

Feature - Ecological restoration

Community-based dune restoration programmes, such as Beachcare, are based on the scientific principles of ecological restoration. In this feature, we look at what is meant by the term 'ecological restoration', explore some of the concepts and ideas related to this field, and discuss the implications for Beachcare and dune restoration.

What is ecological restoration?

The Society for Ecological Restoration (SER) defines ecological restoration as “the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed”.

It is an intentional activity that initiates or accelerates the recovery of an ecosystem, with respect to its health, integrity and sustainability. Frequently, the ecosystem that requires restoration has been degraded, damaged, transformed or entirely destroyed as the direct or indirect result of human activities.

Restoration attempts to return an ecosystem to its pre-disturbance state or its historic developmental trajectory. In the long term, the aim of restoration is to develop a system that is able to be self sustaining – one that has the ability to maintain its resilience, structure and function over time in the face of external stress.

Restoration occurs along a continuum, where different activities are simply different forms of restoration. For example, Beachcare works with coastal community groups and landowners to restore dune-land ecosystems in varying condition, for differing reasons using a range of restoration techniques.

Often the key driver for initiating a dune restoration project is to reduce the threat to communities from coastal erosion and flooding. These projects tend to focus their efforts and resources on establishing a fore-dune buffer through planting the native sand-binding dune plants spinifex and pīngao, and protecting those plantings through access-way management, temporary fencing, and signage.

At sites where the dunes already have a high level of ecological integrity, like those at Otama Beach on the Coromandel, restoration activities may be focused on protecting the existing biodiversity values from the threats posed by weed invasion and pest animals using various pest control techniques.

On coastal land used for farming and forestry, dune buffers and coastal forest are important for providing shelter and intercepting wind-blown sand. Where the original coastal vegetation sequence has been lost, usually due to grazing or land clearance, sand-drifts can swamp productive pasture and forestry can be stunted by the salt-laden winds. The priority for restoration at these sites is to protect any

remaining dune areas from grazing through fencing, followed by re-establishment of the coastal vegetation sequence through planting.

Key steps in restoration

- 1) Identify processes leading to degradation or decline.
- 2) Develop methods to reverse the degradation or decline.
- 3) Determine realistic goals for re-establishing species and functional ecosystems.
- 4) Develop easily observable measures of success.
- 5) Develop practical techniques for implementing these restoration goals.
- 6) Document and communicate these techniques.
- 7) Monitor key variables, assess progress of restoration relative to the agreed upon goals, and adjust procedures if necessary.

The production pine forest located behind the dunes at Kāwhia's Ocean Beach has a permanent shelter belt of macrocarpa and pine trees to protect the plantation from the salty coastal winds. However, these exotic tree species are less tolerant of sand encroachment and salt, and many of the shelter belt trees are now dying. Through an ecological restoration process, this shelter belt could be converted to native coastal forest consisting of species such as pōhutukawa, karo and karaka. This strip of native forest would tolerate the harsh coastal conditions while still providing protection to the commercial pine forest. It would also have the added benefits of providing food and shelter to native wildlife and enhancing the natural character of the coastline.



Ecological restoration and volunteers

Benefits for volunteers

In the quest for balance between nature and development, ecological restoration is critical to ensure the existence of New Zealand's natural areas. In addition, restoration provides one of the most accessible ways in which local communities can become actively involved in nature conservation and see positive outcomes as restoration develops through time. Because volunteers are crucial for most restoration projects, it is important to explore why individuals contribute the time and effort necessary to carry out these enormous tasks.

Research on restoration and volunteers has shown that the restoration of natural areas is beneficial not only to the plant and animal species whose habitat is revived and healed, but also to the individual volunteers who take part in the restoration process.

One of the benefits of participating in restoration activities is an overall sense of satisfaction. Ecological restoration participants may also derive a variety of specific kinds of satisfaction from their involvement, such as the satisfaction associated with a sense of accomplishment or making new friends. Becoming involved in local restoration projects also offers many of the satisfactions offered by nature activities, from getting away from

one's normal routine to providing a source of fascination. In addition, like other environmental or conservation activities, involvement in restoration activities offers the opportunity to be part of something meaningful, and the satisfactions of social or community involvement. Finally, like other leisure activities, ecological restoration can also provide opportunities for physical satisfaction.



