

The Philosophy of American Forestry Education ¹

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INTRODUCTION

An alternative title for this paper could be "The Profession of Forestry and the Education of Foresters and the Public—what can we learn from the Americans?" The paper is the end product of almost five years reflection on an academic year spent at an American University, followed by three monthhs travelling in the United States of America, meeting foresters, forestry educators and researchers, forest industrialists, loggers and the American people. Since it is a reflection, coming after almost five years of thought, rather than a spur of the moment exercise, following impression or disappointment, it should be more objective in approach.

THE FOREST — DEFINITION OF

To understand fully the differing concepts of Forestry in America and Britain we must start by defining the word "Forest". An American definition states thus:—

"A Geographic entity which includes all the components of the area—both organic and inorganic and in which trees are the dominant form of vegetation". (Webster)

An Oxford Dictionary defines the word:—

"Large tract covered with trees and undergrowth sometimes mixed with pasture, with trees growing in it or unenclosed woodland district kept for hunting, usually owned by the Sovereign".

We see therefore, at the outset, a basic difference in approach. We tend to think of forests as consisting only of trees. The decreasing popularity of hunting, for economic reasons, and the changing nature of the forest due to the introduction of exotic conifers has, through the ages, resulted in this tendency towards "mono-interpretation".

The first paper has most clearly shown the immensity of the forests of the United States. We have heard that 34% of the land areas of the 48 contiguous states and coastal Alaska is Forest Land. The skilful management of this vast area, then, is the target of the United States forest educator and this management is called forestry. In the next stage in the build up process I wish to again define, this time, the almost every day word — "Forestry".

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"FORESTRY" — DEFINITION OF

To our relatively unenlightened public "forestry" in many cases still simply means "cutting down trees". I find also that, to many of our foresters, forestry is essentially the management of forest lands for the production and utilisation of timber. In contrast, the American concept of forestry is well illustrated by Graves and Guise (1932) in their book "Forest Education":—

"Forestry is first of all concerned with the constructive management of forest land . . . Timber is not the only resource with which the forest has to deal; the science is concerned with various other resources that are an integral part of the forest. In many forests, grass and other forage plants may be used for the grazing of livestock without jeopardising the forest growth. Here and there, areas of cultivable land may be farmed without interfering with forest management. The protection and management of wild life in the forest and of fish in the streams and lakes and the use of the forest for recreation, fall naturally within the task of the forester. Likewise, mining of materials, the development of waters for irrigation, power, and domestic use, and the use of lands required for special purposes by local industries must be co-ordinated with forestry in order to obtain the maximum service of many large properties".

Graves and Guise go on to say:—

"In managing timber resources, the task of forestry does not stop with the growing of trees and their replacement after cutting. It includes also the economical and efficient use of wood products. The manufacture, distribution, and use of wood products are intimately related to the growing of raw materials. This statement does not mean that logging, lumber manufacture, and merchandising of forest products, taken by themselves, constitute forestry. These activities become an important feature of the forestry enterprise only when they are correlated with and contribute to the conservation of the forests on which their permanence depends. Conversely, silviculture can be carried on successfully only when correlated with industrial and economic requirements."

These quotations should clearly make the point that forestry is much, much more complex than popularly believed. The final sentence of the second quotation deserves particular notice and gives scope for much searching thought.

At this point the basic objective of United States forestry is also worth noting. This was expressed by Secretary of Agriculture, James Wilson in 1905 in a famous letter of instructions, concerning the administration of the national forests, to the Chief of the United States Forest Service. The purpose is, he stated, to assure "the greatest good of the greatest number in the long run."

Dana and Johnston (1963), commenting on this, stress that

"To achieve this goal there must be a net income; receipts must exceed costs. But both receipts and costs may be tangible or intangible, economic or social. They may or may not be measurable in dollars".

This provides yet another facet to dwell upon. Now with, I hope,

a slightly wider concept of Forest and Forestry in mind let us move a step further and look at the Forester.

THE FORESTER — DEFINITION

Obviously in defining Forestry the Forester has to some extent been defined too. However, it is interesting to consider an American interpretation.

One definition is "A Forester is basically a practitioner—a manager or administrator whose unique professional competence lies in his ability to utilise the Sciences (biological, physical and social) and the humanities¹ in the planned management of specific tracts of land for the attainment of specific objectives".

This admittedly is not how the American public sees it's foresters, but the interpretation within the profession. Without pausing to consider how the Irish public sees it's foresters, we should reflect for a moment how the profession in Ireland would define the same word. I feel that while a minority may see it from the American point of view, many would have to define him as an essentially practical individual to whom the sciences are mere series of "ologies".

If our own definition does not measure up to the American one then we must ask ourselves—Has our management of our Natural Resources suffered as a result?

My impression is:— not very much to-date; but with the immediate necessity of paying more attention to the fields of recreation and wildlife, also with the acquisition of more and more water catchment areas, I feel that we must orientate our thinking more in the direction of a multiple use basis of management.

THE PROFESSION OF FORESTRY

I now want to further consider forestry as a profession and the first question that may be asked is—What is it's scope? Dana and Johnston (1963) define it's scope as

"... much broader, the values with which it deals are much greater and more diversified and the skilful management of forest resources is more difficult than is realised by the general public or perhaps even by many foresters".

They go on to say

"Forestry requires professional men, technicians, skilled workers and unskilled workers—BUT the key figure is the professional forester".

