THE OBJECTIVES OF RESEARCH IN FORESTRY[1]

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The subject originally assigned to me was "The Research Objectives of the Forest Service." I am, however, taking the liberty of expanding my comments beyond this restrictive title. The objectives of forestry research by the Forest Service, in the main, must be guided by the same criteria that influence objectives of forestry research by any other agency working in this field.

Before we set out to state research objectives it may be more productive if we first examine the nature of the forest problems and the aims and scope of a research program designed to their solution.

In our own United States, which was a forest wilderness less than 150 years ago, we are now confronted with an inadequacy of wood supply. Everywhere we still see apparent extensive areas of forests and woodland, but we still lack timber products of the desired quality, of the right species, and in accessible locations to meet our demands.

Obviously, as we pass from our pioneer stage to an ever-expanding industrial economy, the demands for raw material from the forests will increase. These needs cannot be left to the vagaries of the unregulated forces that created our original, rich, virgin forests.

Perhaps we can draw a parallel with farming. The pioneer farmer in the Corn Belt grew 200 bushels of corn per acre on virgin soil without fertilizer or fear of pests. Now he can grow as much only if he uses improved tools, heavy applications of fertilizer, and hybrid corn. To sustain production he must apply management based on a large body of research findings.

This same concept of management comes into play as we move from the virgin timber era to the time when we must depend upon timber that we consciously grow. As we become dependent upon timber we consciously grow, we also begin to have certain freedoms of choice as to what we shall grow, where we shall grow it, and how we shall use it. These choices are functions of forest management. An intelligent program of research must be directed to give the basis for making these choices.

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A forest is the creature of a great complex of natural influences, soil, climate, latitude, length of day, soil fauna and flora. These and other factors determine the species that will grow and how well they grow, the succession of species, and even the quality of the wood. Since the goal is to produce goods that will satisfy our needs, it becomes imperative that we understand these forces and how they operate in modifying the composition of the forest. Thus a comprehensive research program must involve attack by several branches of the biological sciences, ecology, soil chemistry, biology, parasitology, and entomology; a concerted attack aimed to unfold the basic laws that govern forest growth. Only by gaining an understanding of these laws can we be in a position to control the composition and growth of the forest and such control is a fundamental of forest management.

I do not conceive that we shall, within a foreseeable time, complete this task for the level of research in forestry can never rise above the level of the fundamental sciences that contribute to it. For example, the discovery of plant hormones and an understanding of their role, has opened new possibilities that could not have been visible 20 years ago. Such new fundamental knowledge raises the level of all knowledge and broadens the opportunities of forest management.

We expect that research be far out in advance of the need for its application. It is particularly true in forestry. Ideal silvicultural techniques must be flexible to meet ever-changing needs. But since the response of tree growth to a variety of silivicultural treatments is slow, management must plan far ahead of requirements. Research must be even ahead of that.

Now, there is always a lag between what we know how to do and what we can do. Conceivably we can develop an ideal silviculture by research, but it is perfectly apparent that economic forces will control what can be done, whether the cut shall be heavy or light, whether we shall direct growth toward pulp species or lumber or plywood, whether we shall harvest now or hold for future markets, sacrificing growth for speculative profit. Matters of taxes, interest rates, freight rates, and general market conditions have the same sort of impact on forestry as on agriculture. Agriculture, however, can adjust itself more rapidly to changing economic conditions than can forestry. But trends in forest products requirements do modify forestry very greatly. For example, the expanding pulp industry in the South has made heavy inroads into the forest crop upon which the sawmill and turpentine industries depended in the past.

In the Northwest it seems quite probable that it will pay in the future to prune Douglas-fir so as to grow a 16-foot length of clear wood as a butt log for plywood. Thus we have intensification of forest practice because of a new industry.

There are examples of management choices that men are making now. I believe it is certain that such choices will increase greatly as the usefulness of wood expands and greater demands are placed on the productive capacity of forest land. The growing number of available options in management and the demand for wood will make possible intensive management. The present

critical shortage of wood is just another indication that the need for intensive management is already on us.

With intensive management we shall need not only fundamental silvicultural knowledge; we shall need to know the costs and returns of the forestry business, whatever options in management are chosen. The cost of growing timber must be measured in terms of yield and land values. The growth rates and yield of different combinations of species on different sites must be determined, and the influence of such things as stand density. We shall need to determine growth rates accurately in order to know when economic maturity has come. Unless we know these things we shall be in no position to manage forest industries profitably.

Economic problems have corollary social aspects that are even more consequential. After all, the important product of the forest is a raw material from which can flow permanent jobs and stable communities. The stability of the flow of wood from the forest determines the stability of the forest community, the town, and the city. Stable silviculture and stable forest management, grounded upon determined facts and natural laws, can bring about stability in large segments of rural America. This is and must continue to be a primary and general objective of research in forestry.

We are confronted with another dilemma in American forestry, as we move from either virgin or culled-over forests to intensively managed forests. This is where forest management and forest utilization must be handmaidens to bring about the end result. In the past we were satisfied to cut over forests for single special uses, and diversified utilization meagerly and haphazardly. If we want to raise the productivity of the forest we will generally find that we must take out the whole wood crop and turn it into useful products. This can be accomplished only through maximum diversification of utilization.

Here we have a broad basis for research in forest products. Its aim is to develop new and improved uses for wood, how to utilize the less desirable species, and how the enormous waste in logging and milling can be converted to useful products.

Since this conference will devote most of its attention to the forest products fields, I have taken the liberty of stressing forest management. But what finally can be done in forest management will hinge on the developments in the forest products research fields.

To <u>have</u> productive forests we must harvest wood regularly, intelligently, and economically; in order to attain this, industry must use the harvest in the manufacture of a huge diversity of goods that can be marketed. This interplay of utilization and management, to my mind, is one of the most important aspects of forestry. It is the strongest argument for the closest possible integration of these two segments of forestry research.

It would be a grave omission to leave out ancillary benefits from forests well managed and husbanded. They influence streamflow, they furnish a habitat for wildlife, a place for America to enjoy a pioneer outdoors. A forestry

research program must deal with these factors as they may be influenced by forest management.

Forestry in America is coming of age. Research workers have a challenge and an opportunity to recreate new and better forests, new and better products from forests -- we hope for a world at peace.