# Eco-sourcing of plants—what, why, where and how

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*Presented at the Wellington Botanical Society's panel discussion on eco-sourcing on 21 July 2014; substantially rewritten in early 2016.*

In my opinion, eco-sourcing occurs when Nature is given the opportunity provided by intensive and sustained control of pest animals, pest plants and other ecological weeds. I believe that natural ecological restoration is genetically sound, and requires considerable patience.

In my opinion, the above description of eco-sourcing is consistent with the Wellington Botanical Society's Rule 2(d):

> "*To advocate the preservation of lands and waters under protected area statutes in their natural state.*"

Thus I believe that Wellington city's Scenic Reserves, Recreation Reserves and Town Belt should be protected by pest control, and not be subjected to intervention in the form of the planting of eco-sourced plants, except as noted in "Nature's role" below.

## OBSERVATIONS

My opinion is based on the following observations:

- 1957/58 & 1958/59: I was employed in vegetation survey teams on the Forest Research Institute's Ecological Forest Survey in Te Urewera, Ahimanawa, Kaweka, Kaimanawa and Ruahine ranges. I saw forests severely degraded by the whole range of pest animals. Ground-cover, and shrub tiers, were dominated by unpalatable species. When recording the vegetation in a 20 × 20-yard plot on the Panekiri Range in Te Urewera, the survey team I was in noted the severely degraded state of the forest.
- 1961/62: I was employed in vegetation survey teams on the Forest & Range Experiment Station's High Country Survey in the Craigieburn Range, Eyre Mountains and Takitimu Mountains. The plant communities below the bush line, and on the tops, were in a similarly degraded state. Chamois and tahr added to the suite of pest animals affecting North Island forests.
- Early 1980s: When tramping in the Tararua Range, I noted the vigorous growth and abundant flowering of alpine species. I presume that this was aided by NZ Forest Service deer-culling, and helicopter hunting.

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- Late 1990s onwards: The numbers of seed-carrying birds, for example tūī and kererū, began increasing in Wellington city, as a result of Greater Wellington Regional Council's (GWRC) possum/rodent/mustelid control in the city's reserves.
- 2001–04: I was contracted to do possum-control work for GWRC, filling c. 275 bait stations (Karori Park/Karori West, Johnston Hill Reserve/Karori Cemetery, Otari-Wilton's Bush, Outer Green Belt/Crofton Downs/Huntleigh Reserve, Orleans-Makererua Reserve, Johnsonville Park). I noted that seedlings of species palatable to possums, and to seed-eating rodents, began appearing after about 18-months' work.
- 2007: I was contracted by GWRC, with Barbara Mitcalfe, to do a botanical survey in Albemarle Road 'Reserve', Northland, Wellington. We found one nīkau seedling; later Richard Morgan found another. I presume the seeds had been brought by birds from Otari-Wilton's Bush, or Johnston Hill Reserve, or the valley of North Makara Stream.
- 1980–present: In 1980, when I bought the property where I now live, 28 Kaihuia St, Northland, Wellington, there were lawns at the back and front of the house, and on the Wellington City Council (WCC) berm. In 1981 I received from WCC about fifteen native plants to plant on the berm. Other native plants, mostly self-sown, have since shaded out all three lawns. Natural arrivals via the wind or birds include: rewarewa, patē, hangehange, five-finger, *Coprosma grandifolia*, *Parsonsia heterophylla*, hound's tongue fern, and *Rubus cissoides* (diameter at base c. 10 cm). In 2015, I found two tawa seedlings, one on the WCC berm, and one at the front of my section—kererū in action! To increase the chances of seeds germinating, I control pest animals on the property with several traps, including a Goodnature A24 self-setting trap, a DOC 200 trap, and a Trapinator trap.
- 2014: On the Society's field trip in January 2014 in Te Urewera and Whirinaki forests, members saw evidence of the regeneration of indigenous species, including some highly palatable species. Despite the absence of intensive control of pest animals such as in Wellington's reserves, Te Urewera's forests will have benefitted from decades of deer hunting, and perhaps possum trapping.

## NATURE'S ROLE

I believe in the adage that we should 'get rid of the bad things, and the good things will come'. Thus I believe that eco-sourcing is best left to Nature. Seeds, and pollen, of native plants may be spread by the wind, or by birds,

and in the case of some species, by gravity or water. In my opinion, the only ecologically and genetically sound exceptions to this should be:

- when there is a need to protect an indigenous ecosystem against the "edge-effect", plantings around its perimeter, of seedlings grown from seeds collected from naturally occurring plants within it.
- when there is a need to plant on grass sward or on land with, e.g., gorse or blackberry. The plants used should have been grown from seed collected from naturally occurring plants in naturally occurring native vegetation that is appropriate to the site, and immediately adjacent to it.

