FORESTRY AT HARVARD

1944

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FOREWORD

The following report, FORESTRY AT HARVARD, is an outline of a proposed new policy and course of action to be followed after the war in the further development of the Harvard Forest, the center of instruction and research in forestry in Harvard University. The history of forestry at Harvard and its present status are briefly summarized to provide the basis for such a program.

The thirty-six years which have elapsed since the Harvard Forest was acquired by the University have witnessed a tremendous growth in forestry and related fields having to do with the use of land. Moreover, there is every indication that the postwar years will witness an even faster growth. Clearly, the time for advancement in forestry in America is at hand, and the Harvard Forest has an unexcelled opportunity to play a leading part in it.

This plan for a revised and expanded postwar program for forestry at Harvard was developed by the staff of the Harvard Forest. It is sent you with a request for your suggestions for its improvement and your support in bringing about its final adoption and implementation. Your advice and help will be very greatly appreciated.

Faithfully yours,

A. C. CLINE
Director
part of Harvard University and the beginning of more intensified use of the Harvard Forest, particularly for research. The staff was reduced in size, and instruction was offered only in specialized fields to students already possessing an undergraduate degree in forestry. The latter limitation permitted earning the degree of Master in Forestry after one year of specialized study. Registration of students dropped off sharply after 1914; classes for the next eight years averaged not more than three students. With emphasis now placed upon research and the research project method of instruction, a number of scientific articles appeared and the Harvard Forest Bulletin series was started. During this period, which included the First World War, Fisher developed to a high degree the philosophy of basing forest practices on the study of natural forces. In particular, the white pine—mixed hardwood succession was intensively studied, and the findings applied to the actual management of the Harvard Forest.

In 1923, instruction in forestry was completely transferred to Petersham, students thereafter spending the entire academic year living and working in the Forest. At the same time the size of the classes was increased, largely by graduates of the New York State College of Forestry, induced to study under Fisher by A. C. Cline, who had become a member of the Forest staff. During the next ten years, research was stepped up to a higher level. By 1934 the Harvard Forest had acquired an international reputation as the oldest intensively managed demonstration forest in North America and as a center of research in silviculture.

The death of R. T. Fisher in 1934 robbed forestry at Harvard not only of its leading spirit, but also of much financial support. Ward Shepard, '13, was made director, and he undertook the difficult task of raising money in a period of economic depression. His efforts were further complicated by the hurricanes of 1938, which blew down practically all of the merchantable timber, a resource which had contributed substantially to the maintenance of the organization. Furthermore, the value of the Harvard Forest as a demonstration of sustained yield management was greatly impaired by this destruction. As the use of the Forest for this purpose had long been in conflict with its use for experimentation, the decision was made in 1939, at which time A. C. Cline became director, to develop the Forest as a field laboratory and research station, and to give up the demonstration of forestry as a business enterprise. Renewed emphasis was placed upon the study of natural forces in the forest and their application to the management of local stands. In 1941, the completion of modern buildings at Petersham and the installation of the Harvard Forest models in the Fisher Museum, both made possible through the generosity of a friend of the Forest, opened the way for a considerable expansion of activities, particularly in the line of increasing student enrollment. Subsequent war conditions, however, have prevented material progress in this direction.

PRESENT POSITION

In 1944, the position of the Harvard Forest is strong in certain aspects and weak in others. A consideration of these factors is essential in the planning of a sound program for the institution.

Strengths

A. As a part of Harvard University. In this simple fact lies the greatest strength of the Harvard Forest. As a part of a great educational institution, the staff has unsurpassed opportunities for cooperating with highly competent specialists in allied fields
staff members are induced, therefore, to seek opportunities elsewhere. Under such conditions, it has been impossible to keep a high-grade staff at the Harvard Forest. The prestige of the institution has consequently suffered.

D. The lack of a specific University policy towards forestry and the Harvard Forest is one of the underlying causes of its present weak condition. Without a long-range constructive program supported by the University, efficient use cannot be made of the strengths of the Forest; nor can its weaknesses be reduced or eliminated. An indefinite continuation of the status quo will result in further loss of prestige and academic position, both by the Harvard Forest and by Harvard University.

