

lists over 100 French entries under **coupe** for a range of silvicultural cuts, with many of these including the word **coupe** in the English equivalent. The *British Commonwealth Forest Terminology* of 1953 defines the term **coupe** as a felling area.

In examples of forestry literature on silviculture (e.g. Troup, 1955, *Silvicultural Systems*), forest management (e.g. Brasnett, 1953, *Planned Management of Forests*), forestry handbooks (e.g. James, 1955, *The Forester's Companion*) and

published papers (e.g. Brit. Comm. Forestry Conf., Canada, 1952, *Organization of sustained yield in previously unmanaged forest*) the word **coupe** is used frequently as an English language technical term.

Among librarians it appears common knowledge that the Oxford Dictionary can be unreliable when used for technical definitions, whereas Webster's Dictionary generally provides more accurate descriptions of technical words. In Webster's

under **coupe** we find definition 4: "cutover", which is elsewhere described as land on which timber has been removed. The Forests Amendment Act 1993 uses **coupe** and describes "beech **coupe** size". It uses the word correctly as a technical term. If it is good enough for bureaucracy, it should be good enough for the profession.

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CONFERENCE PAPERS



Alternative approaches to Forestry, and Education for alternative approaches to Forestry

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Abstract

'Conventional' forestry in New Zealand in 1996 is intensive management and utilisation of radiata pine plantations while excluding logging from most of the indigenous forest. This is decidedly 'alternative' compared to 'conventional' global practice which is harvesting timber from native forests, with little understanding of plantations. International opinion, indicators of sustainability and certification processes are directed towards sustainable management of native forests. Even though 'conventional' forestry in New Zealand is arguably the best model of environmental responsibility, it could become misunderstood in a global market that may move towards penalising wood from clear-cutting of exotic monocultures. The demise of the possum-skin industry in New Zealand bears striking similarities.

Radiata pine grows fast, has wide site tolerance and is silviculturally forgiving. The reasons for having 90% of the estate in this species are compelling. Nevertheless, there are good reasons to increase the amount of alternative species in the estate. Radiata grows and processes well, but it is not a good-quality timber and requires considerable re-engineering

and modification to meet many end uses. Also, despite attempts to downplay the argument, there is a risk of biotic or abiotic catastrophe in having nearly all the estate in radiata pine.

A university education in forestry should not focus narrowly on conventional forestry but should be all about alternative approaches to forestry. Such an education should encourage a student to think, to be creative and to develop planning skills. It should be presented in an historical perspective and in a global context. It should encourage an open and questioning mind. 'Excellence in education' is preferable to 'standards in training', and attempts to confine a university education in forestry to training technicians to meet industry prescriptions of the day should be resisted.

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Introduction

The theme, *alternative approaches to forestry*, suggests that there must be a mainstream feeling for what is 'conventional' forestry in New Zealand and that this is the benchmark against which alternative approaches should be evaluated. The situation, though, is considerably complicated by the fact that 'conventional' forestry in New Zealand in 1996 is decidedly 'alternative' globally, and that

some of the 'alternative' forestry options for New Zealand in 1996 are closer approximations to global norms. New Zealand needs to understand the range of global practices and philosophies of forest management if it is to remain to be an effective exporter.

In contrasting alternative approaches to forestry in New Zealand I shall define 'conventional' forestry in New Zealand as the growing and processing of plantations of radiata pine, often high pruned and widely spaced, and managed primarily to derive export income mainly as commodities but increasingly as value-added products. The corollary to this is that the majority of indigenous forests are 'protected' and unavailable for timber production. Plantation establishment on farms and by small investment syndicates can hardly be considered to be an alternative approach. Recently, small growers have collectively planted more area than the major corporates combined and as such farm forestry is mainstream rather than alternative. Nevertheless, the implications of the rapid expansion of farm forestry need to be addressed, and particularly how forestry education should respond to this. There are a range of alternative approaches that are covered in this conference. Besides farm forestry, there is sustainable management of indigenous forests for values including timber production, the use of species other than radiata pine, and the use of alternatives to wood.