I believe that in any other circumstances, when people plant what they think are 'eco-sourced' plants, the results will be 'botanic gardens', 'designer ecosystems' of little or no scientific value to ecologists and botanists, especially as these planted plants begin to reproduce. Then, as time passes, the distinction between what occurs naturally in the ecosystem, and what was planted in it, will become progressively more uncertain.

## WELLINGTON'S "PRIMARY FOREST REMNANTS"

Dr Geoff Park's 1999 paper, *An Inventory of the Surviving Traces of the Primary Forest of Wellington City*, prepared for WCC, recorded 401 sites in the city with what he defined as "primary-forest remnants". These were stands of vegetation in which he said "… canopy tree species characteristic of the district's primary forests' canopy tree species are naturally occurring." I believe that these remnants, which he said are " … fairly evenly spread across the City's land area," provide a range of seed sources suited for the natural, genetically- and ecologically-sound restoration of the city's regenerating and mature native forests, shrublands, adventive scrublands and even plantations. To achieve this, WCC and GWRC must continue, undiminished, throughout the city and its hinterland, the intensive control of pest animals, and the two councils must intensify the control of pest plants and other ecological weeds.

## HUMAN INTERVENTION

Community groups planting in the city's reserves and Town Belt lack independent professional ecological advice on how to look after the reserves they opt to work in. People need to be given advice on what species to plant, if in fact any plants should be planted. People should be told where to plant them, and be told what species must not be planted. Community groups seem to have a free hand in what they do in the city's reserves and Town Belt. This prevents sound ecological management of these indigenous ecosystems.

The term "eco-sourcing" has a 'feel-good' sound to it. I believe that it is genetically and ecologically unsound because it involves bringing to an indigenous ecosystem, plant material and soil material from beyond it, and the genetic composition of a species may vary from one location to another. It is putting people's pleasure of planting ahead of the ecologically sound management of our precious indigenous ecosystems. It ignores natural patterns of plant distribution, genetic variation, and associated soil organisms such as bacteria and mycorrhizal fungi. I believe that this practice is turning indigenous ecosystems around the city into 'botanic gardens', because people are choosing what species to plant, choosing where to source them from, and then choosing where to plant them. These 'botanic gardens' will tamper with the evolved resilience of the ecosystems, so the sites will become of little value for future botanical, ecological and genetic studies, because their composition has been dictated by people, not by Nature. Examples of plantings that I consider inappropriate include:

- Te Ahumairangi Hill, Wadestown. Many northern rātā from Project Crimson, planted at c. 2-m centres. This task was a photo opportunity, not ecological restoration. Also pūriri (which is not even indigenous to Wellington).
- Polhill Reserve, Aro Valley. Many northern rātā from Project Crimson, and whau.
- Town Belt, Aro Street. Several northern rātā at the base of the old quarry opposite Aro Street bus terminus.
- Centennial Reserve, Miramar North. Forest & Bird's Highbury nursery, and other private sources, provided mataī, miro, nīkau, pukatea, kohekohe, black maire, swamp maire, *Rhabdothamnus solandri*, *Pseudopanax ferox* and *Coprosma linariifolia.* WCC ordered the community group to remove the last three species. *Pseudopanax ferox,* and *C. linariifolia* do not occur naturally in Wellington Ecological District. John Buchanan, during his 1872 botanical survey of Miramar Peninsula, recorded kohekohe, but none of the other nine species. WCC's Berhampore Nursery supplied 500 plants. These included the following species not recorded by John Buchanan: wineberry (30 individuals), tawa (45), pigeonwood (5), *Muehlenbeckia astonii* (30) *Sophora microphylla*/kōwhai (40), and *Austroderia toetoe*/toetoe (100). Did WCC seek advice from an independent qualified ecologist on the potential for genetic pollution, before supplying plants for this reserve, as well as Scorching Bay Reserve, Polhill Gully, and other reserves in the city? (See "Further reading" below.)
- Rangitatau Reserve, Strathmore. *Ackama rosifolia*, *Olearia albida*, *Meryta sinclairii*, *Piper excelsum* subsp. *peltatum* and pōhutukawa.

- Oku Street Reserve, Island Bay. *Meryta sinclairii*.
- Buckley Road Reserve, Southgate, and Te Raekaihau Reserve, Melrose. *Pittosporum crassifolium*/karo.
- Kelburn School gully. *Plagianthus divaricatus* and an Australian *Elaeocarpus.*

## A CASE STUDY

In 2009, Northland's Albemarle Road Reserve StreamCare Group received, unrequested, eight root-bound, desiccated, podocarp saplings, 1.5–2m tall. The group discussed the surprise donation, and noted that there were no records of podocarps ever growing in the small catchment, a tributary of Kaiwharawhara Stream. Finally most of the group decided not to plant the podocarps, believing that in time, podocarp seeds would probably be delivered by birds from Otari-Wilton's Bush, or Johnston Hill Reserve, both less than 1.5 km away. When the group's GWRC liaison officer heard that the group had decided not to plant the saplings, she said that of all the StreamCare groups she was working with, the group was the most advanced in its ecological thinking.

