# Education of The Forester and Specialization

# BY MYRON KRUEGER

T is entirely appropriate and highly opportune that the "AMES FORESTER" should denote the FORESTER" should devote this issue to the subject of forestry education. In nearly every forest region of the United States professional forestry is on the march. The owners of timberlands are becoming increasingly interested in managing their lands for the production of timber crops because there are no longer any new, large frontiers of virgin timber to which they may go after their present holdings are depleted. The professional foresters employed by these timberland owners are daily being challenged to provide technical information on timber growing that would have been considered as extremely theoretical even a decade ago. As a consequence, the owners of timberland may be said to have transferred their interest from geographical frontiers to technological and scientific frontiers. These challenges to professional foresters are basically a challenge to forestry education. Confronting every forestry faculty in the United States is the very direct and practical question: "Are the forestry students now in college being offered the sort of training which will equip them to meet the even more difficult challenges that will prevail ten and fifteen years hence when they will have reached professional maturity?"

Evidences of the growth of professional forestry are perhaps more striking on the Pacific Coast where there still exist reasonably large areas of virgin timber. One large timberland owner of the Pacific Northwest is employing two soils specialists to classify the soils of the properties in his ownership and to give pertinent advice to the foresters on his staff. A large California operator has asked for advice on how to go about conducting a soil survey. Questions from operators concerning the more or less orthodox matters of placing a stand under forest management are common. There is no use laboring the point; foresters in all forest regions are thoroughly familiar with what is taking place. Is it any wonder then that at the recent annual meetings of the Society of American Foresters, the sessions of the Division of Silviculture have enjoyed an attendance of around two hundred members? It is only a few years ago that this would have been considered a respectable attendance for a complete annual meeting of the Society.

The recent book, "BERNHARD EDUARD FERNOW," by Andrew Denny Rodgers, III, has called attention again to the early concern of influential Americans about what they considered to be the abuse of our timberlands. The meetings of the American Forestry Congress in the 1880's called attention on a number of occasions to the need for professional foresters trained in the United States. The continuing discussion and pressure by these pioneers began to pay dividends in 1898 with the establishment of a full curriculum in forestry at Cornell University. Instruction at Biltmore and Yale followed soon thereafter. Ralph S. Hosmer, in "Fifty Years of Forestry in the U. S. A.," published in 1950 by the Society of American Foresters, states that twenty-one additional schools were established during the period, 1903-1914. These latter covered the entire breadth of the United States.

Possibly because of the zeal of the early day "conservationists" professional forestry education was established too soon. At least the graduates of these early curricula, copied as they were so largely from European curricula, did not seem to be in vigorous demand as managers of forest properties. The University of Washington was among the first to recognize that during the period of liquidating our virgin stands something different from orthodox European forestry education was needed. So there evolved the first specialized curriculum-logging engineering. Possibly for the same basic reason-to furnish employment to a larger number of "forestry" graduates-such other specialized curricula as forest products, municipal forestry, range management, wildlife management and forest recreation have emerged over the years. Another impelling influence in the development of some of these specialized curricula has been the feeling on the part of the largest single employer of forestry graduates-the U. S. Forest Service-that it has the responsibility of developing all resources of the non-agricultural lands intrusted to its care.

Forestry education in the United States now has a little over a half-century of experience. At least fifteen of the schools now in existence will have celebrated the fiftieth anniversary of their founding within another decade. In the development of our own brand of forestry education we have set up more specialized curricula than any other forested country. Just what is the net effect of all of this specialization on the education of a forester? To answer this question, other questions present themselves: What is the objective of forestry training? What are the responsibilities of the schools toward the education of a forester? What are the responsibilities of the schools toward specialized curricula? Perhaps we should ask first of all, "What is forestry?"