I shall leave these to the specialists, although I will discuss the use of alterna-

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tive species to some extent. However, the theme does present a golden opportunity to discuss how alternative forms of forestry are related to forestry education in this country. This is sufficiently important to incorporate in the title.

New Zealand and the world

New Zealand has 0.02% of the global forest area and yet produces 0.8% of the world's industrial roundwood. This is achieved while excluding logging from over 85% of its indigenous forest area. Surely this must be regarded as one of the very best models available for sustainable management and maintenance of biodiversity. Only a relatively small group of countries have a concerted replacement rather than supplement policy, i.e. of replacing rather than supplementing logging from native temperate forests with plantations. To some extent Chile and South Africa have such policies, but it is only in New Zealand that this has been taken to its extreme where the indigenous resource is largely excluded from logging and where the country enjoys a major export industry based almost exclusively on plantations.

However, this 'conventional' forestry in New Zealand is 'alternative' by world standards. Globally, almost all timber harvesting is from native forests, and much of this still from old-growth forests. Plantations are still seen by forecasters to be a very small part of future global supply (Nilsson, 1996). Plantations occupy less than 3% of the global forest area, and many of the plantations have not delivered the high levels of productivity that were predicted and there have been some spectacular failures (Nielsen 1995). There is not a global awareness of plantations.

While the New Zealand situation may be 'extremely good', it is still 'extreme'. The situation is the envy of nations who understand it but, unless understood, it can work to our disadvantage (Wijewardana 1996). International conventions are, and international indicators of sustainability will be largely based on sustainable management of native forests. The role of plantations in this process is not clear. For example, the World Bank (1995) applauded the increase in forest cover achieved in the old USSR but contrasted this with the decrease in forest cover caused in part by establishment of plantations. Plantation establishment is still seen by many in the global community as removing native forest and thereby reducing biodiversity. It would be strange indeed if NZ pine was caught in an international certification process which classified it as a timber harvested by clearfelling forests with little concern for biodiversity or forest values other than

timber production. New Zealand must clearly be part of the international dialogue, one clear reason being to adequately explain its unique position (Wijewardana 1996).

Indeed the whole concept of developing international indicators of sustainable forest management is a little bizarre. At one extreme, the state of global knowledge about forests is abysmal. We do not even have accurate figures on how much forest there is yet, let alone details on structure, composition and ecosystem dynamics. Global forecasts of demand sometimes seem to be despairing guesses. Proponents of an insatiable demand for timber would do well to note that FAO has downsized its forecast of global consumption of sawnwood in 2010 from $745 \times 10^9 \text{ m}^3$ in 1993 (FAO 1993) to $629 \times 10^9 \text{ m}^3$ in 1995 (FAO 1995) (my thanks to Alf Leslie for bringing this to my attention). At the other extreme, the possibility of finding meaningful indicators of sustainability at even the national level is daunting. Taking soil quality for example, it is very difficult to find robust indicators of soil quality that can be applied between regions, or even on the other side of the hill. Ecosystems vary in structure and dynamics. Clearfelling in small coupes can be logically argued to be the closest mimic to nature in maintenance of ecosystem stability for some sub-climax forests, for example ash-type eucalypts in south-east Australia, and yet it is hard to see how this would be accommodated in an international statement on sustainable management.

New Zealand is a small player and a price taker in a global commodity market and is especially vulnerable to global attitudes to forest management. The very uncertainty of the future would suggest that attention should be given to evaluating alternative approaches to forestry. The risk is that world demand for our non-native plantation timber could go the same way as world demand for New Zealand possum skins. The analogy is clear.

Alternative species

The choice of radiata pine as the dominant species in New Zealand has proven to be a good one. Some concern has been expressed over the years on the risk of having almost all of the plantation estate in one species but the consensus appears to be that the risk has been overstated (Bain 1981, Chou 1981, Sweet and Burdon 1983). Cox (1995) considered that the spread of risk in growing a versatile and multiple-use species like radiata pine was no greater than for a mix of species. Perley (1993) summarises the dilemma as "doing nothing involves risk, but taking a new initiative may involve greater risk".

