CONSERVING NATIVE PLANTS FOR THE 22nd CENTURY – OVERVIEW AND SUMMING UP

WILLIAM G. LEE
Landcare Research, Private Bag 1930, Dunedin

We have enjoyed an inspiring series of talks on New Zealand botany, and it has been extremely pleasant just to be able to sit back and be reminded again of the beauty, simplicity, distinctiveness, diversity, and grandeur of the plants and communities that share our home. It is appropriate that the Canterbury Botanical Society for its 50th anniversary has chosen to focus the symposium on the conservation of native plants for the 22nd century. We are all aware of the growing monopolisation of landscapes by introduced plants, through agriculture, forestry, horticulture, amenity plantings, or natural invasions. Although these plants provide substantial economic and aesthetic benefits, there are ongoing concerns about the place and persistence of our native plants and communities, especially in the eastern dryland parts of Canterbury where the enduring relicts of past communities are slowly disappearing. The Canterbury Botanical Society has a long history of fostering our understanding and appreciation of native plants, and has produced numerous distinguished amateur and professional botanists. It must be very encouraging for the Society to see the renaissance of interest in botany with the recent emergence of similar societies in most major centres.

This overview of the symposium reflects the interests and biases of the author; however, I will attempt to highlight those themes that I think provide a platform for the way ahead in the conservation of native plants.

Several talks demonstrated the remarkable efforts of local government, community groups, and enthusiastic individuals in the protection and restoration of native plants and habitats. In lowland areas, these initiatives, often involving private land, are going to be critical for maintaining native plants in representative environments, as we have disproportionately few lowland sites in our protected natural area network. At Matawai Park (Rangiora), the conversion of weedy wasteland into embryonic forest, interspersed with wetland, short-tussock grassland and lawns, provides a wonderful example of what can be achieved when a local council supports community-led habitat restoration. As Geoff Henderson mentioned, some elements might upset the ecological pedant (e.g. trees in rows, short-tussock grassland in a forest setting), but surely the means justify the ends, and the learning and thinking that goes on in these projects can only be worthwhile for protecting native plants generally. At a

larger scale and in a different context the Queen Elizabeth II National Trust is an example of the increasing contribution that private landowners can play in protecting biodiversity. As outlined by Miles Giller, the covenanting system, when used with fencing and adequate pest control, can secure major gains for conservation that are both long-lasting and community-building, especially in lowland forest environments. What is needed is for these initiatives to be placed in the context of regional or national biodiversity protection as a whole, so that covenanters and others can better appreciate the value of their work.

The role of the enthusiastic visionary and dedicated nature healer was also illustrated, with Hugh Wilson's talk about the renowned Hinewai, a place where abundant ecological insight, strong commitment, and an army of willing volunteers have facilitated turning areas of weed-infested pasture into an emerging forest in little over a decade. Although we could debate the reality of minimal interference (e.g. lots of pest control and vegetation management has been undertaken), the critical component of the success of Hinewai was the recognition that, in this context, weeds were only those introduced species that prevented the goal of forest re-establishment. This enabled transient gorse to be ignored, while identifying the potentially dominating pines as a species to be removed. The prioritisation of weed control in relation to explicit vegetation goals needs to be widely applied.

Peter Johnson focussed our attention on the long overlooked species-rich turf communities and their flora of diminutive plants that rarely reach a few centimetres tall. Islands typically support giants but interestingly New Zealand has both size extremes. Diverse genera have favoured tiny plants, perhaps because of our mesic history and the dominance of avian grazers. The native turf flora is amazingly mobile and resistant, adept at growing in lawns and golf courses, and surviving the small-hoofed grazers such as rabbits and sheep. These turf assemblages are not only delightful places to botanise, they may in fact be globally distinctive, and represent the most species-rich communities in the land. Fortuitously resilient to smaller grazing mammals and lawn mowers because of their size, they are vulnerable to heavy sod-breakers such as cattle and ecological vandals in vehicles. They emphasise a special character of the flora, and highlight the fact that we have more ecological gems than just those that are widely recognised in grassland, shrubland, and forest communities.