United States foresters are extremely proud of the academic and

1. A definition of the sometimes mysterious American term "humanities" is the following collection of subjects:—

English composition, literature and speech, fine arts, music, foreign language, philosophy, religion and other restricted electives. On the other hand, Social studies are defined as economics, political science, history, geography, psychology, and restricted electives.

social standing of their profession and throughout their country it ranks with the greatest professions and is greater than many. I wonder how many professional foresters in Ireland look on forestry as a true profession. How many of us have even considered just what a profession is? Numerous people have defined the term but perhaps Tawney (1920) does it best. We should note the emphasis that service is an essential attribute :—

"A profession may be defined most simply as a trade which is organised, incompletely, no doubt, but genuinely, for the performance of functions. It is not simply a collection of individuals who get a living for themselves by the same kind of work. Nor is it merely a group which is organised exclusively for the economic protection of its members, though that is normally among its purposes. *It is a body of men who carry on their work in accordance with rules designed to enforce certain standards both for the better protection of its members and for the better service of the public.* The essence of (a profession) is that, though men enter it for the sake of a livelihood, the measure of their success is the service which they perform, not the gains which they amass".

The italicised portion of this quote is worth noting, particularly the words "in accordance with rules designed to enforce certain standards". The maintenance of, and adherence to, a code of professional ethics throughout the forestry profession in the United States impressed me greatly. This ethical code was adopted in 1948 following long years of battle to achieve it. It was controlled by that great body—the Society of American Foresters—who also controlled forestry education, and its title is "Guiding Principles of Professional conduct for a Forester in his relations with other Foresters, with his Employers and with the Public". Great emphasis is also placed on the maintenance of high ethical conduct in the field of forestry education.

The Graduate versus the Non-Graduate

The same segregation of grades within the profession that is common to Britain and Ireland exists in the United States. However, it is rigorously enforced there. The American "Forester" is similar to our Forest Officer grade except that he *must* be a graduate. The Society of American Foresters defines "Forester" as :—

"a person who has been professionally educated in forestry, or who possesses qualifications for the practice of forestry essentially equivalent to graduation from a recognised school of forestry".

and the terminology "school of forestry" implies university rather than vocational training. Canadians prefer, for this same grade, the term "professional forester"—meaning one formally licensed¹ to practice forestry.

In the United States, our foresters are categorised as technicians, which is an appropriate enough term. They are, however, often referred to as sub-professional or semi-professional. These two terms annoyed

1. Licencing will be dealt with in a subsequent section,

me greatly and still do, in that there is little really sub- or semi- in our foresters.

Great controversy exists in these Islands about the necessity for such a rigorous break down into grades. Many say "lump them all together and if the graduate is as good as he is supposed to be he will come out on top". This may be fine, but where will it eventually lead forestry? There must be segregation, I feel, and Dana and Johnston (1963) make a good case for it :—

"Most professions require the participation of others than those who give them their distinctive character. Physicians, for example, do not personally handle all the work in a hospital, or even in their own offices. Engineers do not build roads, or manufacture machines, or construct reservoirs with their own hands. Professional foresters do not themselves perform all the tasks involved in the management of forest lands. They prepare and supervise the execution of management plans, but they have the help of other professional men, of scientists, of technicians, of skilled and unskilled workers, and of stenographers and clerks.

Among these latter groups, the one in which this study is particularly interested is that composed of the technicians, the men who handle or direct the techniques of applying management plans on the ground and who serve as the liaison between the professional and forester and the skilled or unskilled worker. They are commonly, but less appropriately, known as sub-professional or semi-professional workers. In engineering, it is commonly estimated that one professional engineer, on the average can advantageously use the services of ten technicians; and a similar or somewhat smaller ratio might apply in forestry".

George S. Allen¹ here probably gives one of the best breaks down into classification that can be obtained. He states :—

"The distinction between professional and technical men seems to be fairly clear: the professional is expected to be broadly knowledgeable in the many subjects that make up Forestry Science and Art, and should be capable of planning, analysis, and exercising overall supervision, usually on an ever-broadening front as he progresses from junior to more senior positions. The technician or equivalent is trained in one or a few specialties with only enough fundamentals to give him a reasonable understanding of the work involved. He is expected to carry out the plans or directions of the professional within specified areas. The tendency seems to be to broaden the technical man's training, and hence to reduce specialisation, in order that he may be able to perform adequately on a variety of jobs and fit into the season-to-season or year-to-year programmes of his employer with a minimum of 'on the job' training".

To define further the necessity to categorise foresters by training would be to labour the point. I feel, however, that the whole profession of forestry can only be uplifted into its proper place in our community if a similar segregation can be effected. Let us then emulate forestry in the New World and have a profession of university trained foresters and a separate cadre of forest technicians. These technicians

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would be as élite a cadre as their professional colleagues and do a job as essentially important, in the framework of forestry, as do these colleagues. A harmony of these two divisions, not under one professional mantle but between two fully competent sections of it, should be our ultimate goal. Many are the errors that have been made by graduates undertaking tasks that should have been allotted to properly trained technicians, and many a fine technician has been lost when promoted to fulfill tasks necessitating the broader basic training of the graduate.

Much must be done in Ireland before forestry is accepted socially and academically on a par with other professions and as it is in the United States. A possible reason for its "stratification of acceptability" here is the traditional acceptance of forestry as a craft, governed by certain rules of thumb and a mystic awe for Mother Nature, rather than a science. The Forester, in turn, may be seen as a truly earthy individual with gnarled and often dirty hands, rather than a scientific manager of some of the nation's most important natural resources. Do we ever ask ourselves, I wonder, why foresters are not accorded the same social status as other professions, many of which demand less rigorous standards of training and education?

Let me confirm that the division I speak of, between the professional forester and the technician is very real in America. There are, however, relatively fewer technicians than professional foresters. This is, of course, the reverse in this country and Dana and Johnston (1963) as a matter of interest, give the following reason for this. They state that it is:—

"is due to the fact that in the early days, professional schools of Forestry were organised primarily for the purposes of preparing men to assume leadership in introducing the practice of forestry. Intensive forest practice was impracticable and the custodial and protective activities that constituted so large a part of Forest Management could be handled by practical men whose training had been the school of experience".