Over the years many definitions of forestry have been offered. In keeping with all other definitions none has been wholly satisfactory. Recognizing the limitations of any definition, I would

define forestry as "the science and art of managing land for the production of crops of timber." Many will consider this definition too narrow in the light of the multiplicity of curricula now in existence in many of our forestry schools. Nevertheless, most of the questions now being posed to professional foresters in the management of timberlands are pointed at the foregoing definition. If we view forestry as a profession, is it reasonable to suppose that within the space of four or even five years of university work we can give an individual reasonable professional competence in more than the "production of crops of timber?" On the other hand, if in our efforts to develop specialized curricula in logging engineering, forest products, wildlife management, range management and forest recreation, we have deleted from these curricula important courses aimed at the production of crops of timber and then call the result a specialized form of forestry, this is proof in itself that we do not view forestry as a profession but merely as a broad field of activity and endeavor, somewhat analogous to agriculture. There is no central core of subject matter to distinguish it as a profession. If we view forestry as a profession concerned with the management of land for the production of crops of timber, the primary objective of forestry education must be the training of individuals for this sort of a profession. If a school confines itself exclusively to this objective and does an outstanding job it will be no mean accomplishment. This does not mean that schools which have developed one or more specialized curricula have failed to perceive the real objective of forestry education. Specialized curricula are filling a real need—a need for which there has been a strong demand. The relationships of these specialized curricula to forestry education are quite complex. For a better understanding of the situation it is desirable to discuss each specialized curriculum in greater detail.

# LOGGING ENGINEERING

As was pointed out above, curricula in logging engineering arose out of the need for men who could be of service in the more orderly and economical liquidation of virgin stands of timber; stands which because of the large size of individual trees and rough topography presented real engineering problems. It was quite logical that the forestry schools should be more aware of this need than the engineering schools, and that therefore the logging engineering curricula should become associated with forestry schools rather than with engineering schools. It was the original intent that the men trained as logging engineers should have adequate training as foresters, in line with the definition of

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forestry as presented here. Because of the immediacy of the engineering problems it was only natural that the emphasis should develop toward engineering rather than forestry. The net result has been that in altogether too many cases the products of these curricula have been essentially engineers interested in working in the woods, rather than foresters trained to utilize engineering tools in the accomplishment of forestry objectives.

Logging will always be an important part of forestry. It is in the process of logging that the forester accomplishes such a large part of both the biological and economic objectives of his management. It is possible that in the education of a professional forester not enough emphasis has been given to the problems of logging. Perhaps some of the courses usually found in a logging engineering curriculum should be incorporated in what, for want of a better term, we might call a "standard forestry curriculum." Good road location and mechanics of equipment are important tools of the logger. They are no less important for the forester. Whether courses of this nature become required courses in a forestry curriculum or constitute electives in a strong forestry program, the graduates of such curricula are foresters in every sense of the term. It is important, however, that the forestry faculties administering such curricula see to it that these specialized courses remain in proper perspective as regards forestry. They should be viewed as tools to assist the forester and not as the primary objective of the prospective professional forester.

In certain regions there may be a need for engineers as such in the field of logging. That is, the needs of engineering training may preclude the possibility of combining engineering and forestry in one four-year curriculum. Some of the forestry schools may feel a real responsibility for the offering of this type of logging engineering. However, whether the training be offered in an engineering school or a school of forestry, we must accept the fact that graduates of such curricula are not foresters. If the prospective forester feels the need for such training, he should superimpose it on sound forestry training; that is, if he wishes to sell his services to an employer as a forester as well as an engineer. It must be recognized that a program of this character would involve at least five and possibly six years of work.

## RANGE MANAGEMENT

Range management as a professional field owes its existence to the work of the U. S. Forest Service. It arose out of the necessity for managing non-tilled lands under the jurisdiction of the Forest Service for the production of forage crops. As a conse-

quence, some of the forestry schools set up range management curricula which originally consisted of a basic forestry curriculum to which were added as electives a few specialized courses in range management. The graduates of such programs were considered to be qualified to manage either timberlands or range lands, or lands for the dual objective of timber, and cattle or sheep. The historical development of range management curricula has witnessed an increase in the number of professional courses offered, as well as the addition of several agronomy courses, and more recently of a number of courses related to animal husbandry. Here, too, the net result has been the deletion of forestry courses to make room for the work more specifically required by the growing needs of range management.