On the dry and windy side of the Main Divide, the Canterbury hill slopes and valley floors as seen by our forebears were essentially tussock grassland, created by decades of burning and more recently stock grazing. We have slowly accepted the value of these landscapes and the native plants they contain, with increasing areas being protected for conservation. However, as Susan Walker emphasised, the driest, coldest, and hottest environments in these regions can all

potentially support woody growth forms, as shown by the remnant native woody flora, the sub-fossil wood and charcoal remains, the Holocene pollen record, and the invasive introduced woody weeds. It is also becoming clear that under the deadly triad of agricultural practice – mammalian grazing, fire, and fertiliser – both tall- and short-tussock native grasslands are inherently vulnerable. Recognition of the native dryland forest vegetation is long overdue, and may well provide new, self-sustaining, invasion-resistant, community-acceptable vegetation goals for montane and lowland areas where grasslands have been depleted and *Hieracium* reigns. The resulting tall, structurally complex, and diverse woody vegetation would support a rich invertebrate and lizard fauna that has currently retreated to inadequately small and declining refuges.

This is not to suggest that we should abandon the induced and complex dryland herbaceous flora of the eastern South Island. The transition to woodland and forest will in most cases be very slow. Colin Meurk, in defence of these successional herbaceous communities, so beloved of Cantabrians, detailed the ecological drivers and management challenges involved in maintaining herb-dominated communities across the landscape. In the face of unrelenting abiotic (e.g. nutrients, fire) and biotic (e.g. weed invasion) threats, management options at a landscape scale are few, except where dense tall-tussock grassland can be maintained by periodic burning. Local sites subjected to regular stress or disturbance, either artificial or natural, may perpetuate early successional vegetation phases. This might be adequate to keep viable populations of successional species in an area, but it is hard to envisage this being achievable at larger scales. However, the case for affirmative action to enable native plants to feature in intensively utilised landscapes through sensitive management is beyond debate.

A weedy future is inescapable. As Peter Williams pointed out, the size of the biotic baggage of human settlement appears remarkably predictable, with plant naturalisations consistently tracking local human population size. While urbanites can delight in exotic gardens, and horticulturalists and others can work with new crops, they also need to accept responsibility for controlling their borders to prevent escapes and the creation of another costly environmental weed. History shows that weed infestations covering more than a few hectares are near impossible to eradicate, so effective elimination programmes depend on early recognition and action. Weeds are biologically analogous to toxic chemical spills, and often far more expensive to control, but this is rarely perceived by management agencies. Weeds are not segregated by land title or land use, which necessitates a coordinated and realistic strategy amongst local government, agricultural, and conservation agencies for their control.

We have long considered the alpine zone to be remote and safe from weed invasion, but Claire Newell reminded us of the spread over the last few decades of the invasive trio (*Hieracium lepidulum, H. pilosella, H. praealtum*) into the Canterbury high country. However, the long-term outcome of this for native plants, and the relative importance of past mammalian grazing, fire, and fertiliser applications, or just natural disturbance, remains uncertain. The invasive ability of *Hieracium pilosella* appears to be enhanced through hybridisation amongst populations with differing genetic composition. Overall, native biodiversity in the tussock grassland continues to decline as *Hieracium* species occupy a wide range of habitats. Interestingly, *Rumex acetosella* (sheep's sorrel), which was considered the weed curse of the 1950s, has over the last 30 years nearly halved in abundance in the upland plots and, although remaining widespread, is now probably only of nuisance value. It is possible that these herbaceous weeds during their initial expansion phase go through an eruptive cycle and that in due course regulation by local pathogens and herbivores substantially reduces the population to lower (and possibly tolerable) levels, unless they are advantaged by some external factor such as multiple and/or heavy mammalian grazing.

Our phytocentric focus can obscure the interdependency of plants and animals, particularly for critical functions such as pollination and seed dispersal carried out by our now much reduced bird fauna. Dave Kelly presented clear evidence for lower seed-set amongst bird-pollinated native shrubs and trees on the mainland, with some species producing very few seeds. Currently, introduced birds appear to almost ignore the native plants, suggesting that reproductive limitations might at some point precipitate vegetation collapse. Functional ecosystems on the mainland are slowly collapsing, and ominous silence is enveloping our once bird-rich habitats. Although we have had impressive eradication successes on our offshore islands, we desperately require similar areas on the mainland. I would argue that on the mainland of New Zealand there is an urgent need to create extensive mammalian-free fenced areas in representative environments in order to establish realistic conservation goals across the landscape. The pioneering efforts at the Karori Wildlife Sanctuary (Wellington) and the multiple projects being developed elsewhere deserve our support because they will provide the insights into what is potentially possible with zero-mammalian densities, and this will then set the conservation goals for the effectiveness or otherwise of less intensive mammalian control elsewhere. Without these sanctuaries we currently have no adequate reference point for conservation management.

