FORESTRY EDUCATION IN AMERICA*

M. V. LAURIE

Higher education in forestry is a topical subject in this country at the moment. The Society of Foresters of Great Britain under its new constitution, which places upon it, among other professional duties, the responsibility for "keeping under continuous review the changing needs of education and research in forestry", has selected forestry education as the topic for its next discussion meeting; Edinburgh University is recasting its curriculum to include forestry in the wider framework of the management of natural resources; and Oxford University has just revised its programme to give more time to forestry subjects. The appearance, therefore, of this review of forestry education in America at this time is particularly opportune.†

America has a long and active history of forestry education, and for the last half century the Society of American Foresters has played an important part in examining the requirements and improving the standards of forestry education, particularly at the professional level.

Formal forestry education in the U.S.A. started in 1898 with the foundation of the New York State College of Forestry at Cornell University which offered a four-year course leading to a bachelor's degree, and, at a rather more technical level, the Biltmore Forest School, established in the same year by Carl A. Schenk, with a shorter course. Both these schools have now disappeared, but they were followed by a proliferation of schools offering higher education in forestry, the standards of which have been variable.

There has been a series of investigations into the status, aims, and adequacy of forestry education in America, and the Society of American Forester has been involved in most, if not all of them. The main features of these are described in the book under review, which itself constitutes the report on the latest of them. A study of these investigations gives a good idea of the way in which the S.A.F. undertook its professional responsibilities in the matter over the last fifty years or so, and makes particularly interesting reading for our Society which is just assuming similar responsibilities.

The first report, which emanated from conferences in 1909 and 1911, was published in 1912 under the title "Standardization of Instruction in Forestry". It is noted that, even as far back as 1912, there were twenty-four institutions which gave courses leading to a degree in forestry and about forty others that included forestry in their curricula.

The next important report resulted from a national conference on forestry education in 1920 held under the auspices of Yale University. Discussion centred upon the content and length of the courses — with "emphasis on the humanities as essential to preparation for a career in forestry". It is interesting that one of the main topics at that date was whether the courses should be of four

* This review is reprinted from Forestry, Vol. XXXVII, No. 2, 1964.

† Dana, S. T., and Johnson, E. W., 1963. "Forestry Education in America Today and Tomorrow." Society of American Foresters.

or five years' duration. The report was entitled "Education in Forestry" and was published in 1922 as a bulletin of the U.S. Office of Education.

In 1929 the famous "Forest Education Inquiry" was started by the S.A.F. This was probably the most thorough investigation of the subject ever carried out. From it came the comprehensive and authoritative book *Forest Education* by Henry Solon Graves and Cedric H. Guise. Henry S. Graves had incidentally drawn up the 1912 report, and had been concerned with the investigations in the early twenties and the book under current review is very appropriately dedicated to him as the "Pioneer and Leader in the Development of Forestry Education in America".

Shortly after the publication of this book the S.A.F. instituted its scheme for accrediting forestry schools. Under this a special committee of the Society examines the status of the schools in the various universities, with special reference to their facilities, staff, financing, and, in general, their capability of providing an adequate professional education in forestry. Only graduates from accredited schools are automatically entitled to membership of the Society of Foresters. As may be imagined, this question of accrediting and in general of inquiring into and judging professional standards led to lively discussions, and Chapter 3 of the book under review makes specially interesting reading. In 1936 the Council made accreditation a continuing and permanent activity of the Society, and there is no doubt that it has had a beneficial effect in raising the standard of higher forestry education in America.

This, then, is the background against which the present investigation has been carried out, namely a series of previous investigations in which the main principles of forestry education have been hammered out, an excessive number of forestry schools in the universities throughout the country which had sprung up in spite of protests from the S.A.F. — forty-three in all, of which sixteen have failed to attain the still fairly lenient standards of accreditation, and a relatively small number of sub-professional schools (only six). In the universities the undergraduate student body has been increasing, particularly in recent years, reaching all-time high levels of 8,612 in 1961 and 8,757 in 1962. The annual number obtaining bachelor degrees was 1,466 in 1960 and 1,544 in 1961 (provisional figure). Many detailed statistics are given of the numbers of graduates in professional and sub-professional employment, but, although it is clear that the annual requirements for graduates are considerably less than the outturn of the universities, no estimates of the relation between the two are given, and it is probable that realistic figures are not available.