There are undoubtedly a number of "forest" regions in the United States where there is still a need for men trained both as foresters and range managers. The Great Basin area is a case in point. Perhaps, in this area, training along the lines of the original range management curricula would suffice. There is always the danger, however, that the graduates of such curricula would be merely regionally trained. If their future employment should take them to regions where the use of land for either forests or forage crops were paramount, they might find themselves inadequately prepared for either forestry or range management. For the present stage of forestry and range management education, the individual who has in prospect the management of land on which both timber and forage are important crops would do well to lengthen his curriculum to include both forestry and range management. Certainly, he will measure up more effectively to the higher level of the professional demands which are bound to apply in each field in the not too distant future.

If the present trend toward the inclusion of animal husbandry courses in the range management curriculum continues, it is quite doubtful as to whether the training can be completed in four years. Graduation from such a curriculum would entail specialization in both plant and animal science. If this is the end result within the range management curriculum itself, then the combination of forestry and range management education is bound to require at least six years. Much will depend on the degree of future specialization or professional refinement within the range management curriculum.

## WILDLIFE MANAGEMENT

The development of specialized wildlife management curricula, while of more recent origin, has probably followed somewhat the same pattern as has been the case for range management. However, from the start there has been a recognition of the animal or zoological relationship to wildlife management. Whereas range management stressed at first the production of forage crops without much if any attention to the animals which would consume the forage, wildlife management from its inception has viewed wildlife animals as the objective product. There seems to be a much greater emphasis on modification of cover to suit the desired wildlife. This means that wildlife management is already a profession with a dual basis of plant and animal sciences. It is doubtful whether, even at its present stage of development, it can be successfully merged with a forestry curriculum on a four-year basis. With the subject matter refinements and the increase in professional intensiveness that are likely to take place in both forestry and wildlife management, it appears that not less than six years of study are necessary to satisfy the professional requirements of both forestry and wildlife management.

Just as in the case of range management, there may be "forest" regions of the United States where greater breadth and less depth of training is a desirable attribute for the management of certain wild lands. Breadth of training may extend to the inclusion of wildlife management with forestry, or range management, or with both. Here, too, it is training aimed at a specific type of region. The training does not seem to offer much hope for wide employment in the highly intensive phases of either type of land management alone, nor does it seem conducive to the highest development of any one of the three professions.

# FOREST RECREATION

Forest recreation is a relatively new field of specialization. Only a few curricula, as such, are in existence. Most of the education in the field consists of specialized courses offered as electives in a forestry curriculum. Where the offering is of curriculum length or approaching it, the emphasis seems to be on how to handle large volumes of people on "forest" areas. Management of the area itself is at best a secondary consideration. There is no basis of soils-tree relationships such as applies for forestry.

There is considerable doubt as to whether this field has attained professional status at present, and some doubt that it ever will. In spite of a different point of emphasis, it is possible to provide for limited specialization in this field in conjuncton wth orthodox forestry training. However, if a large amount of specialized matter emerges in the years to come, there will inevitably be a deletion of forestry courses to provide for expanding specialization. One thing that may force this development is that in the expansion of professional subject matter in a forestry cur-

riculum, the growing emphasis on production of forest crops may have less and less appeal to the person interested in forest recreation.