A PROGRAM FOR THE FUTURE

The future of the Harvard Forest is dependent upon (1) the development of a sound long-term program in forest research and education; (2) the gathering of a high-grade staff, small in size, but with normal opportunities for advancement in rank and salary; and (3) the integration of this program with that of other divisions of the University to the end that the Harvard Forest functions not as an independent research station but as an integral part of Harvard University.

In order to determine the position of the Harvard Forest in American forestry, it is necessary to look at other agencies engaged in forest research and education. Research in the applied phases of forestry is being carried out on a broad scale by federal forest experiment stations, state agricultural experiment stations, and other public agencies. The policy of Harvard University should avoid as far as possible fields of research for which adequate public funds are available, particularly where those fields are of a highly applied nature. Specifically, the Harvard Forest should not conduct research in forest protection, wood utilization, forest influences, logging and marketing, forest surveys, and forest regulation, except in cooperation with public agencies. On the other extreme, fundamental research in botany and the other natural sciences is adequately covered by our colleges, universities, and independent research stations. The Harvard Forest should not encroach upon these basic fields. Rather, the research program of the Forest should be designed to bridge the gap between applied forestry on the one hand and basic scientific knowledge on the other. It is in this intermediate field that the Harvard Forest has gained the greatest prestige; it is this field which is not adequately covered by existing research agencies; and it is in this field that the greatest possibilities for future progress lie.

In education, too, publicly supported forest schools adequately cover professional forestry in its applied aspects. The Harvard Forest should not compete in this field, but should instead turn out men well schooled in the basic sciences and their application to problems in the forest. Such men would be fitted to compete on favorable terms with the graduates of other forestry schools as teachers, scientists, practical silviculturists, and forest administrators. No other school exists in this country today where the student can learn forestry, not as a separate applied science, but as the end product of an integrated study of basic sciences and their application to forest trees.

In both forest education and forest research, then, the Harvard Forest can do an important job that is not being adequately done
fully documented histories form a backlog of accumulated knowledge unobtainable anywhere else in America. Although the 1938 hurricane destroyed most of the older stands of timber, it did but little damage to the younger stands which have been under management and observation since their inception. The accumulated experience in silviculture has been summarized in a series of case histories which are being prepared for publication. Current silvicultural research stresses the application of recent ecological investigations to weedings, operations, improvement cuttings, thinnings, and other cultural practices.

Of particular interest in the general field of silvicultural research have been the cooperative studies undertaken with entomologists and pathologists of the United States Department of Agriculture. In these investigations, forest pests are being studied at Peterborough with a view to controlling them by taking advantage of the natural forces operative within the forest. This cooperation between Harvard silviculturists and Federal entomologists and pathologists has proved mutually advantageous. Particular emphasis has been placed on the silvicultural control of the gypsy moth, the white pine weevil, the tent caterpillar, and decay hazards in hardwood sprout stands. Such work should be continued and amplified. Similar cooperative work might well be developed between Harvard University and the forest experiment stations of the United States Forest Service.

In order to operate the Harvard Forest efficiently, the staff must interest itself in such practical professional subjects as forest management, forest fire protection, forest mensuration, the extraction of forest products, and wood utilization. Research in these fields, however, should be left largely to public and other research agencies. The University should, however, rather, apply

the research of these agencies to the forest lands under its management. This is not only good business, but also is highly desirable for demonstrational and educational purposes.

The above discussion deals primarily with research in the biological aspects of forestry. Equally important are economic considerations. The Harvard Forest, however, cannot cover both broad fields adequately, because of its limited resources. It should be preeminent in one rather than mediocre in both. A consideration of the natural strengths and facilities of the institution shows the importance of concentrating on the biological aspects of forestry.

There is, however, an excellent opportunity for research and graduate instruction in forest economics in cooperation with the Department of Economics of the University and the Graduate School of Public Administration. In such cooperative research, the Harvard Forest should provide research facilities and advice on the biological aspects of forestry, rather than undertake projects with its own staff. Investigations of this nature have already been successfully carried out in such fields as (1) the land-use history of the Harvard Forest; (2) a plan of land use for Worcester County, Massachusetts; and (3) the economic possibilities of farm forestry and forest farming in central New England.

