



## Guest Editorial

# High-country land use: What are the issues in 1994? What relevance has Forestry?

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The South Island high country is on the agenda of too many people for its own good. All sorts of land-use interest groups have made it their business: native conservationists, pastoralists and farmers, horticulturists, viticulturists, apiarists, recreationists, tourist entrepreneurs, recreation-seekers of different kinds from anglers to off-road vehicularists, water resource managers and users, wildlife managers, ecologists, foresters and forest scientists, and, finally, a spectrum of natural resource managers from neighbourhood landcare groups, district and regional councils, to national departments and ministries. We nearly all have some idea of what we each want, but can't all be satisfied, and are not generally disposed towards seeking agreement.

We nearly all present the high country as in some way special or different from the rest of New Zealand, not just in its land character but also in its land-use character. By exaggerating the difference and misrepresenting the character of the high country, we confuse the issues that affect it and reduce the likelihood of New Zealand as a whole, and the high country as part of it, mutually benefiting from our experience and understanding. With perhaps no other land-use issue will this mutual benefit, of the whole from the part and of the part from the whole, be more valuable than in forestry and its larger relations with resource management and conservation.

### The High Country is New Zealand?

More than two years ago, I was asked to write a chapter about mountain lands for a text on *Environmental Planning in New Zealand* (Memon and Perkins, eds, *Environmental Planning in New Zealand*, Dunmore Press, 1993). When I examined the proposed schedule of chapters I found that there was none designated for the

countryside as a whole. There were specific chapters planned on urban areas, water resources, indigenous forests, coasts, mineral and energy resources, transportation, recreation and tourism; but none on agriculture, pastoralism, horticulture, plantation forestry or nature conservation. I asked the editors if I could attempt "Rural and Mountain Land Use Planning" as a single chapter. I prescinded from the topics covered in other chapters and set about integrating rural land uses in an historical interpretation of our national geopolitics for 14 landscape provinces, embracing all main island New Zealand from mountain tops almost to the sea.

There were several reviewers who had appreciative things to say about the Memon and Perkin volume, including the 30 pages of my chapter. Sadly, as I hacked and whittled it down to that length, I realised that I had almost completely dissolved the essence of my own understanding of that relationship between high-country land use and the low land. The essence of my interpretation of the land-use history of high-country New Zealand is that it is an integral part of the land-use history of all New Zealand. Indeed 20 years ago I had proposed to UNESCO, and its National Commission in New Zealand, that to study land-use conditions in the Waitaki Basin as an integrated unit was a good outdoor laboratory exercise for the understanding of human impacts on nature in New Zealand, as part of the international Man and Biosphere Programme.

Admittedly, the pastoral high country is climatically offset from the low lands. Likewise, the pastoral history of the high country is diachronically offset from that of the low lands – a little later to begin, much longer persisting in pastoral dominance. But these offsets are not major, in comparison with differences between New Zealand and North America or Europe. It is these small but important offsets in space and time which make study of the high country valuable for our

understanding of New Zealand land-use issues.

### Ecologic History as a Framework for Sustainability

So, to the larger issues, in space and time. New Zealand ecological history is well summarised as: (1) a natural succession towards high forest, wherever climate allowed it; (2) destruction of forest, principally by fire, wherever climate allowed it; (3) conversion of fire-induced or fire-affected grasslands and the like to herbivore-dominated systems; (4) intensification of land-use control locally to human-dominated rather than herbivore-dominated systems.

I suggest that this four-phase story of New Zealand nature and culture is a good framework for interpreting the "ecologic sustainability" of any particular land use. It would also be a good framework for identifying what are the real land-use issues for any particular terrain, rather than the more ideological land-use issues that are often paraded under the name of ecology. It is also a valuable framework to conceive or critically examine the potential contribution of different forestry approaches towards resolving identified issues. I believe that foresters and forest scientists have some special contributions to make to all phases of this discourse, not just the last mentioned. They will make their best contributions, however, only by developing and applying their holistic forestal skills, rather than by being merely tree growers or wood brokers.

I emphasise that my four-phase summary of ecological history is a general summary. There are reminders needed for particular features. For example, most people with some real comprehension of soil science know that the succession to high forest is not continuous but is likely to be interrupted by periodic geologic or hydrologic events. They also know that ecological succession is not external. Systems, and the soils that support them, mature and degenerate, perhaps sooner

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than we might expect if we do not give proper attention to the chemical quality of the substrate and the rate of its involvement in the material cycling of generation and degeneration. Variations in these factors within the high-country environment are the source of some of the most abundant errors of over-generalisation and extrapolation with which the high country is afflicted in the name of science.