The present status of the forester in the United States was, however, not achieved without a fight. Listen well to H. H. Chapman speaking with specific reference to the Society of American Foresters (Chapman 1934):—

"We can no longer postpone the decision as to whether this Organisation is, in fact, a professional society or a mere loose aggregation of practising or non-practising foresters and woodmen—The standards set up by the professions of Medicine, Law and others demand a basic theoretical education as the undeviating requirements first for admission to the Professional Societies, and second for a licence to practise as a member of this profession. To continue the present muddled policy on memberships is simply to admit that Forestry has not yet been recognised by its own members as a profession in distinction from a craft—Either we are a profession or we are not".

This actual quotation was made during the fight for accreditation

of American Forestry schools and will be referred to again later in the paper.

In conclusion of this section let us look at the professional forester in summary. "Forest Education To-day and To-morrow" (Dana and Johnston 1963) summarises his characteristics thus:—

- "1. He is well grounded in the basic biological, physical, and social sciences.
2. He has a thorough grasp of the principles and practices involved in the application of basic knowledge in the science, art, and business of forest land management.
3. So far as existing knowledge permits, he understands not only how things happen but WHY they happen as they do in both the virgin and the managed forest ; he understands the relation between causes and effects.
4. He is equipped to formulate forest policies, to prepare plans for the integrated management of the forest's various resources that give full consideration to biological, physical, economic, and social factors, and to supervise the execution of these plans.
5. He has a comprehension of people and of human institutions that makes him at home as an individual, a citizen, and a professional man in the community in which he lives and works.
6. He recognises that the objective of his activities is the rendering of useful service, which may take a wide variety of forms.
7. He is guided in all his activities by his profession's code of ethics.
8. He joins with his fellow foresters in advancing the interests and maintaining the standards of the profession".

The task of the schools of forestry is to educate men possessing these characteristics.

Let us ask ourselves, this minute—how do we measure up ?

Having built up the background of the forestry individual we will now go on to build up a brief background to the present forestry education system—first of all in United States Universities then in the Technician or Ranger Schools. We will afterwards look very briefly at the curricula of each.

HISTORY OF EDUCATION IN THE UNITED STATES.

Prior to 1897 when a forestry policy for Government timber lands was established, the history of forestry in the United States was one of almost reckless exploitation. The history of the exploitation was also the history of the colonisation and the onward creep of civilisation. Many bills were drafted prior to 1897 designed to stem the tide of this destruction, but like most bills they had loopholes and were largely ineffective or not wide enough. Great names later to figure in the further development of forestry like B. E. Fernow, Theodore Roosevelt and Gifford Pinchot were among the leaders of this fight.

Forestry education really commenced in the United States in 1898, when two schools of forestry opened, the New York State College of Forestry at Cornell University and the Biltmore Forestry School on the Vanderbilt Estate near Asheville, North Carolina. Both were headed by men who had been trained in Forestry in Germany, B. E. Fernow at Cornell and C. A. Schenck at Biltmore.

Next came Yale University in 1900 under Henry S. Graves—a Yale Graduate who later studied forestry in France and Germany. The number of forestry schools multiplied rapidly until the Great War and then resumed afterwards.

Accreditation

As the number of schools increased many people wondered if the increase was not too fast and felt that perhaps their curricula and courses were being relatively uncontrolled. A request for a rating of Forestry Schools was then made. This rating would measure by degree how the schools fulfilled the requirements of professional training. The idea however, was rejected by two great workers in the field of Forest Education who maintained that Forestry had not yet stabilised like Medicine, Law and Engineering and that there was not a full recognition of its requirements and standards of forest education.

However, a system of stabilisation in the form of accreditation eventually came in 1949 with announcement of the minimum subject matter requirements.

Accreditation is in the sole hands of the Society of American Foresters and today there are 28 accredited universities and eight unaccredited universities in the United States. Unaccredited universities of course, endeavour, by control of Faculty and courses, to achieve accredited standard.

Registration and Licensing

Almost side by side with the fight for accreditation was the demand for the registration or licensing of practitioners which in the United States is a State requirement of long standing in many professions. Professor Chapman, one of the champions of this cause stated around 1938 that:—

“Legal recognition and protection are the objectives of all professions” but that “Foresters so far have not attained this recognition in the eyes of the law and are still on the status of common untrained labourers or vocational foremen”.

The Society of American Foresters led the promotion of legislation for registration and licensing and in 1951 the State of Georgia provided for the registration of qualified foresters and prohibited all others from using the term “Registered Forester”. Four other States have since followed this example, Michigan, Alabama, Florida and South Carolina. Georgia has since made registration mandatory.

Dana and Johnston comment on licensing as follows :—

"Licensing and education can be mutually beneficial. State legislation usually requires that a candidate for licensing or registration must be a graduate of an approved school of Forestry or must have acquired by experience a knowledge of Forestry equivalent to that represented by such education. In practice, this leaves the Board of Registration free to approve only schools that are accredited by the Society of American Foresters. This is a policy that puts strong pressure on unaccredited schools to strengthen their programmes.

At the same time the strengthening of educational programmes at all Schools of Forestry, stimulated by stricter standards of accreditation will automatically assure greater competence on the part of candidates for licensing. The schools and the Society of American Foresters, working together, can do much to make licensing more effective by putting professional education on an increasingly higher plane".

In these Islands the first steps in regulating the forestry profession have been taken by the Society of Foresters of Great Britain with their registration of forestry consultants. Wider terms of reference enabling this body to keep a watching eye on education and the supply and demand of graduates would, I feel, be beneficial also. In Ireland, with only two schools of Forestry, the task of regulation is much easier. The Society of Irish Foresters can certainly play a large part in maintaining and improving the standards of training, education, and the profession in general.

