

HIGHER EDUCATION FOR PRODUCTION FORESTRY

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I have assumed that the Forestry course will be a four-year one, and that it will be divided into the options, production forestry, protection forestry and high-country management, and wood utilization. The fourth important section, that of forest research, I have assumed would require advanced degrees of these options and other degrees not covered in the Forestry Faculty.

I have been asked to deal with the production forestry option, but I wish to make it clear that I consider all options must be very closely interlocked, and are complementary, and that for this country each is vitally important.

Production forestry can be defined as the growing of wood as a raw material for consumption in some form of utilization plant. I would stress the point that protection forestry can do this, but that this is not its primary function.

In production forestry, the forester is required to grow the wood and market it at a profit, and to justify all operations as sound economic propositions. He must be able to control the whole operation from the seed to the selling point. He must be trained so that he can do this and not have to allow accountants and others to step in and take charge of the all-powerful money side of the industry.

The production forestry option for the forestry degree must have training for this role as its main objective. However, it must be remembered that forestry as a discipline provides good training in the basic scientific approach and as such would be a useful start for many professions.

It is worth noting how forestry graduates are employed in industry in New Zealand today. At N.Z. Forest Products, Ltd., there are 15 graduate foresters—or about one for every 16,000 acres. This is in no sense a normal figure; in production forestry many other positions could be filled by forestry graduates and several of the positions now occupied by foresters would be open to non-foresters.

Of the 15, seven are engaged in senior administrative and supervisory positions in which technical background plays an essential but minor role. Another seven are engaged in investigational work and of these only three are directly engaged on conventional aspects of forestry. The remaining one is a full-time student for a B.Com. degree and he, I believe, is particularly germane to our discussion today.

Students qualifying in the new school can expect to return time and again to their studies as their careers develop. The university is not required to turn out a graduate mentally equipped for a lifetime, but with a sound grasp of fundamentals and the ability to commence a career. It is interesting to note that early advanced training is of a specialist nature and that later training is aimed specifically at converting specialists into generalists.

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It will be noticed that graduates are not at present employed in operational or territorial positions. It is considered important that the type of graduate coming forward should be suitable for employment in this way, should the management consider it desirable, or the graduate himself prefer this kind of position.

When the functions which the graduate forester will perform in production forestry are considered, the requirements of his training divide into four parts:

- (1) The investigation of production opportunities.
- (2) The fundamentals of production opportunities in forestry.
- (3) The formulation of policy.
- (4) Administration.

(1) Training in investigation is the distinguishing characteristic of university education and it is in the expectation that graduates will have been thoroughly trained in this respect that they are sought for employment in production forestry. From the technical point of view, training in investigation is least subject to obsolescence. High priority is therefore attached to developing in students an ability to gather information, to analyse it and finally to make the best decisions from the data available.

Tools for the investigation, evaluation and appreciation of production opportunities in forestry which are presently employed and of which the student should gain a thorough understanding include:

- (a) Statistical methods.
- (b) Experimental design.
- (c) Selection, definition, collection and processing of data.
- (d) Computer programming.
- (e) Library research.
- (f) Work study.
- (g) Analysis of capital projects.
- (h) Cost analysis.
- (i) Mathematical techniques of operations research.
- (j) Logic.

These subjects are of such importance that the requirements for a degree in forestry should permit the student to concentrate on them at the expense of any other aspect of the course.

(2) Being equipped with the tools of investigation, the student should next acquire an understanding of production opportunities in forestry. The distinguishing characteristic of production forestry is concentration on the provision of material services to the consumer. All the factors which enter into this are of equal importance

and the student should be familiarized with the entire process. Topics include:

- (a) Fundamentals of forestry—dendrology, forest soils, ecology, climatology and meteorology.
 - (b) Foundations of silviculture—choice of species; establishment technique, thinning, pruning, genetics; site amelioration, regeneration.
 - (c) Forest management—survey, inventory, growth patterns; regulation and design.
 - (d) Forest engineering—roading, harvesting methods, transportation.
 - (e) Forest protection.
 - (f) Timber technology—wood properties, conversion processes.
 - (g) Forest products, markets and marketing.
 - (h) Economics, business theory and finance.
- (3) Possessing an understanding of the role and methods of production forestry and being equipped with the tools for investigating production opportunities, the student must next develop an ability to contribute to the formulation of policy. In this the most important factor is an ability to communicate. Time must be found to train the student in communication both formally and as an aspect of all his other work.
- (4) Having the ability to formulate a production policy the student finally requires training in the ability to administer. Topics include:
- (a) Principles of management—authority and responsibility, span of control, organization.
 - (b) Programming, scheduling and control.
 - (c) Budgeting, costing and accounting.
 - (d) Supervision.
 - (e) Employment.
 - (f) Public relations.
 - (g) Reports.

In a four-year degree course, the student will not immediately embark upon his specialist studies but will first receive a sound grounding in basic subjects. Among these subjects are botany, chemistry and physics; but I think it is becoming increasingly clear that the most important basic subject is mathematics, especially the newer mathematics and courses which include set theory. As a subject for teaching good basic reasoning it has no equal and is in many ways essential to an appreciation of the problems with which the professional forester will have to cope.

It seems to be important that the student should retain the option of transfer to a different degree to a late stage in his university career. To his end, the units taken for the first two years at least should be drawn from those acceptable for such degrees as B.Sc., B.A., B.E., or B.Com. A similar late choice should also be available for the option to be taken for the forestry degree.

The units should emphasize the need for a good training in basic subjects and be aimed to correct a weakness in the present attitude to forestry. This is that forestry is a "natural science" subject and, if you are weak at mathematics, chemistry or physics, then you take forestry and avoid these subjects. All forestry requires a good foundation of at least one of these three subjects and were it not for the need for some botany, I would strongly recommend the Engineering Intermediate examination as the entrance requirement. This, however, requires passing mathematics, applied mathematics, chemistry and physics to Stage I level in the first year. This I feel would be an insurmountable hurdle to some potentially good foresters, whereas the units set out above allow sufficient flexibility and would set a good general standard for entry.

Another point that I feel is important is to give the student a sense of belonging at an early stage. To this end, some units with a forestry slant should be available in the second year.

Of major importance to the forestry degree is the practical field work done under the guidance of university staff. The balance of developed technical skill, alongside developed mental capacity, is one of the hallmarks of a good professional forester. Theoretical work must all tie into the actual conditions that exist in the field and one of the important qualifications of a forester is that he be able to make measurements and observations, accurately record them in a legible manner, and enter the data and his signature on the record. His basic data must above all be reliable.

Field exercises are necessary to demonstrate the application of principles developed in the course and in the practice of techniques that have been taught. Some short field trips can be arranged during the terms and short-term vacations, but the long vacation between the third and fourth years should include 12 weeks of prescribed field work.

In addition, the university should assist in obtaining suitable vacation work for students to widen still further their practical experience. It should be possible to arrange for large employers of labour to take a certain number of students for vacation work on a regular basis.

Finally, I would like to mention the graduate student. The needs of production forestry would, I believe, be best met by the taking of masters degrees across the various disciplines. The B.Com., B.Sc., or B.E. graduate should be able to take the masters degree in forestry or on a forestry topic and similarly the forestry graduate should be able to choose a topic in commerce, science or engineering.

Foresters must be trained so that they can control all aspects of the industry and so that they can also take the forestry outlook — I believe this to be of great value — into other industries.

The trained forester must have the confidence and ability to hold his own in any company.

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