Forestry as a profession is analysed in some detail, and the characteristics of the professional forester are summarized (p. 17) and are important as a basis for determining the content of his education. Emphasis is placed on the need for a sound grounding in the basic biological, physical, and social sciences, and the need to have a thorough grasp of the principles and practices involved in the application of this basic knowledge to the science, art, and business of forest land management. The importance of understanding, within the limits of existing knowledge, not only how things happen, but *why* they happen as they do, both in the virgin and the managed forest, is particularly stressed. The professional forester must be

taught to think. Other points made are that he must be equipped to formulate forest policies, to prepare plans for the integrated management of the forests' various resources that give full consideration to biological, physical, economic, and social factors, and to supervise the execution of these plans. He must have a comprehensive knowledge of people and human institutions, and must recognize the objective of his activities as rendering a useful public service. Mention is also made of maintenance of high professional standards and observance of his professional code of ethics.

This definition of professional requirements, of which the above is only a condensed summary, is unequivocal, and universally acceptable. The emphasis is on the production of a man of culture, knowledge, and wisdom, who can think for himself and make sound decisions.

Having defined the aims of forestry education, and described the evolution of forestry education in America (Chapter 3) — current programmes of teaching in all the accredited and unaccredited schools are analysed, both at the undergraduate and postgraduate levels. This chapter contains a vast amount of interesting and useful information and statistics, not only on the content of the courses, but on such subjects as practical work, specialization, standard of candidates, facilities, finance, etc., and concludes with a summary of views on current programmes and their improvement.

The main points that emerge are:

Firstly, general agreement that the four-year undergraduate curricula do not provide adequate instruction in the basic biological sciences, physical sciences, and mathematics. That in forestry subjects they pay too little attention to theories and principles and too much attention to practices and techniques.

Secondly, that there is often an undesirable proliferation of courses and curricula.

Thirdly, nearly all commentators bewail the inability of the average forester to use the English language effectively either in speaking or writing.

Fourthly, with the increasing need for administrative as well as technical ability, foresters need a better grounding in the social sciences and their application in the fields of forest economics, forest administration, forest law, and forest politics. They also need the broadening and civilizing influences of the humanities.

No one would, I think, dissent from these views. In this country we have probably been more conscious of the aim of training good forest administrators rather than good forest technicians, but how far we have succeeded in this is an open question.

Fifthly, there is an increasing need for "forest land managers". The forester should be concerned with all the products and services of the forest and not merely with timber production. Multiple use should be practised and not just talked about. Consequently, an understanding of the whole ecosystem and its control is a prime requisite for a forest manager, and this may require a broadening of the undergraduate programme.

This concept has, I think, been well appreciated in this country and forestry teaching has had a fairly definite ecological bias.

Again, it is an open question whether this bias has been sufficiently strong.

Sixthly, the perennial problem of whether the training should aim at producing "generalists" or "specialists", and at what stage specialization should be permitted is discussed. Opinions differed on this. It is clear that both categories will be required, and the most general view was that specialization should mainly be at the post-graduate level.

Chapter 5 of the book deals with faculty matters, size and composition of teaching faculties, duties and the relation between teaching and research, teaching loads, evaluation of teaching effectiveness, teaching techniques, tests and examinations, and the maintenance of standards.

Chapter 6 collects information on students, their numbers and degrees granted. The reasons why students choose forestry as a profession are analysed. Recruitment and counselling are discussed and there is an interesting section on the quality of students and rates of attrition during courses. One of the main causes for the lower-than-average standard of students enrolling for forestry is lack of knowledge by parents and school teachers as to "the nature of forestry and the challenging opportunities it offers to competent and well-trained men". The wider dissemination of information concerning the profession of forestry to the public in general, and to teachers, counsellors, students, and parents in particular is considered to be an outstanding need. It will be agreed that there is a similar need in this country.

Training in forestry at the technical (ranger) level is discussed in the next chapter and the differing opinions on the desirability of establishing more schools (there are only six at present) make interesting reading. The official attitude of the Society of American Foresters, as embodied in a resolution in 1962, is that the number of non-degree sub-professional programmes training forest technicians should remain limited and that new schools for forest technicians should be considered with caution and should not be established except under certain conditions of clearly defined local need not met by forestry graduates. This discouraging pronouncement is based on past experience, especially in the high mortality of technical schools in the past, and the fact that, in contrast to the professional forestry schools which have continued to multiply and to have a low mortality, technical schools are still few in number. The usual length of courses is two years. The situation is anomalous, and is said to be partly due to the four-year courses of the professional schools being scarcely adequate to provide a truly professional education, and to the greater emphasis already mentioned on the teaching of technical and practical details rather than principles and theory, so that in fact the professional schools are producing highly qualified technicians for whom there is a great demand. The authors believe that differentiation between technical training and professional education will evolve, but the process may be gradual.