Similarly, the unifying fractures of forest destruction by fire in almost all parts of New Zealand are probably more important than we have given them credit for, whether such fires began from volcanic eruption, from Polynesian hunter-gatherer travellers, later pastoralists in the south and east, or from forest-clearing small holders in higher rainfall districts of both islands. It has been a popular tradition to attribute the apparent decline in soil fertility on lands cleared recently from forest to a loss of fertility from the residual ash. This interpretation has never seemed to me to have been properly substantiated. The character of nutrient cycling in indigenous forests in New Zealand has been very skimpily researched, and forest influences on topsoil fertility have seldom been examined in a plus or minus forest comparison. For this reason the current forest research in this area in the high country may have considerable significance on some low-land landscapes.

The significance of these features to the sustainability of land use will be readily understood by people familiar with farm accounts. At the drier end of the scale it is the variability in pasture production, associated with year-to-year variations in critical seasonal rainfall, that affects the sustainability of the pastoral enterprises, whether they be in the low lands of Hawkes Bay, Wairarapa or Canterbury, or in the Marlborough, drier Mackenzie or Central Otago high country. At the wetter end of the pastoral spectrum, it is the associated greater fertiliser need that dominates farm expenditure and thereby affects both ecologic and economic sustainability. I believe that a thorough but open-minded examination of these rainfall-contrasting, pastoral farming situations will soon indicate that the interactive roles of forestry affecting the sustainability of pastoral farming may vary dramatically from what is found by evaluation of forestry as a land use on its own account. Forestry may be better suited to the higher rainfall areas within the montane zone of Canterbury, as the research of Ledgard and Belton (NZ Journal of Forestry Science, 15(3): 298-323, 1985) indicates.

To plan benefits for an integrated pastoral enterprise in such a humid climate, agroforestry will need to provide some



**Tekapo Soil Conservation Reserve plantation with degraded rangeland in foreground. Recent removal of contorta pine has opened the forest canopy. The remaining trees are predominantly Corsican pine planted about 30 years ago. Photo: M. Belton**

spatial betterment of topsoil fertility to lower the need for pasture fertiliser. In the drier but variable climate, the integration of lower and uneven annual increments in tree growth might conceivably affect timber quality, but annual log output could be subject to much less variation than would pastoral output. Current research indicates that betterment of topsoil fertility in soils of this drier subhumid to semi-arid zone, as a result of plantation forestry, may be much greater than in the humid zone, at least insofar as extractable phosphorus is concerned. Both humid and drier regions can have temporary benefit of greater log extraction in low wool price years, as farmers themselves have demonstrated in the high country in recent times.

All these comments are designed to stimulate awareness that forestry effects in high-country land use are interactive, not merely additive, and are not likely to be simply calculated, or even well researched, without constructive and genuinely interactive thought.

In the high country, forestry is a difficult and aggressive neighbour to many other land uses. It has to be planned in conjunction with their planning.

#### **Drowning in or Escaping from Herbivore Domination?**

I have earlier described the third, post-fire phase of ecological history as herbivore-dominated. In this phase, herbivores are making nearly all the decisions. The fourth phase is one of local substitution of human control for herbivore-domination. Why do I distinguish between herbivore and human? Are not these dominating herbivores introduced by humans? Why not lump together "man and his intro-

duced animals"? My reason is to emphasise the significance of animal behaviour – of animals making their own decisions after their introduction to a terrain.

The degree of herbivore-domination is affected by three principal variables. The first is the proportion of annual primary productivity that is consumed by herbivores – low in a tall-tussock grassland, perhaps higher in some forest associations stocked with both deer and possum. In a partly improved pasture it may be higher still, but even in an improved pasture the proportion of herbage carbon consumed by grazing animals seldom greatly exceeds 50 per cent. The second factor in herbivore domination, familiar to plant ecologists, is diet selection and grazing site selection. The third factor is nest site selection and the often related sites of excretion. Together these three animal behaviour factors have a dominating influence on the volume and direction of nutrient cycling and transfer. So far as the critical P, S, N and bases such as Ca, Mg, K, and Na are concerned, animal transfer is arguably more significant than fire. Fire has excited a great deal of ecological zeal and attention and little research. Animal transfer of nutrients to loss sites has attracted little research but even less ecological attention. Herbivore influence on soil fertility seems to have been one of the most important and perhaps misrepresented topics in our 150 years of pastoral history. The only group who seem to have some inkling of what is going on are those pastoral farmers who seek to escape from this herbivore-domination by shepherding, farming and other behaviour controls, and by alternative land uses.