Playing a devil's advocate role, I think there are reasons why consideration should be given to increasing the amount and variety of alternative species. These reasons are not so much related to monocultures but rather to the nature of radiata pine itself. Two factors that should be further considered are: (i) the quality of radiata pine and (ii) the risk of catastrophe.

(i) The quality of radiata pine: Radiata pine is a good tree to grow. It grows fast, it is not site specific and it is silviculturally forgiving. These are the predominant reasons why the diversity of species in plantations in the 1950s has been steadily eliminated in favour of radiata pine as the predominant species (90% of planted area in 1995). The planting of essentially one species has allowed focused management of growing and processing with excellent R&D support. Radiata pine is also an easy tree to process. It saws, glues, nails and screws well; it readily absorbs preservatives; and it is amenable to reprocessing and re-engineering. It is satisfactory for panels and paper.

However, despite attempts to beat up its image, the wood is very ordinary in use. Radiata pine is not a high-quality timber. It is weak, soft, variable and bland. It has a high proportion of juvenile wood, it readily blue-stains and has difficulty remaining straight. It may be true that re-engineering and the use of coating and hardening technologies can change a somewhat inferior material into a superior one, but all this comes at a cost and at the end of the day the consumer may well prefer something that is natural as well as superior. There are two options to provide the range of wood products required by the consumer. One is to have a range of species with different properties. The other is to have one species and to re-engineer and modify it to produce the range of products required. New Zealand has little option at present other than to choose the latter. However, the continued viability of this option depends on environmentally acceptable re-engineering and processing technologies and on the maintenance of health and vitality of radiata pine as a species. It is inevitable that the current use of chemicals in preservation (e.g. arsenic), re-engineering, panel manufacture (e.g. urea formaldehyde) and plantation silviculture (herbicides, insecticides and fertilisers) will come under much greater scrutiny in the near future, and such scrutiny may or may not be based on scientific justification of their safety or their environmental suitability.

(ii) Risk of catastrophe: Like wood quality, this argument has been largely brushed aside. Perhaps it is true that care-

ful quarantine and management can reduce the risk associated with disease or insect attack to acceptable levels. Perhaps it is true that tree-breeding programmes will maintain sufficient genetic diversity to guard against catastrophe. After all, our main foods are from monocultures which are very narrowly bred and in comparison to which plantation radiata pine is still like a wild population. However, this is not a strictly fair comparison. Food plants are usually annuals and they do occasionally fail. The loss of a year's crop is very unfortunate but usually not a catastrophe. On the other hand the loss of a plantation of trees towards the end of its rotation is somewhat more serious. There are several examples this century of a tree species being all wiped out by catastrophic disease (e.g. Dutch elm disease, Chestnut blight).

Why does radiata pine do so well in the southern hemisphere but is almost a relict species in its natural habitat where it has all but been pushed into the sea by more successful species? The inference is that radiata pine is not a good survivor in the long term, and any country that has over 90% of its plantation estate in radiata pine would do well to seriously consider the implications of this. I have not yet seen a completely satisfactory answer to the question. One reason for the cause of the restricted natural distribution of radiata pine could be climate change. Its present natural distribution is limited by cold and drought. Climate change is a serious issue in our present day and research is being undertaken into the likely impact of predicted climate change on the future of radiata pine in this country.

Another reason why a species can become severely restricted in distribution or indeed become extinct is because of failure to survive an extreme event, either biotic or abiotic. One factor that has not been seriously considered is temperature. There is much more ocean in the southern than in the northern hemisphere, and consequently the land in the southern hemisphere has a more maritime climate. Because of this, the countries in the southern hemisphere do not experience extreme cold events at the same frequency as that experienced in similar latitudes in the northern hemisphere. I remember being told about a plot of 20+ year-old radiata pine in Oregon in which every tree died after a string of 11 consecutive days when the maximum temperature was below zero degrees Celsius. Adjacent Douglas-fir were unaffected. Radiata pine has been in New Zealand for less than 150 years, which is a short time in comparison to the frequency of such climatic extremes. Irrespective of whether temperature is a factor, for one reason or another radiata pine does not appear to be a particularly suc-

cessful long-term survivor.