An excellent chapter by Dean Shirley follows in which he brings together and contrasts and compares systems of forestry education throughout the world, and draws attention to many differences between American practice and practice in other countries, assessing them according to whether they are likely to meet with favour

in the United States or not. Fourteen points are ventured which he considers might find acceptance and five are listed as unlikely. He suggests that technicians will be used in increasing numbers in the U.S.A. in future and that as a result professional foresters will be given increasing responsibility and will need a more thorough education. As the profession broadens in scope, U.S. forestry schools will be obliged to curtail even further their emphasis on current forestry practices in order to concentrate more on basic principles that have a permanent and world-wide utility. This is a point that is important in this country where we are training nationals of other countries, many of them in the early stages of development.

Chapter 10 deals with education in related fields. Many American universities provide courses and give degrees in such subjects as Range Management, Wild-life Management, Watershed Management, Conservation, and Wood Technology. In some of these, notably the first two and the last, professional employment is readily available for men so qualified. In the others, there are limited prospects of employment. Another subject for which professional status is in the offing is "Outdoor recreation management" and a few schools offer organized curricula in this field. The courses given in all these subjects are analysed and their relation to forestry discussed. It is clear that the concept of forestry is more restricted in America to what they term "wood technology" and what we call productive forestry. Warnings are given of the dangers of too narrow specialization as obscuring the essential unity of forestry in the widest sense, with its common biological, physical, social, and economic foundations.

What I have refered to so far is the material in Part I of this book which is concerned with the past and present. Part II, like any standard forest working plan, contains conclusions and recommendations for the future. A certain amount of repetition is inevitably found here, but is necessary to put the proposals in proper perspective. The emphasis is on integrated land management as the future trend, requiring high professional qualifications over a wide field — *i.e.*, "not only technical competence as a practitioner but the broader development that is the mark of a truly educated man". Current programmes require strengthening in both breadth and depth.

This leads on to an interesting series of arguments and comments on the desirable length of the programme, with the final recommendation that five years instead of four are necessary. It is pointed out, incidentally, that seven years are required by Medicine and Theology, six by Dentistry, Hospital Administration, Law, Osteopathy, Social Work, and Veterinary Medicine and five for Architecture, Chiropody, Library Science, Optometry, Pharmacy, and Public Health. Is forestry such a simple and restricted profession as to make it possible to acquire adequate competence and knowledge in a shorter time than some of these professions?

In considering the length of courses, we in this country have to appreciate that the standard of entry to an American university from high school is lower, and that students qualifying for entry to a British university with two or three A level subjects, and the necessary language requirements, are more nearly equivalent to the American students at the end of their first (freshman) year,

though, of course, this varies in different universities. The proposals, therefore, for a five-year course in America are more nearly equivalent to some of the four-year courses in this country and in Europe.

The content of the desirable curriculum is then discussed under the heads of basic (non-professional) subjects and professional subjects. In the former, in addition to the usual basic sciences and mathematics, are included "Communication" (written and oral) — a subject to which we might well pay more attention — basic economics and political science. The professional subjects are divided into "core requirements", and "electives". Core requirements include the usual subjects of Dendrology, Forest Ecology, Silviculture, Forest Protection (including pathology and forest entomology), Forest Measurements, Forest Policy, Forest Administration (not usually taught as a separate subject in this country), and Forest Management. This last has a wider connotation than we normally understand by the term, and includes general land management, multiple use, and the inter-relations between the various resources of the forest.

Logging, milling, wood technology, and wood-using industries are *not* included in core requirements as being unnecessary for a person whose major interest is in some field other than timber production. They are, however, to be included in the elective programme for the prospective timber manager.

The core requirements are intended to include the minimum coverage needed by every forester, and so provide a foundation but not a full professional education. In order to round out his training the student will normally choose one of several available electives. These are General Forestry, in which the student can broaden and deepen his knowledge of the whole field of forestry, or more specialized options such as "timber management" (production forestry), watershed management, range management, wild-life management, recreation management or, in a rather different category, wood utilization. It is interesting to note the suggested approximate allotment of time to these various parts of the forestry curriculum, 45 per cent. to basic non-forestry subjects, 30 per cent. to "core requirements", and 25 per cent. to "electives".

The electives, which provide a limited degree of specialization, are not intended to produce specialists. The degree granted is a bachelor's degree in *Forestry*. If anyone wishes to become a specialist in any of these subjects it is recommended that this be done at the postgraduate level, working for an M.Sc. in a "professional" subject or a Doctor of Philosophy in a scientific subject. It is suggested that there is a place for a degree of "Doctor of Forestry" to cover subject-matter of a professional nature, at the doctorate level, and in fact two graduate schools (Duke and Yale) already offer this degree. The standard required would be the same as for a Ph.D., but it would not be in any sense a substitute for it.