Now for the technician. It is generally thought that there are few technician schools in the United States. Certainly there are many fewer than professional schools but they also are on the increase. The Biltmore School—already mentioned was the first, although it did not rank fully as a Ranger School. The first Ranger School proper was established by the University of Southern California in 1899. Other schools followed at Colorado A and M college and North Dakota School of Forestry. The story continued from here, schools came and schools closed. As more schools open the controversy between the technician and the professional forester continues. Arguments may be heard in favour of the necessity for more technicians and other arguments may also be heard for the use of the professionally trained forester in jobs which could possibly be carried out by technicians. As Dana and Johnston (1963) say :—

"the long term prospect is, however, unclear. The probability is that technicians and the formal training of technicians will play a more prominent part in the forestry enterprise in the future than in the past".

BASIC FORESTRY TRAINING

(a) *The Technician*

I now wish to consider forestry education, having developed it's background. First of all, — technician training. One of the forestry schools I visited was the New York State, Ranger School at Wanakena.

This school is a Division of the State University College of Forestry at Syracuse University. This fact is in itself interesting—that of having a technician training school attached to, and part of, a University. This is quite a common procedure and not by any means peculiar to the New York State School. The school trains men for foremanship and those who qualify are eligible for positions of responsibility between those of the average woodsman and the professional forester. The course is terminal in nature — which means that it is not designed for students interested in a professional degree in forestry. Subjects necessary for entrance qualification are plane geometry, elementary algebra and mathematics. The course is eleven months long and is in session for all this time except for a few short recesses. Approximately 50% of a student's time is spent in class-room and discussion. Formal classes are held for $5\frac{1}{2}$ days each week. The student's day commences at 6.15 a.m. and classes at 8 a.m. Each evening, students are expected to work on assignments from 7.30 p.m. There are no free periods or elective courses and students are encouraged to devote their free time to enjoying the recreational advantages provided in the woods through such sports as camping, fishing, snow-shoeing and in developing, through these activities, a familiarity with forest environment. Athletic activities are not emphasised and there are no organised sports as part of the programme. Students are not permitted to have motor cars as they are expected to devote their full efforts to accomplishing their purpose in attending the school. Subjects are pretty well the same as at our own Forestry Schools.

Where does the moral of this story lie? Having seen this school in action and met both staff and students, I am fully convinced that fine foresters can be produced in *one* year thus saving taxpayers money and the students' time.

(b) The Professional Forester

Dana and Johnston (1963) quote one of the primary functions of a school of forestry as "the education of men of high professional calibre". They state:—

"High professional calibre includes not only technical competence as a practitioner but the broader development which is the mark of the truly educated man. It connotes a combined scientific and liberal education that provides the abilities and the skills to work with nature and with man in identifying and solving complex problems".

Keeping this at the back of our minds let me first of all confirm that the basic courses are pretty well the same as those in Britain and Ireland. A foundation of the basic sciences is required before the applied courses are commenced. Certain "core" subjects are insisted upon for the applied course, and these are basically similar to those at present on the curricula of British and Irish Universities. The subjects are Dendrology, Forest Ecology, Silviculture, Forest Protection,

Forest Measurements, Forest Economics, Forest Policy, Forest Administration and Forest Management.

I will now comment on these where differences with our conceptions of them exist. For want of a more concise and explicit description of these subjects, I have again gone to "Forestry Education Today and To-morrow" and admit to downright plagiarism in several places. In the interests of brevity and clarity I therefore do not apologise for this.

Deednrology: This is an American term for subject material common to British curricula—it teaches the characteristics, distribution and the occurrence of the major tree families and forest types.

Forest Ecology: This subject is greatly stressed in American Universities. It teaches the structure and operation of the forest community including the plant and animal ecology and the silvical characteristics of forest trees. Inter-relations between organisms and their physical environment, including "forest influences" is stressed.

Silviculture: This subject is pretty well as we know it, except that it is stressed that silviculture should be taught as an art which is based primarily on the biological sciences—notably forest ecology and plant physiology. Silviculture is also related closely with the subjects of protection, mensuration, economics and management. My personal experience of this subject in the graduate school was mainly physiological and it greatly influenced my philosophy of silviculture. I now feel that a most thorough grounding in plant and Forest Tree Physiology is necessary before a course in silviculture is fully appreciated. In fact, I feel that Forest Tree Physiology is the foundation on which all forestry stands or falls. We should and must have more of it taught.

Forest Protection and Forest Measurements: These subjects are very similar to our conceptions of them except that fire protection gets more than lip service and that photogrammetry is considered an integral part of mensuration.

Forest Economics: Again pretty well as taught in this country, the object being to clarify and illustrate the practical use in forest management of the economic principles and facts that play such an important part in determining the policies and the practises of both private and public owners.

Forest Policy: This subject is not taught with exclusive reference to the United States but more with a world wide cover. It is a subject that deserves much more attention in our curricula than it receives at present. The breadth of view needed by foresters for exerting leadership both within the profession and in the development of

sound policies relating to forestry requires a knowledge of the history of the profession with special reference to the policy problems that it has faced and will continue to face. An understanding of the motivations, influences and processes that shape both public and private policies—of which and how policies develop in a democratic society—is of particular relevance in a profession with such strong economic and special impacts as forestry.

Forest Administration: This subject teaches the principles of administration including organisation of personnel and finance with special reference to the problems faced by both public and private agencies at different levels of administration. This is another subject which is not generally required but with which a forester comes into such frequent contact that ability to deal with the problems it presents is essential. Its importance increases as he rises to higher levels of responsibility. It is also a subject that is not covered to any great extent in present curricula at British universities and one which should receive much more attention than it does at present.

