Ecological Restoration Plan Template and Tips

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Contents

1. Purpose of this template

The purpose of this template is to guide the development of ecological restoration plans for Hamilton gullies. However, it also has applicability to other land-based restoration projects in New Zealand. The template has been developed from local ecological restoration research, planning and experience as well as information from other resources (key documents are listed in the resources & references section).

Ecological restoration plans do not need to be complicated but they are important tools for developing direction and identifying key values/assets, threats and potential solutions for your project. A cohesive, well thought-out plan will help keep volunteers, managers, funders, landowners and territorial authorities on the same page and will increase the effectiveness of restoration efforts.

This template provides guidelines for projects from small to large scales. However, very small projects may not need to follow every step (e.g. you may only have a vision and goals), while very large projects could potentially extend the exercise to detailed operational plans for each objective. Many other resources could complement this planning process, some of which are listed in the resources & references section. Sections 3-8 follow the structure recommend by Hartley & Forsyth (2013) (details in section 10).

It is intended that each of the template sections are completed and then brought together in a stand-alone ecological restoration plan for your group.

2. Group/organisation/partnership details

Name		Address	
Contact person		Email	
Phone		Legal status	
Website		Date	

3. Vision

An inspirational and aspirational high-level statement that describes what your group would like to achieve in the long term. Your vision statement serves as a clear guide for developing current and future goals, objectives and actions and could include a concept map of how you would like the site to look in 20 (or so) years. To provide context and inspiration if you are in the Waikato region, we suggest reading *Restoring Waikato's Indigenous Biodiversity: Ecological Priorities and Actions*.

Examples of vision statements:

- Mangaiti Gully Restoration Group: to restore the native flora of upper Mangaiti Gully, Hamilton, New Zealand, back to pre European status and to sustainably manage it in such a way that native fauna will re establish, either naturally or by introduction.
- Sanctuary Mountain Maungatautari: to share the mauri and mana of Maungatautari.
- Ōkahu Catchment Ecological Restoration Plan: Waters fit to swim in at all times, with thriving marine eco-systems that provide sustainable kaimoana resources to a Ngāti Whātua Ōrākei community who have strong daily presence in and on the bay as users and kaitiaki.
- Orokonui Ecosanctuary: A healthy, self-sustaining ecosystem, free of all introduced mammals and comprising indigenous species that are appropriate to the Orokonui site, where people can enjoy a peaceful encounter with nature, and from which they may take recreation, refreshment, new knowledge, new skills and a new commitment to conservation.

Our vision:

4. Site description

A description of the main characteristics and attributes of the project site. This can include:

- Location, size and map
- Site history
- Current land tenure, legal status, neighbours and management
- Landscape description (potentially both for the site and wider landscape)
- Soil and water features
- Flora and fauna
- Cultural values and human use
- Photos

It is important at this stage of planning to also spend some time documenting and understanding the current state of the site, the factors that have led to its degradation and the ongoing threats.

Examples of site descriptions can be found within the following reports:

- Barrett Bush Management Plan: https://hdl.handle.net/10289/8436
- Overview of the Kukutaaruhe Gully Restoration Initiative. ERI Report 136. The University of Waikato, Hamilton: https://www.waikato.ac.nz/eri/reports

Our site description (will likely need extra pages):

5. Goals

For each key value or section of your vision, develop 1-3 specific goals which describe the desired endpoint. Goals should not be fixed or time dependent and should be are agreed upon by all key parties (as much as possible).

Examples of goals:

- Possible gully restoration goals:
  - Provide habitat and food for local native fauna
  - Restore historic native vegetation
  - Control erosion
  - Improve water quality
  - Enhance views and recreational opportunities
- From the Mana Island Restoration Plan:
  - Reintroduce or encourage colonisation by all native animal species known to have previously occurred on Mana Island
  - Eradicate/control animals and plants which would severely compromise other restoration goals
  - As far as possible, restore invertebrate communities typical of the plant communities created
- From the Saunctuary Mountain Maungatautari Restoration Plan (2019-2029):
  - Ecological long-term goal: To increase indigenous dominance and species occupancy (Lee et al. 2005) on Maungatautari by the sustained removal of introduced species and by translocations, so that the original and natural character of ecosystems is as far as possible restored
  - Social/cultural long-term goal: To increase the number of people who treasure the Saunctuary Mountain Maungatautari project and are involved with its operation
- Goal from Hartley & Forsyth (2013):
  - Increase bird numbers

Our goals:

6. Objectives

For each goal, develop objectives that provide specific, time dependent targets (medium term: 5-30 years) which will help achieve your goals. Objectives need to be feasible given your available resources and can be revised as necessary. It is recommended that a year for completion be assigned to each objective so that progress can be measured.