Inherent in the very nature of forest research is the long-term character of most of the investigations. As a single rotation of forest crops requires from 40 to 100 years, many years are needed for the satisfactory solution of a vast majority of problems. Consequently, forestry research can be efficiently undertaken only by a relatively stable staff working on a long-term research program which is institutional, rather than individual, in nature. As a research worker can seldom hope to round out his investigations in forestry
within his lifetime, special care must be taken in the development of a long-term program to insure the continuity of research and an efficient record system to enable each new man to take up where his predecessor left off. Fortunately, thus far there has been a most exceptional continuity of projects and records at the Harvard Forest.

The pursuance of a long-term research program, however, should never prevent periodic productivity or excuse the lack of it. The dissemination of knowledge, whether through writing, speaking, or teaching, is the only justification for research. Men engaged in forestry research are not freed from this responsibility because of the long-term nature of much of their work. Rather, they must pay particular attention to the periodic production of completed research. Opportunities for this are ample.

A privately endowed institution is always in a much stronger position to prosecute research than are tax-supported or business-supported ventures. Such an organization can benefit others by publishing conclusions drawn from its own mistakes. Public and industrial agencies cannot do this. An endowed institution can also study freely and without prejudice problems which other institutions cannot undertake. The Harvard Forest, being unique in its comparative independence from both government and industry, can make important contributions to American forestry.

Outside the field of forestry, the Harvard Forest can and should serve as a general field research station for the entire University. Here botanists, zoologists, geologists, and other research workers can find varied field conditions within easy reach of modern living and working quarters. The Forest might very well become an "inland Woods Hole" for scientists of a wide variety of interests.

AN EDUCATIONAL PROGRAM

The educational responsibility of the Harvard Forest has three major aspects: (1) training graduate foresters in the specialized fields of silviculture and forest management; (2) training teachers and research workers in forestry; and (3) teaching the principles and problems of forest conservation to interested persons who plan careers in other fields. In the past, emphasis has been placed upon the first of these aspects; but the other two must also be developed if the maximum value is to be derived from the forestry program at Harvard. A curriculum can be organized to carry out this program without requiring any marked expansion in the size of the prewar staff.

Professional Training

Since 1914, the educational policy of the Harvard Forest has been based upon one year of intensive graduate work in forestry offered to graduates of professional forest schools and leading to the degree of Master in Forestry. Under this program, about eighty professional foresters have been given postgraduate instruction. These men have had the opportunity to develop a high degree of technical ability, and many of them have attained positions of prominence. Student enrollment until 1941 was held down by limitations of accommodations and staff, comparatively small scholarships, and a restricted curriculum. Since then, war conditions have prevented an increase in enrollment.

This educational program, though sound, has been subject to distinct limitations. In particular, the program has been too general to afford prospective students a clear idea of the possibilities of work at Harvard and the course of study they would follow. The solution of this difficulty lies in the establishment of a specific
course program designed to cover the same general material as at present in a better organized fashion. Instead of taking four courses in Biology 120 (Forest practice and research) as in the past, the average student should take courses in silviculture, forest ecology, tree physiology, forest genetics, forest management, the extraction of forest products, and utilization. These should be listed under the Department of Biology in a separate subsection entitled "Forestry." A synopsis of the subject matter of these courses follows:

**Silviculture.** Full course. The first half may be taken as a half-course. Theory and practice of controlling forest establishment, composition, and growth by cultural treatments. Forest protection. Case histories of individual stands in the Harvard Forest. Applied silviculture in temperate North America.

**Forest ecology.** Full course. The first half may be taken as a half-course. The relationship of trees to climate, soil, topography, and other environmental factors. Structure of forest stands. Forest succession. Elements of biometry.

**Tree physiology.** Half-course (spring term). General principles of nutrition, water relations, and growth processes with particular reference to forest trees.

**Forest genetics.** Half-course (fall term). Principles of heredity, variation, and breeding among related organisms with particular reference to forest trees.

**Forest management.** Half-course (spring term). The application of economics and biology to the operation of a forest property. Forest mensuration.

**Logging and utilization.** Half-course (fall term). Methods of extracting forest products. Demands and needs of wood-using industries.

This integrated program would give the graduate forester a basic understanding of silviculture, and advanced training of a highly beneficial nature for professional practice. Students who have already had sufficient advanced training in any field would substitute one or more courses in Biology 20, Research in forestry.