Forest Management: This teaches the inter-relations among the various resources of the forest (wood, water, forage, wildlife, opportunities for recreation) and basic principles of forest land management, including organisation and administration for multiple use, sustained yield, etc. The subject covers a wide field and offers an opportunity to integrate all the other subjects in the consideration of the management of the forest as an entity. This concept of forest management should again be brought into British curricula. At present, little reference is made in them of anything other than the timber resource of the forest.

Other Subjects: Logging engineering is also taught as a main subject at many universities particularly in the west.

There is at present much controversy in the United States about the amount of cultural subjects taught during the forestry course outside the professional field of forestry. The desire to include more and more of these e.g., English and Literature, Social Science and general communication fills the present four years course to the extent that at many Universities serious consideration is being given to the formation of a five year course as a requisite for professional training in Forestry.

In this country with our higher standard of pre-university education many will argue that the inclusion of such subjects would not be required. However, the sad fact is, for example, that the standard of general communication has dropped rather than improved during the last 10-15 years. British and Irish curricula could also take a leaf from the American book by including subjects like accounting, personnel management and business law.

As well as these subjects, I submit that our curricula would benefit greatly from the inclusion of *courses* in, not just passing reference to, engineering, elementary aerial photography and statistical methods, although in the United States this is often left to the graduate school.

I would now like to comment briefly on the missing subjects or partially covered subjects in our curricula—bearing in mind that their fuller coverage or inclusion could over-tax our already loaded academic terms.

Statistics is a subject which often gets little more than lip service in British and Irish Universities and yet is a subject basic to many aspects of forestry. A knowledge of the complexities of statistical sampling are essential, I feel, for a thorough understanding of mensuration and also for an understanding of research work. We are often overawed by the use of such terms as regression analysis, chi square, significant at the five per cent level and even such simple terms as weighted average. However, in being overawed we are ignoring the fact that these are tools of forestry just like the chainsaw, the scale rule and the hypsometer.

Aerial Photography is being used more and more in forestry and other subjects for example, geology and engineering. It is taught at a very large number of forestry schools in the United States and I feel that it has got so much importance in this country that it should be included in forestry courses here. When I mention the uses of aerial photography I do not mean the use of photographs in making topographic and precise planimetric maps, but of the everyday use of photographs in mensuration, management and silviculture.

How instruction in aerial photography should be incorporated in a forestry course is not for me to say. It will probably be found, however, that if other university curricula are considered, that courses in aerial photography are being given in the engineering department of the university or perhaps in the department of geology. A combined course for the basic work should therefore be highly possible.

Forest Engineering/Logging Engineering:

Until the appearance of Mr. Huggard and his textbook on Forest Engineering (Huggard, 1958), little was taught in British universities about this extremely important aspect of forestry. If we only consider roads, the profit/loss margin of a forest crop can be determined by road espacement alone. While Huggard's book certainly fills a gap, we could ask ourselves again does it do so completely or does some space yet exist which could be usefully filled. Can we not again, like the American, take a look, or a longer look as the case may be, at such fundamental things as road width, the degree of curvature, the number of curves per mile, the type of road surface, the density of

the traffic which the road will eventually carry, the spacing of passing points and their visibility and the effect of these on haulage costs. We should also, I feel, be able to pinpoint such things as the optimum truck size and horse power required for certain haulages and road types etc.

Communication:

Of the many courses taken in my graduate programme, perhaps "research methods" was the most enlightening. To describe this course in full would perhaps steal the next speaker's thunder, but I feel I must dwell on one aspect of it—that of scientific writing. This is the art of writing for a profession and not a public. It is meant to inform rather than entertain and is for journals and technical papers which, due to the cost of production must be kept to minimum acceptable size. This is a subject that we should think strongly about, because few of us are capable of producing a creditable short, precise, logical report, memorandum, or even letter. British and Irish universities could well include a course on this subject in their curricula. Americans accept it as a necessary subject—but British graduates in the United States almost reject it out of hand. To quote Thirgood (1961) on this subject—"The British and the Americans are one people divided by a common language, so says George Bernard Shaw". Thirgood states that especially in the field of scientific writing, British and Irish students experience very real difficulties. He states further that the sentence form of the Briton and Gael:—

"is long with supporting and amplifying phrases. He is accustomed to a syntax that to North American eyes may seem unnecessarily literary, verbose and complex. If obliged to attempt an American style he will feel restricted. In his reading he may find North American research writing disjointed and disconcertingly lacking in continuity".

I must confess that for a while I recognised some difficulty and I also agree with Thirgood that my difficulty was unrecognised by my major professor. However, I soon came to see the American point of view and I now accept this form of scientific writing as perfectly normal, logical and proper.

However, communication is not report writing alone, there is much more to it than this and it is stressed continually at American universities. For example, in the journal of Forestry (Garrett, 1959) we read that by and large there is a general agreement among most United States forestry educators that the forestry schools there are doing a creditable job in the technical preparation of their graduates for the forestry work in hand. However, it is stressed that emphasis continue to be given to the forester's need for improving his ability to communicate . . .

" . . . to transmit his ideas to his business and professional associates and to the general public through effective writing and speaking. In fact, whether it be in preparing and submitting reports to his superiors to account for his activities or stimulate action programmes, or in engendering goodwill for his company or agency among laymen and public organisations with which he comes in contact, ability to "sell" his ideas may well be one of the forester's most effective attributes. It will have a large bearing on his ability to motivate and work with the people in his own organisation ; it will have an equally important bearing on his ability to perform an adequate public relations job in dealing with a wide range of actual and potential critics or supporters of the policies and practices of the organisation he represents and in improving public understanding of forestry and recognition of its professional opportunities and responsibilities."