The main reason why radiata pine has been chosen over other species is not just because it is a fast grower, but because it is consistently a fast grower over a wide range of sites and because it is a relatively easy tree to grow. Other species, and some that grow equally fast or faster, have been discarded because they did not perform consistently across sites or because they were silviculturally difficult for one reason or another. It does not necessarily follow that the wealth of experience gained with radiata pine can be easily transferred to alternative species. The very reason for the initial rejection of some of these species was because they did not behave like radiata pine and they were more difficult to grow. However, there have been considerable advances in understanding the nature of site specificity in many species and in the refinement of silviculture and what may have once been a problem species may no longer be so.

Nevertheless, having said all this, if I had money to invest in a plantation venture, I probably would still invest in radiata pine.

Education for alternative approaches to forestry

There is considerable debate in this country at the moment about standards in training, not only in forestry but over the whole educational spectrum. The very use of the words 'standards' and 'training' devalues the debate. The concern should be for 'excellence' in 'education' rather than 'standards' in 'training'. The former seeks the best we can get, the latter caters to the common denominator. The former is creative, the latter is static. The former develops the leaders of tomorrow, the latter develops the followers of today.

One view that I have heard from more than one source is that forestry in New Zealand has now reached the stage of sophistication that the science part of the forestry degree is no longer necessary. The argument is that just about all that needs to be known about growing radiata pine plantations has been determined over time by FRI, and now it has become so routine that it is trivial compared to the new challenges which are processing, logistics, marketing and business. This may well be an extreme point of view and unlikely to hold much credibility at this conference, but it is symptomatic of a more widely held point of view that the sole role of tertiary education in forestry is to provide technicians to support the forest industry of the day and that curricula should be determined by the industry to serve what industry perceives to be its immediate needs. The main problem with this point of view is that it encourages the

teaching of recipes or prescriptions. Sometimes our own recent graduates (a minority, I hope) ask why we teach forestry in an historical context and why we don't just teach them how to follow the latest procedures or packages. This is unfortunate.

The main objective of a university education is to broaden the mind rather than provide training for specific tasks. The education should encourage a student to think, to be creative and to develop planning skills. Certainly it is important to provide students with the basic knowledge required for their chosen profession, but this should be done in a way where everything is open to question and all points of view are explored. In other words, education in forestry is all about alternative approaches. Also, education should be presented in an historical perspective and in a global context. Forestry, more than most forms of human endeavour, has long time horizons and in order to predict the future it is necessary to have some understanding of the past. This is necessary to determine the rate and direction of change as well as to understand the degree of circularity in various arguments. New Zealand's current enviable position is not the product of current corporate structures, nor excellence in current management, but rather it has been inherited from decisions made in the past. The next generation of foresters will be in a better position to judge whether the forestry decisions of the 1990s have been wise.

There is a curious circularity in the debate on appropriate forest management in New Zealand. In the 70s, raising radiata pine in plantations was considered by some to be environmentally irresponsible. It was an evil exotic weed which destroyed the soil, desecrated the landscape and created a biological desert. At the same time there were calls to exclude logging in indigenous forests on the basis that it could not or would not be pursued in an ecologically sustainable manner. Fortunately, New Zealand was already in a position in the 80s where it could meet its domestic demand for timber and support an export industry based on its plantation resource, and the decision to reserve the bulk of indigenous forests as protection forest and to focus timber production in plantations was inevitable. Plantations were now seen to be the salvation of the indigenous forests and the protector of their biodiversity. Today the scene is set for renewed criticism of plantations (Rosoman 1994), while global directions are towards sustainable management of native forests and we are back where we started. One graphic example of how attitudes are changing and alternative approaches are being used was given by

B. Deckelmann in a recent seminar given at the School of Forestry. Germany has long been considered to be the originator of most of the ideas on which professional forest management is based. Norway spruce has been managed as monocultures in Bavaria for hundreds of years. Intense public pressure in Bavaria recently has resulted in the requirement that these forests be returned to their near-original condition as mixed conifer hardwood forests. It is called 'near-natural' forestry.

