

ECOLOGICAL RESTORATION AND THE ROLE OF ECO-SOURCING

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It is undeniable that land management and the effect of invasive species have had a devastating impact on the biological heritage of New Zealand (Parliamentary Commissioner for the Environment 2017).

Restoring habitats by creating plant communities is a relatively recent phenomenon. It is a highly visible and seemingly easy to understand action taken to reverse some of the impacts of land management and invasive species. Yet while it appears benign, it has the potential to do irreversible harm to the very values it seeks to support.

Early efforts simply used plants that were native to the islands that constitute the geopolitical entity that is New Zealand. The result was plants that could become invasive when planted outside their normal distribution, such as karo (*Pittosporum crassifolium*) or *Hoheria sexstylosa*; or that hybridised with local members of their genera, such as kowhai and again *H. sexstylosa*. This approach was replaced with attempts to establish plant species that would have originally occurred in or near the subject site, but with no great emphasis on the provenance of the plants used.

The current standard approach is often referred to as eco-sourcing (Ferkins 2002). The premise is that all plants used in restoration plantings are to be grown from seed collected from wild plants growing in the same ecological district. These ecological districts were developed to aid the establishment of a network of representative reserves (McEwan 1987). They were convenient ready-made divisions on the map, but they were not entirely fit for purpose.

The understanding and application of this approach has been patchy and not well adhered to: planted plants in urban reserves have been used as source plants, and cultivated stock plants for cutting material have been regarded as acceptable by some plant suppliers. While this certainly reduces costs for the growers, it also results in very poor genetic variation and resilience in the population once re-established.

Recently there has been pressure on this approach for a number of reasons. These include climate change. Should we consider introducing genetic material from other areas, areas that have more extreme climatic conditions? Another challenge to following the principles of eco-sourcing come from impatience: The plants aren't available now from the appropriate ecological district, so I want to source them from wherever they are available. Or put simply, it gets in the way of getting on with it. These arguments ignore the fact that this work is undertaken to undo harm and consequently should seek to avoid causing harm to the biota at all costs.

Arguments have also been made that there would have been constant gene flow across the landscape. While this is true, it is also true that this gene flow would have been filtered through many generations and resilient ecosystems. This is no longer the case in the landscape we have created.

How these unintended consequences might come about are well illustrated in the horticultural production sector. Plant cultivars are bred, among other reasons, for their resistance to diseases and pest animals. While this is useful when producing plants for a market, it is not desirable in an ecological sense. Bacteria, fungi, plant eating invertebrates and even pathogens are all part of an ecosystem and should not be considered foreign to the communities we seek to establish. Yet there is potential inadvertently to select plant strains that are resistant to host specific indigenous plant pests. One of these species, the Teucrium leaf miner moth (*Caloptilia* “Teucrium”) is specific to *Teucrium parviflora*. This moth has been found at two sites with planted *T. parviflora*, and two wild sites (pers. Comm. Brian Patrick), all in Canterbury. Is it possible that plants in other ecological districts are resistant to the predations of this moth? The answer to this we don’t know. The research hasn’t been done. There are many other host-specific species that rely on threatened species, and we have no understanding of what harm a mix-and-match approach to plant provenance may have.

Further threats to the genetic diversity of our biological heritage are looming in the form of the mānuka honey industry and indigenous tree planting for timber production. There are a number of instances of plant clones with high Unique Mānuka Factor (UMF) being sourced from Northland and planted in Nelson.

A sensible approach may include taking into consideration such things as seed dispersal mechanisms, pollination vectors and natural barriers to dispersal, rather than rigidly sourcing plant material from within the same ecological district. Some examples of where this might be considered are wind dispersed species, where the parent may naturally be some distance away.

Planting for habitat creation certainly has a place if it is done well: done in a way that cannot cause harm; and done where it is needed and not just for an opportunity to give the public a warm fuzzy feeling. The history of ecological restoration is strewn with examples of wasted effort that required more resources to undo the harm. Matawai Park in Rangiora is but one example, with *Hoheria sexstylosa* planted early on when it was thought to be a local native plant. Subsequently, much effort has been made to eliminate it from this urban restoration project. Once mature, the *H. sexstylosa* colonised the surrounding gardens and is now likely to continually reinvade from this reservoir. Another example, from Stephens Island in the Marlborough Sounds, had both pōhutukawa (*Metrosideros excelsa*) and karo (*Pittosporum crassifolium*) planted and later removed. These were relatively simple issues to resolve. It gets more difficult when alien plants hybridise with wild plants of the same genus.

When adequate planting of a good standard has been achieved, the desire for gene flow will be met. It may require landscape scale planting. But if not done well, then are we doing it only to satisfy ego? To aspire to novel ecosystems is to aim for second prize.

References

Ferkins C 2002. Eco-sourcing, code of practice and ethics. Waitakere City Council.

McEwan WM 1987. Ecological regions and districts of New Zealand. Department of Conservation, Wellington.

Parliamentary Commissioner for the Environment 2017. Taonga of an island nation: saving New Zealand's birds.

[<http://www.pce.parliament.nz/media/1695/taonga-of-an-island-nation-web-final-small.pdf>].

THE RIVERBRIDGE EXPERIMENT – HAKATERE / ASHBURTON RIVER

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Starting in 2001 with a bulldozer and 10 hectares of paddocks crossed by water races, Russell Langdon began to construct wetlands for native water fowl in the middle of the Canterbury Plains. His ambition was to create a breeding centre for native wetland birds, and plant a forest of native trees for bush birds. He excavated ponds and began planting. In the past 18 years he has never stopped planting trees. A few more ponds appeared too.

As Russell said “digging ponds is my heritage: my great grandfather dug ponds for a mill, my grandfather and father dug ponds on the farm for irrigation, and now I have dug ponds, this time for birds”.

Russell holds DoC permits to breed red-crowned kākārīki, buff weka sourced from the Chatham Islands, pāteke / brown teal, and to hold Canterbury mudfish. His original trees are now 5-8 m high and seeding. The endangered Australasian bittern and marsh crakes found their way to Riverbridge, along with grey teal, royal spoonbills, the hardy bush birds pīwakawaka / fantail, riroriro / grey warbler and silver eye / tātou (but not korimako/bellbird yet).