George A. Garrett in his article "Education for a Profession" (1959) continues :—

"Better than average command of English, knowledge of human behaviour, and appreciation of the arts will all combine to improve the foresters' standing in the eyes of the general public. The opportunities for the forester of the future to lose himself in woods or in the laboratory will become fewer. Most foresters will be judged by the public for whom they work or with whom they come in contact, more on their possession of abilities and skills than are, or should be, common to all people of broad educational background, than on demonstration of professional efficiency".

After five years I now feel more strongly than ever that communication has an essential part in our profession. Indeed it is interesting to note that the Agricultural Science Association of Ireland recently held a two day symposium on this subject. We can use the knowledge from courses in communication in the preparation of technical material and leaflets which will eventually be read by farmers, youngsters and the public in general. At present most of this literature could do with an objective inspection, and we could ask ourselves quite often is this information written especially for the person who is going to read it. Also we could brighten up our literature and give it more reader appeal. What could be more forbidding than many of our advice pamphlets for farmers and the public.

A facet of American education which I feel bound to refer to is their attempts to develop the thinking and reasoning processes of students. I will therefore call this section of my paper :—

The Reasoning Mind

I was extremely interested in the ultimate goal of education at the particular university I went to and I believe that this university was not unique in this field. Dean W. F. McCulloch made the following statement :—

"The scientific method is an integral part of general education and, should be an integral part of forestry instruction. To attain the goal of scientific forest management, the forestry school should hold to a sound basic education, developing a minimum of specialised techniques, and a maximum of ability to think scientifically. Development of the ability to think is so difficult that it absorbs college time which might otherwise be spent on more techniques but this is not necessarily a loss to forestry. The reasoning mind is effective in all fields, techniques to a limited few".

It would appear to me, having been exposed to the American system of education and research after a period of indoctrination under the traditional "Old World" system, that the American tendency is to develop a most inquisitive nature—to question everything at all times—the European will very often accept more things as being fact and will not question them. With the American it is different. Dean McCulloch tells of the forester from a "distant land"—somewhere in Europe—quoting an alleged authority, while visiting the Pacific north-west, to the effect that hemlock seedlings would not germinate on duff. It was pointed out to him that he was at that very moment standing on duff literally carpeted with hemlock seedlings. The visitor was not taken aback. He said, "If that's duff, then those are not hemlock seedlings, because hemlock will not germinate on duff".

How is the development of a questioning mind achieved in the United States Forestry Schools?—to quote McCulloch:—

"It is possible in college to develop scientific precision by rigid adherence to the highest professional standards in all that the school does. It is possible for the instructor to develop a questioning mind in the student through the example of his own questioning mind. It is possible to develop critical appreciations through persistent use of problems requiring accurate analysis. It is possible to develop this mental alertness and active imagination through sympathetic and inspiring teaching. Any school can do this, and all should".

The underlying reason for this persistent inquisitiveness and reasoning ability is the type of university education system that one finds in the United States. There they have a doctrine of student participation with a pattern of prescribed readings, quizzes and assignments.

The "Old World" student in essence finds himself back at school and does his homework nightly and obediently. Class participation soon sorts out the laggards, and in American Universities they are not tolerated. There are too many applicants, particularly in graduate school, to waste time.

In our traditional system, textbooks contain the complete course and indeed, the so called lecture notes given by many lecturers are indeed précis of the textbooks. It is possible for a British or Irish student to pass his examination having read, say, only two textbooks. On the other hand, I feel, that the American system is more ideal,

textbooks are certainly used but also are technical journals and research papers, to a very large extent. In order that the amount of reading may be reduced as far as possible, prescribed reference to specific pages and even to paragraphs in these books are often quoted. This exposes the American student not only to the views of one or two experts but to the views of many people. This, in itself, develops the mind since it lets the student see that one man's view is not the be all and the end all of that particular subject.

The Place of the Graduate

There has been for the last number of years, and there is now, a tremendous stimulus towards graduate study in the United States. Graduate study is now being stressed to such an extent in forestry education that many men upon receiving Bachelors degrees decide to continue their studies for an additional year or more. With the enrolling of students in, or heading towards, forestry at an all time high, it is easy to conclude that the best equipped men will ordinarily have first call on the better positions. Competition is bound to become so keen as to stimulate interest in graduate studies. This then is the situation in the United States. It is a great pity that it is not similar in this country. George S. Allen in the Forest Conservation series of lectures given at the University of British Columbia entitled "Facts, Fiction and Forestry" stated:—

"The most effective contributions in silviculture are likely to be made by a man who has had advanced training in ecology and soils as well as a broad forestry background and experience".

How does one get this advanced training?—in this country only by either an Honours degree or a post-graduate degree. But what incentive have we?—we certainly do not get paid according to qualifications, and, let us face facts, it is doubtful if there is any promotion reward for qualification either. I feel that it is time that an incentive was created—one could say here—'wake up, it is later than you think!' It is too late to look around for the men with the increased knowledge when the problem has arrived and must be set upon immediately. Having exclaimed dissatisfaction with our own country, let us look again to the United States. How does that country look upon graduate study, and what does it really constitute?

For an answer let us again turn to "Forestry Education Today and Tomorrow"—The characteristic of graduate study is:—

"that it throws the student largely on his own resources, with the opportunity to develop initiative, scholarship and sound judgement under the guidance of a graduate faculty. It may be primarily professional or scientific in character. If the former, its object is to strengthen the student's ability as a land manager, administrator or executive in a forestry enterprise; if the latter, to strengthen his ability as an investigator or teacher.

"Graduate study, that is essentially scientific in character, usually requires a minimum of three years beyond Bachelor degree, in order to qualify for the degree of Doctor of Philosophy often, as an intermediate step, a science orientated student will earn the Master of Science degree which provides a foundation for doctoral work and also the background for teaching and research. On the other hand, graduate study that is essentially professional in character is limited to a single year beyond the first professional degree and leads to the Master of Forestry degree. The forest practitioner who wishes to round out his education in some particular branch of the profession usually finds that additional work at the graduate level is worthwhile."