I will conclude with some comments on the American proposals in relation to forestry education in this country.

The general trend of the American proposals appears to be towards more standardization of curricula to meet national needs for professional foresters. This is particularly the case in the "core subjects". It is, I think, clear that the content of the training required by professional foresters who will have to administer and

manage the national forest estate will differ according to the stage of development of the country concerned. For instance, in countries which are at the stage of assessing their forest resources, demarcating them and preserving them from destruction, emphasis needs to be more on the general principles of land use, the general functions and influences of the forest, legal and policy matters, forest protection, etc. It may be many years before more intensive management and development of the productivity of forests become important. When they do, and intensive forestry and forest industries develop, much more technical know-how will be necessary. There is, however, a large range of basic principles that needs to be taught in all cases.

Forestry is such a wide subject involving so many different sub-disciplines that there is a danger of it being taught in fragments that are not propertly integrated in the student's mind. The value of a curriculum that is not too crowded and which permits, particularly in the final year, seminars and discussions that cut across sub-disciplinary boundaries cannot be overestimated. The tutorial system can also be used to this end, as well as in teaching students to think, reason, and learn for themselves.

The very breadth of the subject of forestry carries with it two dangers, that of superficiality on the one hand and the temptation to specialize too early on the other. Both of these must be guarded against. To ensure that the student experiences and appreciates the depth of the subject it is desirable that he undertakes a research study of a limited project in great detail. It matters little whether the results of his researches are useful or not, or whether his study produces an original contribution to knowledge. The main objects are to teach the student how to tackle a piece of research, how to work out his own methods with a minimum of assistance, how to record results and analyse them, and present them in the form of a small thesis. Another valuable exercise is for the student to give a verbal account of his special subject to his class and conduct a discussion on it.

Another exercise that is standard in all British Schools of Forestry, but is not specifically mentioned in the American programmes, is the preparation of a detailed management plan for a specified area of forest. This is, we consider, invaluable in making the student carry out the necessary detailed investigations into the past history, and present conditions of the forest, to determine the objects of management, which may involve multiple uses, and prescribe the management of the forest, and its control. It makes the student integrate his knowledge of ecology, silviculture, surveying, statistics, mensuration, policy, land tenure and legal status, economics, utilization and marketing, protection, etc. Here again he is made to realize the depth of the subject.

I have, perhaps, given the impression that practical experience is not important, and certainly little mention has been made of it in the book under review. Here one has to distinguish, on the one hand, between the teaching of too much technical or practical detail that merely taxes the memory rather than the intelligence, and is clearly undesirable, and on the other hand, the actual execution of practical work in the forest which, in moderation and provided it is sufficiently varied, is truly educative in the highest degree. Such practical experience can, it is suggested, be best obtained partly by working in the forest as a forest labourer in

vacations in the early part of the student's training, partly by carefully designed and supervised practical exercises in the forest during the course (including the Working Plan exercise already mentioned) and partly, as used to be the practice in India, by doing the job of a subordinate technician ("Ranger" or "Forester") for six months or so after appointment. Having had to do this myself I can look back on this as probably the most valuable experience in my career. I cannot think why more forest services do not adopt this excellent practice.

Regarding the temptation to specialize, the American proposals strike what seems to be about the best compromise, allowing a limited amount of specialization in the form of options in the curriculum for the bachelor's degree — any further specialization to obtain full professional qualifications in specialized fields being relegated to postgraduate courses and degrees.

The matter of the length of courses and their content is of primary importance. It is essential that programmes should not be overburdened, that unnecessary technical detail be ruthlessly cut out, and the teaching concentrated on principles rather than practice. I am sure that everyone concerned with higher forestry education will endorse the American recommendations on this. Speaking for Oxford, the two-year science course followed by two years of forestry resulted in the latter being so crowded that it was more like hard labour instead of the "glorious intellectual adventure" that a university education should be as Dean Shirley so aptly puts it. Consequently, Oxford has recently revised its curriculum to give more time to forestry, and, in particular, the last year is relatively lightly loaded, giving more opportunity for seminars and discussions, and for the special research project. A five-year course would indeed be even better, but would be so out of step with first degrees in other faculties as to be unacceptable at the present time.

In this review I feel I have scarcely done full justice to this excellent book which is packed with information and ideas on many other aspects of forest education that I have not had time to mention. It will be a valuable source of reference for all concerned with forestry education for many years to come.