Ecological restoration networks in NZ

Over the summer period, Beachcare staff have been busy collating all the data and photos we currently hold for each Beachcare group so this can be shared on the Nature Space and Ripple Effect community group networking websites. This will give Beachcare members better access to their group's records, and will add valuable data to the nationwide picture of restoration activities. If you would like to be involved in helping to administer your group's page, please contact the Beachcare coordinator at the Waikato Regional Council (see back page for contact details).

The Ripple Effect

In 2013, Waikato Regional Council launched a major new project called The Ripple Effect to celebrate the work of community groups and individuals and to help boost involvement in environmental initiatives in the Waikato region. A key feature of The Ripple Effect website is its ability to link the organisers of environmental improvement projects with volunteers wanting to get involved. Groups looking for volunteers or funders for a particular project can use the site to promote their project, while those wanting to get involved can sign up to projects that interest them. www.makearipple.co.nz

Nature Space

Nature Space is a website for groups, individuals and landowners undertaking ecological restoration in New Zealand. There are hundreds of community restoration groups and individual landowners across New Zealand dedicating time and effort to restore our native ecosystems. The Nature Space website supports these people. Here you will find information about some of the community restoration groups and individuals working throughout New Zealand, maybe in your own neighbourhood, as well as resources to help you or your group get the best conservation results. www.naturespace.org.nz

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Key concepts

Zonation

A key feature of dune vegetation is the sequence of different vegetation communities or zones that occur with increasing distance landward from the sea. Each zone in the vegetation sequence has a different species composition that is related to the ability of the plant species to withstand environmental factors prevailing in that zone, such as sand deposition and burial, salt spray episodes, sand movement, wind velocity and sand blasting. These stressors vary with increasing distance inland and with dune landforms.

Variations in the physical environment result in ecologically distinct communities of plants and animals. The most seaward vegetation zone on New Zealand dunes tends to consist of sand trapping and dune forming species such as spinifex and pīngao. Further inland where sand burial and movement is reduced, the dune building vegetation typically gives way to vegetation communities composed of vines, sedges, and low woody plants. In pre-human dunes, the ground-cover zone gave way to our coastal forests.

While the original vegetation sequences on most New Zealand dunes have been significantly destroyed or altered since human settlement, the underlying ecological processes that form these zones are still there and need to be taken into account when planning dune restoration.

Succession

Succession is defined as a change in species composition within an ecosystem over time. On dunes, the term succession is typically used to refer to the evolution of plant communities over time following disruption – i.e. from the pioneer species which initially colonise the bare sand following disruption right through various successive stages to some form of “climax community” where the vegetation is in dynamic equilibrium with the environment.

At each stage of succession, the plant community alters the physical environment (e.g. soil organic matter, light/shading, improved shelter, microclimate, change in nutrient levels in soil) allowing the establishment of another later group of species better adapted to living in the changed environment.

Reference sites

The use of “reference sites” can be useful for helping to set targets for restoration projects. A reference site is an ecosystem that serves as a model for restoring another ecosystem. This implies that the reference site has more intact ecological processes, higher functionality, and greater diversity than the system to be restored. The physical site conditions of the reference site also must closely match those of the restoration site.

Reference sites can be either less disturbed portions of the landscape in close proximity to the restoration site, or when the restoration site is an isolated fragment the only option may be a more distant, relatively intact site that occupies a similar topographic position in the landscape. Usually more than one reference site is considered when seeking guidance in the design of a restoration. There can be multiple sites that represent a time sequence of succession typical for a specific ecosystem. This is especially important when the site to be restored is highly disturbed and lacks any biological legacy.

Over the page, we take a closer look at some examples of dune-land sites in the Waikato that can be useful as reference sites for dune restoration.

References for further reading

Dahm, J. *Zonation and Succession on Coastal Sand Dunes*. Dune Restoration Trust of NZ - Technical Article No 2.4. 2014.

SER International Primer on Ecological Restoration. Society for Ecological Restoration. www.ser.org.

Miles, I. et al. *Ecological restoration volunteers: the benefits of participation*. Department of Natural Resources and Environmental Sciences, University of Illinois at Urbana-Champaign. 1998.

Hobbs, R.J, Norton, D.A. *Towards a Conceptual Framework for Restoration Ecology*. Restoration Ecology Vol.4 No.2, pp. 93-110. 1996.



The lack of weeds and a native seed source nearby has allowed the dune vegetation in the back-dune zone at Otama to follow a natural successional pathway from ground-covers to coastal forest. In this photo, pōhutukawa and karo shrubs can be seen beginning to emerge through the shelter provided by the knobby clubbrush and pōhuehue.