I have already intimated just how worth while it is in our country. I have also said that we should wake up. We need hardly be unique in feeling that we can forever dispense with professionals beyond the primary degree standard.

This is an aspect of American education which I feel could be copied to our advantage. In America as in this country, the forester often finds his duties increasing in the administrative sphere. He finds himself dealing with fields outside his formal education, fields in which he cannot hope to become technically competent. The Americans realise that here is a challenge and a necessity for post-graduate education via short courses, seminars, institutes, conferences and other forms of intensive specialised instruction. An example of the subjects that are dealt with at such courses are: new developments in forest practice and research, taxation, legal problems, business administration, fundamentals of supervision, labour relations, effective speaking and report writing.

Such courses are popular in the United States and the profession there owes some of its extremely high standard to them.

So much, therefore for "academic education". I must pass on, but before I do, let me leave another quote with you — that of a Yale colleague of the famous George Garratt

"The coming generation of foresters more than ever must be educated for profession rather than trained for a vocation. The rapid pace with which our civilisation is developing may well tend to leave foresters behind if we continue to emphasise technical training based on our past experience and concepts".

We have now looked briefly at American forestry education, both undergraduate and graduate. What have we seen? Basically much the same practitioner education as our own but more orientated towards Science. The end product, I feel, gives a sounder ecological basis for land use and forest management coupled with a background of economics. We have, by virtue of their training, men better equipped to be administrators. The end product demonstrates the value of an argumentative and open minded student life achieved by contact with a research trained faculty. Admittedly in Britain and Ireland, this fresh academic air has started to blow and

the days of the practitioner trained "status quoists" are rapidly receding.

THE PUBLIC — EDUCATION OF

So much, therefore, for the education of the forester. However, an even greater field now presents itself, that is, the forestry education of the public. In commencing this section of my paper, may I be forgiven for again quoting, this time from M. N. Taylor in his paper "Trees and People" (1954).

"From the time a girl called Eve reached up and plucked an apple from a tree, the impact of trees upon people and of people upon trees has influenced the destiny of mankind. In the Garden of Eden public relations between trees and people stood at an all time low".

To-day the United States public relations has reached an all time high. This is the method of selling forestry, forest conservation and all the different facets of forestry to the public and of developing an awareness in the public of their responsibility towards their country. But high and all as public relations may be there is no time for complacency.

Gregg (1959) states :—

"We are just beginning to understand a few of the basic facts of public relations as they affect the problem of fire prevention, but we have not been deeply interested in the broad problem of human relations and their effect on a business enterprise".

This surely could apply equally well to our own country.

With this introduction, I want now to briefly look at public relations in forestry in the United States dealing with each particular branch and facet of it in turn.

Many different bodies are implicated in this "big sell", perhaps the largest of them the Federal Government and the various States who together provide assistance to the owners of small woodlands. This branch of public relations comes under the heading of extension forestry and it provides educational assistance to owners of farms in establishing, renewing, protecting and managing woodlots, shelter belts, wind breaks and other valuable forest growth, also in harvesting, utilising and marketing the products thereof. This public education programme is basically similar to our own. However, since it is entrusted to extension officers with no other duty, a closer contact with the individual is maintained and better results achieved. Admittedly, woodland owners are more tree conscious in the United States but one cannot help feeling, that, if not a separate service, then at least separate officers are required in this country. Forest Officers have not, normally, the time required to do the job as thoroughly as it should be done.

Although it is not directly an educational programme as such, I feel that the great *American Tree Farm System* is worthy of mention here, due to its insistence on a forward attitude towards forestry by demanding that woodlands are managed in accordance with the best forestry practice. This is a nationwide programme designed to encourage the practice of good forestry by giving public recognition to land owners who are properly managing their woodlands. The programme has, to-day, thousands of members, from bankers, doctors and factory workers to farmers and lumber companies. The minimum area required is three acres and there is no maximum. The programme is dedicated to continuing growth of forest crops for man's use. For small areas, advice and assistance comes directly from State or Federal sources, but advice usually to larger owners is available from Forest Industries. Certified tree farm owners receive certificates to state that their properties are being protected and managed under conscientiously applied forest practices for the continuous production of commercial forest crops. They also receive distinctive signs for erection on their property for public information.

This programme was started in 1941 by progressive forestry industry leaders who recognised that more of America's woodlands needed to be put to work growing continuous timber crops to meet the nation's increasing demand for forest products.

Here then is "a thought for to-day" — that forestry be made to appear more of a business adventure to the private owner. What better way of getting industry interested in the growers. We hear, every day, of our forest products industries screaming for raw material. What guarantee have they that in 20 years they are still not screaming? What better way to turn the scream into a groan of pleasure than to contract with private land owners to grow their raw material for them. The American Tree Farm System in this event would at least be a basis to start thinking about.

The next organisation worthy of note is that of 4H — a youths organisation, very similar to the Young Farmers' Clubs and Macra na Tuaithe, the members of which work out for themselves principles and theories they have been taught (usually by the extension forester). The project method is thought to give a better understanding of subject matter and it develops a plan of reasoning. The youths obviously then work these improvements on their parents.

The United States Forest Service

The main contribution, apart from extension forestry, of this great service is in teacher training. This is much like our own methods, and training is both "In-" and "Pre-service". The teaching is again conservation. The Forest Service provides simplified textbook material and supplementary teaching aids both written and audio-visual. Talks are given and nature trails are set up. There

is not much we can learn from this section of Public Relations except that it behoves us to take a special look at the type of literature they prefer. Obviously this branch of education will eventually react on the children, therefore, the literature must have that child appeal. An example of this is the Smokey Bear — "Story of the Forest". This type of literature appeals at first glance to a child and the Forest Service set out to get through to the children and through them work on the elder section of the population. There is no doubt that they certainly achieve their object.