Examples of objectives:

- Possible gully restoration objectives for some of the above goals:
    - Goal: Provide habitat and food for local native fauna
        - Objective 1: ensure year-round food sources from plants are available for birds
        - Objective 2: protect older trees that could provide bat roosting sites
        - Objective 3: install wētā motels for invertebrate habitat
        - Objective 4: install stable instream deadwood to provide refugia for fish
    - Goal: Restore historic native vegetation
        - Objective 1: create a native planting plan based on “right plant in the right place”
        - Objective 2: plant eco-sourced native plants
- Example from Hartley & Forsyth (2013):
    - Goal: Increase bird numbers
        - Objective 1: reduce predator numbers
        - Objective 2: improve food sources for birds

Our objectives for each goal:

7. Actions

The finest level of detail, actions relate to each objective very specifically. The practical feasibility of actions, objectives and goals need to be considered carefully; including time, financial and labour restraints. This should involve talking to multiple experts and experienced practitioners as well as revision of objectives or actions if necessary. The outcomes of your group's actions will be uncertain (e.g. you can never be sure if trapping will reduce predator numbers) and this is why monitoring and adaptive management are important (see following sections for more information).

Actions are time dependent (short term: 1-5 years) and can be revised as necessary.

Examples of possible actions:

- Possible gully restoration actions for each of the above objectives:
    - Goal: Provide habitat and food for local native fauna
        - Objective 1: ensure year-round food sources are available for birds
            - Action 1.1: document existing food sources and identify any gaps in the year-round food supply
            - Action 1.2: plant appropriate native tree and shrub species for year-round bird food supply
        - Objective 2: protect older trees that could provide bat roosting sites
            - Action 2.1: protect old and dead trees from felling
            - Action 2.2: install information signs about the importance of bat habitat
            - Action 2.3: install sheet metal strips to stop possums from climbing potential roost trees
- Example from Hartley & Forsyth (2013):
    - Goal 1 : Increase bird numbers
        - Objective 1: reduce predator numbers
            - Action 1.1: deploy poison baits for predators
            - Action 1.2: set up a trapping programme for rats and possums
        - Objective 2: improve food sources for birds
            - Action 2.1: plant fruit and nectar sources
            - Action 2.2: provide supplementary feeders

Our actions for each objective:

8. Monitoring plan

Monitoring plans measure ecosystem changes and assess the effectiveness of your restoration actions. Monitoring is an essential step in the process of ecological restoration and it can be undertaken using many different methods.

Choose your monitoring methods based on your objectives and actions. Talk to one or more experts to ensure your monitoring plan will be effective. If your group is short on resources, expert advice will be crucial in deciding which approaches should be a priority for your project. The *Auckland Community Ecological Monitoring Guide* is a very useful resource (see section 10).

Example from Hartley & Forsyth (2013):

- Goal 1 : Increase bird numbers
    - Objective 1.1: reduce predator numbers
        - Action 1.1.1: deploy poison baits for predators
        - Action 1.1.2: trap predators
- Monitoring for goal 1:
    - Annual 5 minute bird counts
    - Tracking tunnels and chew cards to measure abundance of targeted predators before and after poisoning and trapping

The basic monitoring approach in the above example will provide useful data to indicate if goal 1 is being achieved. If monitoring indicates no improvement, you can adjust your actions accordingly. This adaptive management approach is very effective for keeping your project on track.

See the *Auckland Community Ecological Monitoring Guide* to learn about the large array of monitoring methods available for measuring ecosystem change and for guidance in identifying the best methods for your project.

Some examples of common monitoring methods for small-medium restoration projects are:

- photopoints
- 5 minute bird counts
- pest tracking tunnels
- camera traps
- monitoring kits, e.g. Forest Monitoring & Assessment Kit (FORMAK), Stream Health Monitoring & Assessment Kit (SHMAK), Wetlands Monitoring & Assessment Kit (WETMAK)
- aerial photographs and GIS (geographic information systems) from your local council

Reporting the results of your monitoring regularly is important for informing adaptive management. Monitoring time frames will vary depending on the ecosystem attribute e.g. survival and regeneration of shrubs and trees could be reported every 5-10 years while pest mammal numbers could be reported annually.

9. Tips and guidelines

Although every ecological restoration project is different, there are some general tips and guidelines that may help your group to avoid mistakes and enjoy greater success. These have been compiled from the restoration experience, research and publications from many people and organisations: see section 10 for more.