# FOREST UTILIZATION

In the development of forestry education in the United States, there has been from the outset a justifiable emphasis on utilization. It is a matter of record that the first educators in forestry recognized the widespread lack of knowledge concerning the physical and chemical properties of the tree species of the United States. There was evidently a desire on their part to inform the forestry students not only as to qualities inherent in the species which they were to grow, but also to give them a basis for determining how to preserve or obtain the desirable qualities during the process of growth. Right from the start then there were courses called by such names as "wood technology," "forest products," "logging," and "sawmilling." But the field of utilization has progressed far from this relationship to the growing of forests. The trend has been in the direction of developing superior products and getting more complete utilization of the forest crop. The result is the extremely broad field which may best be referred to as "wood technology." Originally this term was confined to the physical characteristics of wood structure but, in this newer use of the term, there would be included not only the study of the physical and chemical properties but the whole ramified field of processing wood into more useful products. Probably in no other offshoot of forestry has specialization progressed so far. The progress has been so great that it is doubtful whether anyone can now consider himself a specialist in "forest products" or "wood technology." It is possible that he would be hard put to it to consider himself a specialist in even the phyisical or chemical phases of wood technology. Pulp and paper technology at least has attained a status all by itself.

No one can deny that the high degree of specialization in the field of utilization has been of outstanding benefit to forestry. The increase in knowledge concerning uses of wood and the development of new products has served to increase the value of the forest crop. A certain amount of training in utilization and wood technology will always be needed in the complete training of a forester. But it is quite doubtful that a wood technologist can devote very much time to forestry during the period of his training and still hope to reach the degree of specialization needed to meet present demands within his own field. Even though many foresters are still going on to graduate work in the field of wood technology, it seems highly probable that in the future

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there will be less of this especially as forestry itself develops toward more highly specialized soils-tree economics relationships, and wood technology partakes more and more of the character of industrial or chemical engineering. At least the forester of the future will find it necessary to spend a much greater amount of time in post-graduate work if he should desire to become highly trained in wood technology as well.

## SUMMARY AND CONCLUSIONS

In the foregoing discussion the terms "specialization," and "specialized fields" have been used rather loosely. The federal lands containing any appreciable amount of tree growth were set aside originally as "forest reserves" or "national forests." The management of these lands for any of the resources was termed forestry. It was therefore the most natural thing in the world that the fields discussed above should have had their inception as university subject matter in forestry curricula. Because they developed so largely from special "forestry" courses into full fledged curricula, we are still prone to refer to them as "specialized curricula." In reality some of these fields, notably range management and wildlife management, now have all the attributes of well-defined professions. As such they should be recognized as sister professions, with forestry in the broader field of natural resources. This has already been pointed out by Professor Kenneth Davis of the University of Michigan in the September 1951 Journal of Forestry.

Wood technology, having both physical and chemical aspects, may be too broad a field to have the attributes of a profession. Regardless of what term may be applied to the field, it is intimately concerned with the processing and better utilization of a natural resource. Therefore, it too can be considered as being one of the natural resource fields.

Forestry itself is going through a transition period. To meet the future needs of the profession it will undoubtedly become more "specialized" along the line of soils-tree-economics relationships. Therefore, the old idea of becoming a "specialist" in wood technology, or range management, or wildlife management by merely taking a few courses in these fields as electives in the forestry curriculum is a thing of the past. The forester who now aspires to become also a wood technologist, range manager, or wildlife manager will of necessity have to meet the educational requirements of these other fields. Any attempt to combine the fields within the limits of a four-year curriculum may prepare the individual for employment in limited types of land management,

but it will be inadequate preparation for significant contribution to any of the "specialized" professions within the natural resource field.

## ABOUT THE AUTHOR

Mr. Krueger was granted his B.S. degree from Union College in 1912. From there, he went on to get his B.S.A. (For.) from Cornell in 1914 and his M.S. from the University of California in 1917.

He was engaged in general forestry and sawmill work along the West Coast in 1914-1915. In 1917 and 1919 he was with the U. S. Forest Service; and in 1917 and 1918 he was with the U. S. Army as a logging engineer. From 1919 to 1925 he worked as a logging engineer in the redwoods of California. From there he moved to the Forestry Department of the University of California where he is at the present time.

Mr. Krueger is a regular contributor to the JOURNAL OF FORES-TRY and he has recently been elected as a Fellow of the Society of American Foresters.