## PLANTING VERSUS PEST CONTROL

Planting workbees attract more volunteers than weeding workbees, or workbees servicing traps and bait stations. Otari-Wilton's Bush Trust calls its weeding workbees "plant-care workbees", to make them sound more attractive.

## PEST-ANIMAL CONTROL CRUCIAL

In the early 1990s it was estimated that there were about twenty tūī and two kererū in the city. There are now hundreds of tūī, and during a BotSoc trip in Otari-Wilton's Bush, on 13 February 2016, Amelia Geary saw a flock of about twenty kererū. If pest-animal control efforts are maintained, and intensified, the burgeoning numbers of these seed-distributors, plus the ever-reliable wind, will ensure that, over time, seed, as well as pollen, from Dr Geoff Parks' 401 Wellington "primary forest remnants" will be distributed far and wide—into other forest remnants, regenerating forests and shrublands, gorse, broom and Darwin's barberry scrublands, and even into plantations on the Town Belt.

## FUTURE CONTROL OF PEST ANIMALS AND PEST PLANTS

We can look forward to increasing success in our efforts to protect Wellington's indigenous flora and fauna:

- as the development of pest-animal toxins, traps, and biological-control methods, progresses
- as GWRC, and WCC, invest more in the control of pest plants and other ecological weeds, aided by biological control methods, as they are developed.

Vigilance will always be essential to find and remove pest plants and other ecological weed species, brought from private gardens, by birds and the wind into the city's reserves and Town Belt.

## EVOLUTION OF THE CITY'S INDIGENOUS ECOSYSTEMS

The last Ice Age would have eliminated indigenous forest ecosystems in some areas of what became Wellington city, and drastically altered them in other areas. After the Ice Age, refuges of indigenous species in the region would have enabled plant communities in what is now the city area to develop and cover much of the landscape Thus, when Māori arrived, there would have been a wide range of indigenous ecosystems in what is now the city's area. Māori would have cleared some areas of vegetation; fires would have cleared others.

Pākehā settlers caused widespread loss of the city's indigenous ecosystems, to the extent that it is estimated that only about 1% of the city's original forest cover remains. Nevertheless, extensive areas of second-growth forest exist, and it is into these that seeds and pollen arrive from the remnants of the city's original forest, described by Dr Geoff Park as "primary forest remnants".

If present and future Wellingtonians systematically seek and remove the adventive biota in our indigenous ecosystems, this will result in the restoration of the natural functioning and resilience of the indigenous biota.

My answers to questions raised by Carol West at the Society's panel discussion on eco-sourcing on 21 July 2014:

- Fitness of locally sourced plants for local conditions? Please refer to my "Nature's role" paragraph.
- Genetic variation, and why it does or doesn't matter? It matters because it differs within each species according to location.
- What are the impacts of bringing native plants from outside a region into a region? Genetic and ecological pollution. (See "Further reading" below.)
- Has the horse bolted with plant movements throughout New Zealand by people? Perhaps, but let's not compound past errors.
- What are the "rules" on eco-sourcing? Nothing definitive.

## ECO-SOURCING GUIDELINES

Should the Society draft eco-sourcing guidelines for "Ecological Restoration", and another set of guidelines for "Revegetation"? The two activities are completely different, yet often confused. Should the Society then present these draft sets of guidelines to the Department of Conservation (DOC), to encourage debate, and eventual agreement, on what each set should state? DOC is working to develop national guidelines on eco-sourcing, first consulting staff, before consulting regional councils and territorial local authorities. Should the Society seek an invitation to be involved in the discussions now, to help to speed the process of developing nationwide, easy-to-follow, guidelines for the two activities?

In the meantime, the keeping of records of all work done in the city's reserves and Town Belt may help to protect what remains of Wellington's indigenous biodiversity. However, as time passes, and the planted species begin to reproduce, and in some cases breed with naturally occurring native species, genetic pollution may blur the distinction between what plants are naturally occurring, and what plants were planted, or are the offspring of planted species. These plantings disrupt the natural processes of ecosystem recovery. Thus I believe that eco-sourcing is best left to Nature, with the only exceptions being those indicated by bullet points in the "Nature's role" section of this article.

## FURTHER READING

Mitcalfe, B, Horne, J.C. "Ecological restoration in WCC reserves". Letter dated 22 April 2012, to WCC staff members, Amber Bill, Manager, Community Engagement & Restoration, and Myfanwy Emeny, Biodiversity Coordinator. [In the WCC records.]

Park, G. February 1999: *An inventory of the surviving traces of the primary forest of Wellington city*. Compiled for Wellington City Council by Geoff Park Landscape Ecology & History.

Simpson, P. 2000: Genetic Pollution. Pp. 271-272. In: *Dancing Leaves – The story of New Zealand's cabbage tree, tī kōuka*. Canterbury University Press.