It may be that we are more likely to be wrong than right with projections as short as a decade or so!

As a corollary, flexibility, or the capacity to shift the use of resources over time at acceptable cost, may be the key to preventing waste in the long run. Although the probable costs of flexibility can usually be estimated, the decision about whether flexibility is worth the cost remains basically a subjective evaluation. This function clearly belongs to the manager responsible for final success or failure, and is perhaps his peculiar and distinguishing area of expertise. ^{9/}

A second working hypothesis could be that the usefulness of forest land is not simply the result of its natural endowments, but rather stems largely from increments of labor and capital applied to its management. The really basic limitation on land productivity lies not in "nature" but in the "cunning hand and contriving brain" of man himself. Thus plans may equally well aim for stability, or for increasing, decreasing, or completely changing the character of resource and the flow of products over time.

In the present situation it can be argued that a radical innovation in the extraction and use of wood is needed to greatly cheapen and expand its use for housing. Such an innovation, based on accelerating the development of technology to use our

^{9/} Johnson, Glenn L. Relevant theories, concepts and research techniques. In Proceedings of Research Conference on Risk and Uncertainty in Agriculture. North Dakota Agr. Exp. Sta. Bull. No. 400. 1953.

vast production of surplus trees, may be more urgent than any intensification of management to produce more of the kinds of wood used in the past. Similarly, forage production in the forest might be phased downward, while the flow of water and recreation could be considerably stepped up.

To achieve these ends it may be desirable to produce wilderness and some other forest values by using some land freely, with practically a zero application of labor and capital, and at the same time to use other forest land very intensively. There seems to be no logical reason to call one extreme of management intensity "forestry" and the other something different. As long as the woodland, labor, and capital serve man's purpose effectively, any combination can fall under the rubric of "balanced forestry."

The third working hypothesis concerns the fact that forests do not exist in a vacuum; they are intimately connected with the economy and society. It may be desirable to shift productive resources into or out of forestry for fiscal or other reasons having nothing to do with the physical properties of trees; or to expand the area of production beyond the operating unit, region, or country being managed. Such changes are a matter of choice and relative economic and social values. Although in the past we have incurred heavy social costs from a migrant lumber industry, for instance, such losses are not inevitable. As the state of the arts of private and public management improves, wholly new techniques of forest use become feasible. Permanence and stability may create a false air of security while really leading to obsolescence and irrelevance in an expanding economy.

A process of continuous planning is needed to balance the use of forest resources. This process should be predicated on the necessity of meeting relatively uncertain

needs by the flexible combination of labor and capital with land, in an expanding and open economy. Developing such a dynamic new synthesis will pose an exciting challenge not only to foresters, but also to specialists in the natural and social sciences and the humanities. Creating an inductive theory of "balanced forestry" promises to help field foresters meet change head on and grow with the times.