There will be renewed and vigorous debate in New Zealand on the sustainability of plantations. The fact that indigenous forests are largely free from logging because of plantations will become increasingly forgotten and disregarded in the debate. It will be no use arguing that plantation forestry is just like another form of agriculture. Agriculture is an environmental villain several orders of magnitude worse than forestry. It is amazing that agriculture has largely escaped the environmental scrutiny of the last two decades. Perhaps this is because it is more difficult to confront the person next door who puts food in your mouth than Government or a faceless private company. Every indication now is that the turn of agriculture has come.

How then does a forestry school rise to the challenge of providing professionals to service a dynamic forestry sector which is based mainly on growing, processing and marketing radiata pine, but at the same time to allow for alternative approaches to forestry?

(i) The basic degree is appropriately designated a Forest Science degree. Education in forestry is quite correctly based on science, and particularly the biological sciences. An understanding of basic ecosystem processes, of the underlying principles of silviculture and of the physical and chemical nature of wood is essential and not negotiable.

(ii) The degree should be generalist rather than specialist. The strength of forestry education worldwide is that it integrates management, ecology, economics, sociology and engineering as well as the basic sciences. In our degree about three-quarters of the course comprises compulsory subjects. There is some scope to specialise in the remaining quarter, but the best way to specialise is to take a second degree. Employers in the sector and students alike accept this. A consistent message from the sector has been that they require forestry professionals with more skills in business and marketing. We have responded to this by providing a conjoint degree with the Faculty of Commerce where a student can receive two degrees, one in Forestry Sci-

ence and the other in Commerce. The conjoint degrees take a total of five years, two years less than if the degrees were taken separately. This can be achieved because of shared common content and without sabotaging the Forestry Science degree in any way. It is also possible to get a Science degree as well as a Forest Science degree in five years by sharing common content. This allows a student to specialise in, for example, genetics, pathology or entomology.

(iii) The best environment for undergraduate education in Forestry is in a strong research environment where staff and postgraduate students are continually challenging current ideas, evaluating alternatives and breaking new ground.

(iv) Even though there is a dichotomy in New Zealand between production in plantations and conservation in indigenous forests, this does not mean that we should be producing different professionals for each interest group. Indeed a recent decision we have made is to discontinue providing two streams, a production stream and a conservation stream, and to replace this with a single course in which the whole spectrum of forest management from preservation through to intensive plantation management is covered. The logic behind this is that all interests are best served by having professionals who can see the whole picture, rather than encouraging polarisation and single-interest groups. Consequently we teach Conservation Management, Environmental Sociology, Ecology and Management of Indigenous Forests, Farm Forestry, Community Forestry, Tropical Silviculture, Fragmentation and Restoration Ecology, as well as those subjects which support plantation management. Our graduates are and will continue to be employed over the whole spectrum. Note that our students are being taught management of indigenous forests for a range of values including timber production.

(v) Small forest growers are now collectively the largest planter. Management philosophies and practices suitable for large forest estates are not necessarily the best for small holdings. Often best management of these will require a lower standard of technology with cheaper tools. Local knowledge about climate, permits and cultural considerations are required. Education needs to provide for this changing demand.

(vi) There is a shortage of skills in New Zealand in processing, particularly solid-wood processing. Clearly the tertiary sector has the responsibility to fill this

vacuum. The School of Forestry should not remove subjects from its curriculum in order to expand in this area. Rather it makes more sense that education in processing should be additional to rather than at the expense of the basic Forestry Science degree. In this sense the University of Canterbury is well positioned to move into this area. The School of Forestry at the University of Canterbury enjoys a good working relationship with the Faculty of Engineering. This is demonstrated by the development of the Bachelor of Engineering (Forestry) degree. This degree is the better vehicle to improve skills in the area of processing and plans are in progress to do this. The added advantage is that additional processing expertise in the Bachelor of Engineering (Forestry) degree will spill over into the Bachelor of Forest Science degree in the form of increased options for undergraduate and postgraduate papers and for joint research.