**Scientific Training**

A basic objection to the professional curriculum outlined above is that graduates of forest schools, by the very nature of their training, are generally lacking in the essentials of a liberal education. Too often they are deficient not in technical forestry, but in English composition and speech, in chemistry, in biology, and in the basic knowledge necessary for an understanding of any applied field. In the professional forestry course outlined above, Harvard can help to overcome these difficulties by demonstrating the dependence of forestry on fundamentals, and by showing how this dependence can be utilized profitably by the practicing forester.

There remains a definite need, however, for interesting the better grounded graduates of liberal arts colleges, often men of superior caliber, in forestry. Such students cannot come to Harvard at present for a complete professional training in the practice of forestry leading to the degree of Master in Forestry, as can be obtained at Yale or Duke, but they can come for a broad liberal training in the theory of forestry leading to the degrees of Master of Arts and Doctor of Philosophy. Although such a program has long been available at Harvard, it has never been developed or emphasized. A curriculum of this type should prepare students not only for teaching and research in certain phases of forestry, but it should also aid men planning to enter wood-using industries or any other field in which a general knowledge of forestry would be useful. As no other institution offers such training, and as no other institution has equal facilities for offering such training, this program should be strongly emphasized at Harvard.
and important phase of human endeavor. Harvard University, therefore, should offer to its undergraduates an introductory course in forestry. This could best be given during the summer term at the Harvard Forest. There, undergraduates could carry on college work throughout the summer and yet spend a great deal of time outdoors in an attractive part of New England. Incidentally, this work would serve as an exploratory course for those considering a career in forestry. Every consideration, including the success of the Squam Lake Engineering Camp, emphasizes the fact that a summer course in forestry, offered to undergraduates at the Harvard Forest, would be highly popular and worthwhile. This program could be handled by the resident staff, which is relatively free from graduate students during the summer term.

The number of students that could be taken care of would be limited by the living accommodations available to about twenty.

A DEMONSTRATIONAL PROGRAM

In addition to its activities as a center of research and instruction in forestry, the Harvard Forest plays an important role in public education. Thousands of people visit the Forest, singly and in organized groups, to see the results of long intensive management and to learn forestry first hand. Particular emphasis has been placed on attracting professional and scientific groups to Petersham.

The Fisher Museum, containing the Harvard Forest models, is a major public attraction that is seen by additional thousands. These dioramas present in three-dimensional miniature a coherent summary of the forests and forestry of central New England.

The demonstrational activities of the Harvard Forest have been highly successful in the past and should be continued. Through them the Forest can perform a service in public education unsurpassed by other divisions of the University.

STAFF CONSIDERATIONS

Any marked expansion of the staff of the Harvard Forest at present is out of the question because of financial considerations. The program of Harvard University in forestry, therefore, must be carried out by a staff of approximately the same size as before the war. This can be done. The program proposed above requires the services of a minimum of four men stationed at the Harvard Forest. These include: (1) A director and lecturer in silviculture; (2) an ecologist; (3) a superintendent of the Forest and lecturer in the extraction of forest products and utilization; and (4) a tree physiologist. For full operation of the proposed program, two additional men are needed, one each in silviculture and in forest genetics. A group of this size and composition can teach the courses suggested above, carry out the necessary administrative work, and still have sufficient time for research.

Although the University should not attempt to increase unduly the size of its forestry staff, it should make every effort to develop a high-grade staff. To attract graduate students, teachers of unquestioned ability are needed. The gathering of a small but competent staff should be the primary concern of the University in the field of forestry.

As long as Harvard University has no policy toward academic promotion at the Harvard Forest, it will have great difficulty in gathering a satisfactory staff. Good men will not accept positions
The University can adopt a helpful policy in regard to building up its forestry program with little expense to itself by bringing present funds into better relation to existing facilities. If the programs of the Cabot Foundation and the Harvard Forest are integrated to a greater extent than at present, and if general funds of the University are made available to the Harvard Forest to an amount equivalent to tuition charges paid by forestry students, there is reason to believe that the forestry program at Harvard can eventually be developed to a point where, through additional endowment, it is financially stable and self-sufficient.