Another section of the American community — the American Junior Red Cross, is of passing interest only, but its objectives are interesting. It is organised by the schools because forest fire disasters have been among the worst in which the Red Cross have been involved — the organisation via its Junior group co-operates in teaching, not only principles of forest fire prevention in schools, but extends its interest also to all aspects of forest conservation.

Time does not permit mention of more than a few of the numerous organisations dedicated to advancing better use of American forests, *e.g.* the thirty thousand member American Forestry Association which is a citizens' organisation founded in 1875, the Charles Lathrop Pack Forestry Foundation and the American Tree Association.

The American Girl Scouts and Boy Scouts like our own Baden Powell Scouts confer badges for efforts that include a knowledge of tree species and the uses of different species. It also teaches planting and protection. These organisations and the American system are very similar to our own. The moral here is the way the project is fostered by the Forest Service in that it is not just another drudgery but a work recognised as very important by every manjack and lumberjack.

The next section that I wish to deal with at length is the American products Industries. These industries encourage several programmes principally the great "Keep America Green" programme. This is popular education in forest fire prevention. Many states organise their own "Keep Green" programmes. The first "Keep Green" programme commenced in Washington in 1940 and after that came Oregon, Minnesota and Idaho with their own "Keep Green" programmes. These organisations published their "Keep Green" pleas via posters, decals, table mats, place cards, ashtrays, newspapers, TV, radio and even car licence plates.

While the big "Keep Green" movement is for everyone, the main appeal has again been to the youngsters. Oregon has, for instance, its Green Guard for boys and girls between 8 and 16. The purpose of this organisation is again to remind people via the children of the dangers of fires, not only fires to forest and range, but also to property.

The great American public appeal is, however, for forest fire protection and this section cannot be let pass without mention of America's number one gimmick, that of Smokey Bear. I have previously written at length (Dallas, 1961) describing how this programme started and also Smokey's story and history. This programme is of note, not so much because of the actual physical nature of the gimmick, but of what and how it works. It aims at the children and possibly many adults via their personal feelings for wild life.

The moral of this story is not, however, that we should immediately jump for an animal gimmick such as Smokey or his old Canadian rival Benny Beaver or his new partner "Howdy", the 'Good Outdoor Manners' Raccoon. We should first of all logically consider what appeal wild life has got in this country. We must develop and sell conservation and then, for instance, work upon the farmer's children telling them of the effect heather burning has on baby grouse. Also, the more we develop our sporting facilities, such as our moorlands and our mountains and lakes and open our forests to the public, the more we will get through to the outdoor folk — and, after all, they are the people that matter. In them we will have a fine nucleus to form any gimmick pressure group. An interesting fact is that the Smokey campaign is financed from Federal funds, State funds and, note well, the American Lumber and Products industry alone contributes fourteen million dollars annually.

On our side of the fence we must remember that if our forests are worth saving then a proper fire publicity programme must have its cost. The Ministry of Agriculture in Northern Ireland have gone a long way to make the public there fire conscious, but they are only part of the way. Their campaign must not be allowed to stagnate, it must be kept dynamic and up with the times to guarantee full success. Our friends in the Republic, have however, to think pretty well from the beginning — but it is hoped in doing so that an even better end result will be achieved. It is hoped also that when they do make an effective move and, say, consider adopting a symbol such as the United States, that we all recognise the fact that trees are equally green on both sides of the border, and that there is a tie-up between campaigns.

It may be of interest here that the Governments of Mexico and Canada have negotiated to obtain legal rights to use Smokey as their forest fire prevention symbol. It may be equally interesting to know that the Forest Service and the Forest Products Industries do not conduct the campaign on their own, but use an advertising agency. Growing and protecting trees, they say, is a foresters' job — selling to the public, a job for the professional advertiser.

Forestry and the Irish Public in general

We have now seen in outline at any rate, a few of the great

publicity campaigns of the United States — aimed at preserving a most valuable natural resource. My plea at this stage is that, while we are doing a considerable amount, and spending a considerable sum on it, we must do more. As our forest area increases, so must also our campaign to make the Irish people aware of the fact that timber is a crop — a raw material for forest products industries that are an essential part of the country's economy.

However, I find it hard to believe that we should be the sole subscribers to such a campaign. The millers, the defibretors, the pulpers and also the private grower, whose bread and butter timber is, could usefully contribute individually or via their professional or trade bodies. Who knows that the appeal might not be better coming partially from such a source. The job is so big that a combined effort of public and private authorities is required.

May I be forgiven if I quote again George A. Garrett:—

"Foresters in the future will have to lean more and more heavily on their ability to think and improvise and invent. They will find that their understanding of trees is no more important than their understanding of people. It is already evident that some of the major problems facing our profession will be in the realms of public relations and politics. In our choice of men to succeed us, these factors must receive important attention.

The above is addressed to the American Forestry profession but it could be meant for any forest service.

CONCLUSION

We have now looked briefly at some concepts of American Forestry education and if we have learned nothing else, I hope that one thing sticks — that a forest is not just trees. A considerable amount of this paper has been quotation, therefore it would not be out of place to finish with a few words from Bramble (1960). He states, when bearing in mind that scientific forestry commenced in the United States with the coming of men like Pinchot and Graves, that

"The effect of European traditions on forestry was good. No nation stands alone in scientific and professional advances and only a foolish man fails to use the knowledge gained by others as a springboard for newer and better advances, using his own talents".

Let us therefore, then, reverse the original trend and change our outlook and our basic philosophy of forestry, just a little, so that it may be said "The effect of American tradition on our forestry was good".

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