Forest nutrient cycling and protected

tall tussock nutrient cycling are the relatively stationary standards against which pastoral and other cultural nutrient cyclings have to be referenced. The temporal dimensions of forest nutrient cycles are important, involving sequestering of aluminium in needles and soil organic matter, active and less active carbon pathways. Agroforestry nutrient cycles may greatly vary spatially from either the plantation forestry cycles or the purely pastoral cycles from which they are sourced. How do animals behave in relation to topography in a forest, in contrast to an open hillside, or in contrast to a sheltered hillside? We shall have to learn what we are doing, as we do it. We had better ensure that our mistakes are small, start monitoring and keep on monitoring.

Forestry, arable agriculture and horticulture have each been much slower than intensive pastoral farming to find their niches in high-country landscapes. Much more reluctantly and belatedly have they been admitted into the span of acceptable uses in the minds of those holding or controlling the land. Even now the disposition of the land-use controllers is to be more conservative than the landholders.

There are many million more hectares of New Zealand suited to production forestry than we are likely to turn to such a use in a century, especially if we confine ourselves to short-rotation crops (see O'Connor in Memon and Perkins and be prepared to re-open the debate in this journal). Some of the ironies of timing in human perceptions of land-use availability and sustainability are nothing less than exquisite. At the very time that 100 years of exploitative extensive pastoralism found itself unsustainable and turned, by the interaction of farmer, scientist and soil conservator, to pastoral farming as a way of escape to a viable future, i.e. about 1960, forestry was being cautiously

allowed out from under the rock in competition for land in the national scene! It required more than 20 years punctuated by my periodic nagging of Jack Holloway, John Morris and Colin Bassett before forest scientists made use of high-country farmers' experience with plantation forestry and their own adventures in soil conservation forestry, to discover how suited to production forestry were some of the montane-zone, high-country terrains (Ledgard and Belton, 1985).

It is also ironic that resistance to forestry as a landscape-integrated land use should have followed its initial welcome on soil conservation and landscape-protection grounds. Resistance once shared by the traditional pastoralist and the Land Settlement Board has been inherited by a strange amalgam of "hydro-electricity generations" and "natural landscape conservationists". As Colin O'Loughlin (NZ Forestry 38(3) p 33) observed, ECNZ may have misinterpreted the information in a joint NZFRI/Landcare Research report on the hydrological implications of converting tussock grassland to pine forests. But what of the now persistent and clamorous campaign of conservationists against the "contorted alien" and other perhaps less objectionable conifers?

#### **Islands of Nature or a New Wilderness?**

Nature conservation is an anomaly among the belatedly-begun uses of high-country pastoral land. For decades, nature conservation had been for forests and birds. My own experience in the 1960s was of the reluctance of the nature conservation movement to become involved in the tussock grasslands. Natural grasslands in alpine zones and glacial valleys close to the Main Divide had been protected incidentally. Nature conservation had come almost too late for the indigenous grass-

lands of the low lands. The last of the low-land red tussock of Hawkes Bay was ploughed in our own time and sown to ryegrass pasture at Ball's Clearing, to reduce the fire risk to nearby totara forest! Some Southland low-lands red tussock grasslands, and Otago low-land snow-tussock grasslands, were saved from destruction by pastoral development only by the timely intervention of Otago botanists led by Alan Mark. Fragments of red tussock low lands and short tussock grasslands and shrublands on the plains of Canterbury have been saved by the vigilance and intervention of people such as Brian Molloy.

And what is the land-use issue in nature conservation in the high country? Numerous "Recommended Areas for Protection", ranging in size from a few hectares to some thousands, are identified on maps, as well as in the minds of the pastoral leaseholders whom they immediately affect. Are we now witnessing a genuine and relastic attempt to save representative examples of our natural heritage, "the best of what remains?", or are we to be party to a new idolatry of the wild, a bid not to save adequate representative examples of the nature that is already so widely transformed, but a bid to rededicate to wildness the land for which culture has been till now incomplete? This is the central issue of the high country, for the implications of reserve establishment in the midst of other land uses are greater in extent and character than most ecologists or conservationists seem able to comprehend. Foresters aware of the transgressive behaviours of wildings from Hanmer, Mt Cook Station, Lake Coleridge, Mid Dome and Tarndale are well aware that good intentions are not sufficient for good neighbourliness to be earned or accorded. Nature conservators have to learn the same lesson. So also do some pastoralists.

I posed the central issue as a spatial issue, "islands of nature or a new wilderness?" I believe this question has different relevance and different answers on different terrains. I suggest it requires everywhere some fairly rigorous classification of values and objectives, and some equally rigorous sifting of so-called facts, scientific and historic. I believe this is needed on all sides, for no party has a monopoly on either fact or value. I am not sure that this exercise is well carried out by Tribunals. Nevertheless, it has to be done, so that we can be ready for the confrontation of fact with value, which is the stuff of real world planning for the integration of uses.

## ***New Zealand Forestry***

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