(vii) The argument has been put and accepted that education in plantation forestry traditionally has been bottom up. Forestry education has been primarily about growing trees in the expectation that the market would follow. Historically this was inevitable. We are now at the stage that this should be reversed and education should be top-down with the consumer determining the market which determines the product which determines what is grown and how. However, this can be taken to illogical extremes. Processors and marketers have been very quick to criticise the bottom-up approach of growers. This is to a large extent unfair. Processors and marketers have not yet reached the level of sophistication where they have a coherent idea of what they are about and where they are going, and they should be very pleased that there have been generations of growers before them that have been providing the resource in a very professional manner. It would be unwise to kill the goose that lays the golden egg. Often processors have no understanding of the inherent variability that is present in a biological material. Even in clonal material the variability within rings, between rings, with height, with growth rate, with site characteristics and with stand management is large. Wood is not like cement, sand or iron ore. You cannot turn it on and off at will at the factory gate, and you cannot guarantee consistency and uniformity. Industry requires its product now; growers face a rotation; and students require an education that lasts a lifetime. Industry can quickly retrain employees as demands change. But retraining is easier and more beneficial if they have been well educated in the first place.

(viii) The Forestry Science degree should continue to have a strong management focus. It is important that foresters continue to be educated to be doers rather than observers, monitors and criticsers.

Conclusion

Forestry education is all about alternative approaches to forestry. It should encourage an open mind, never blindly accepting and always questioning. We are not trying to produce cooks who can follow recipes but rather those with the flair and creativity to make the recipes.

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The New Zealand Forest Accord: A step backward in participatory forest management

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Abstract

This contribution to the debate on the New Zealand Institute of Forestry's need to sign the 1991 New Zealand Forest Accord reflects a long-held view that decisions related to forestry should be made with a clear understanding on a full range of functions any forest should serve and an equally full participatory deliberative process in the priorities, compromises and trade-offs that all such possible functions should be accorded in deciding what is best to be done in any one set of circumstances. The Forest Accord appears to exclude a large number of rightful stakeholders in the decision-making process and to focus operationally on only plantation forestry concerns, though the real issue is to enhance the quantity and quality nationally of all, including indigenous, forests.

The opinion offered here is that New Zealand should rather address the wider context of all kinds of forestry in New Zealand in line with the Resource Management Act, the UNCED Principles emanating from Rio and the Montreal Process, to which the New Zealand Government is a signatory. The Institute should reject an agreement which serves the interests of only some relevant groups,

which excludes relevant participatory deliberation on decisions about resources and which does not consider a holistic range of forest functions, all types of forest and the national as opposed to only the local picture. The preoccupation in New Zealand with primacy of single uses, strict zonation of resource classification and ecological precedence over social, economic and cultural well-being has hampered conservation in the past and is continuing to do so in terms of how some people interpret the Accord. Indications are given here of earlier attempts to encourage the study of New Zealand resource problems using real multiple-objective planning, and also of how recent technological developments have made use of these techniques much more readily applicable. Unless recognition is made of the need (i) to effect compromises and trade-offs; (ii) to make decision-making participatory and transparent; and (iii) to ensure that outcomes are accountable, the conservation of resources by owners of property rights and the funding of it by these owners and the taxpayer will never be properly achieved.

Introduction

This paper attempts to clarify the main reasons why the Institute should not support the 1991 New Zealand Forest Accord, which appears to serve interests

of only some relevant decision-makers and also a far too narrow forestry focus. The arguments developed in a contribution by Whyte & Daellenbach (1987) at the New Zealand Institute of Forestry AGM in Greymouth that year are further analysed in the light of subsequent New Zealand legislation, global initiatives on sustainability, New Zealand's international commitments, together with individual agreements such as the Forest Accord and the Institute's National Policy Statement on Forestry.

The 1987 contribution mentioned above was made because the main reason for disestablishing the New Zealand Forest Service and separating so-called commercial from so-called conservation interests arose from the long-held belief that a single organisation could not serve and administer multiple conflicting objectives. That viewpoint, which is totally rejected here for well-documented technical reasons, is being perpetuated by self-serving agreements like the Forest Accord in preference to the more holistic requirements of the Resource Management Act (1991 and its 1993 amendments) and global initiatives such as the Montreal Process, to which the New Zealand Government is a signatory.

In the 1980s there was an intensive campaign to "lock-up" the native forests of New Zealand and take State forest from

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