The New Zealand flora is globally unusual in having a very high proportion of species concentrated in relatively few genera. While outlining the array of modern molecular techniques available for plant taxonomy today, Peter Heenan

acknowledged the challenge presented by multiple closely related taxa in many genera, and how an understanding of the different levels of genetic differentiation at and below the species level has important implications for conservation. Contemporary evolution recognises the major ways humans have changed the configuration of native species assemblages. For example, the removal of forest habitats and the transplantation of plants are facilitating co-existence, whereas prehuman landscapes would have segregated many herb or shrub species by forest or latitude. It is tempting to want to maintain all prehuman evolutionary processes in the native flora, but this is not possible because of the changes humans have made. Perhaps a more realistic paradigm, which may create adaptive features better suited to our new environments, is to treat the mixing of the native flora as an experiment, and just watch for the evolutionary novelties to form. Their chances of survival in the new world may be better than those of their predecessors, and their existence may go some way towards remedying the loss of intraspecific diversity that has occurred through habitat destruction.

Māori were clearly dependent on a strong familiarity with the flora of New Zealand for food, medicinal purposes, shelter, and many cultural uses. Murray Parsons, in outlining Māori understanding of the Treaty of Waitangi, emphasised the importance of dialogue and partnership to ensure the survival of environments that will continue to provide traditional, high-quality food, and clean water. Many traditional sources of plants have been degraded and require restoration, and extractive use of native plants is often restricted. Māori perception of native plants provides a strong focus for restoration and sustainable use of species. To enable national and regional governments to understand what this might mean in any one area, it would be worth developing spatial environmental maps depicting what the landscape would look like to achieve these goals.

Numerous cities have developed adjoining wetlands, rivers, streams and estuaries, which have traditionally been drained, canalised, ducted, or infilled. However, cities are now accepting responsibility for the restoration of these often nationally threatened ecosystems, together with encouraging the use of native plant species generally within the city limits. Christine Heremaia from the Christchurch City Council outlined progress towards establishing native plants and restoring habitats along the Styx River. The costs of consultation, planning, and budgetary aspects of these projects are significant, but the gains for native plants and threatened habitat restoration are potentially enormous, and in the long term considerable economic savings can be made. Urban areas often lack some of the feral (e.g. rabbits, possum) and domestic (e.g. sheep, cattle) herbivores that restrict native plants elsewhere. Habitats such as gullies, streams, and wetlands are often interconnected, and although surrounded by

suburbia may provide a near-natural system for establishing native plants. Eventually they may also come to be recognised as a key indicator of environmentally sustainable cities.

The Department of Conservation is the primary Government agency responsible for the protection of biodiversity across representative environments in New Zealand both for its intrinsic values and for the benefit and enjoyment of the public. Harry Broad identified some of the real high points over the last few decades, including the development and application of mammal eradication techniques on offshore islands, and the massive contribution local communities are making to keeping native plants and animals in their areas. The Department has a major leadership role in biodiversity conservation, which will become even more important as regional and local government accept responsibility for aspects of native plant and animal protection. Encouraging and facilitating across agencies and guiding our progress nationally will be major future challenges for the Department.

The enthusiasm of individuals for using native plants in gardens and elsewhere is often unrealised because of the lack of information about suitable species, planting methods, and weed treatments. Judith Roper-Lindsay stressed the need to make this information more widely available, and to work with groups to ensure that their conservation initiatives are achieved. One encouraging aspect of this has been the proliferation of nurseries retailing native plants, and the considerable practical expertise now available. Also, central and local government are increasingly supporting environmental initiatives involving native plants.

Overall, I believe the symposium has produced many ideas that could guide the conservation of native plants through to the 22nd century, and I have mentioned some of these above. Perhaps one of the key initiatives the Canterbury Botanical Society could undertake is to have similar symposia every decade to remind us all of our special native plants, to share in the progress we have made in conservation, and to identify the challenges ahead.

ACKNOWLEDGEMENTS

Susan Walker, Colin Meurk, Peter Wardle, Peter Johnson, Dave Kelly, Matt McGlone, and Peter Williams kindly commented on the manuscript.