General

- **Start small** - gully restoration is a fun and very interesting process, providing you don't bite off more than you can chew! Start with small steps such as one or two actions, or one corner of the site first. This approach will allow you to adjust your activities as you learn along the way.
- **Talk to others and do your research** - there are many great resources available for ecological restoration in New Zealand. These could be publications, restoration experts, your neighbours, or family and friends. Reading around and talking to others about your project can help develop ideas and gain knowledge.
- **Protect the special features of your site** - take some time to get to know your site and understand what the special natural features are. Special features could include stands of native plants (identifying plants as weeds or natives is an important early step), bat and insect habitat (including dead trees and logs) or streams.
- **Learn about ecological succession** - when we observe nature we see that forests develop in a certain order. Fast growing, light-loving species arrive on open ground first; these are called early successional species. They stabilise a site and provide some shade for the slower growing, larger, mid successional species. Eventually, late successional species arrive - these include large, long-lived trees. Research shows that ecological restoration projects are more successful when this successional pattern is followed.
- **Look below ground too!** - understanding the soils of your site will help with planning of your planting. The *Gully Restoration Guide* can help with this.
- **Map it out** - it is very useful to make a sketch map that shows the key features and planned restoration of your site.

Planting

A planting plan is an essential tool for restoration projects. Check out the *Gully Restoration Guide* and the Nature Space Resource Centre and consider the following key questions for your project:

- What plants currently grow here?
    - Record which native and non-native plants are currently present on your site. Not all non-native plants are weeds but it is important to identify those that are.
- Which native plants grew here in the past?
    - Investigate which species would have historically been on your site. The historic mix of native plants provides a good model for planting because they will generally do best with your soils, climate, topography etc. This can be achieved by visiting forest reserves near you or established restoration projects. Choosing a diverse mix of native species will help to provide resilience as well as a good range of food and resources for fauna.
- Which successional stages should be targeted?
    - Do you have an open site that needs a lot of light-loving, early successional species or do you have a shady, established canopy where later successional species will work better? Or do you have a mix of different stages across the site?
- What landforms and soil types are present?
    - Different native species are suited to different landforms and soil types. For example, pukatea like to grow at the bottom of slopes where there is plenty of soil moisture while kauri like ridges with well-drained soils.
- Is site preparation required?
    - Before planting can begin, do you need to prepare the site by installing steps/paths, clearing weeds, building fences etc.?
- When is the best time to plant?
    - Winter is usually best in the Waikato region as this allows the plants to get established before summer dry spells arrive.
- How many plants are required?
    - One plant per square metre for early-stage planting in the Waikato region will suppress weeds faster and save you time and money on maintenance and replanting in the long term.

- Where will you source your plants?
    - Local, eco-sourcing nurseries have great expertise in restoration planting. Think about how far in advance you might need to order plants if you require large quantities. You might also like to set up your own native plant nursery, see the Nature Space Resource Centre for suggestions and resources.

Weed management

Controlling weeds on your site is vital for ensuring that your plantings have the best chance of survival and good growth. If you are planting amongst weeds, use plants that are at least one metre in height to avoid them getting overgrown. It is particularly important to regularly release your native plantings from weeds in the first three years. Suggested resources: Waikato Regional Council's "Controlling weeds in riparian margins" and the Nature Space Resource Centre.

Pest animal management

Control of pest animals such as rats, mice and possums is recommended for gully restoration projects so that native plants, birds, insects and bats have a chance to recover. Suggested resources: Waikato Regional Council, Nature Space Resource Centre and Manaaki Whenua Landcare Research's vertebrate pest control decision support system.

Stream care and management

Streams, rivers and wetlands are often a central feature of restoration projects. When in good health, they provide habitat for native aquatic plants, fish and invertebrates, including koura (freshwater crayfish), shrimps, larvae, snails and worms. However many wetlands and waterways are degraded and in need of protection and ecological restoration. Suggested resources: NIWA Restoration Tools, Department of Conservation Stream Protection webpage and the Nature Space Resource Centre.

Access

Safe access for your restoration site is crucial for the long-term success of your project and the health and safety of those involved. The "Tracks and Access" section of the Gully Restoration Programme website (gullyguide.co.nz) includes photos and guidelines for building tracks with boxed steps.

Health and Safety

All restoration projects must have effective processes in place to manage the health and safety of the people involved (including volunteers, public and contractors) and these processes need to be in accordance with the Health and Safety at Work Act 2015. See https://worksafe.govt.nz/managing-health-and-safety/workers/ and seek guidance from your local council. Reviewing the health and safety documents of other restoration groups or projects may also provide a useful starting point for the development of your own. Other suggested resources: Nature Space Resource Centre.

Budgeting and Fundraising

Developing a budget for at least 5 years is important to ensure that your project will be appropriately funded. Keep your budget up to date and plan ahead as much as possible. A wide range of funding opportunities are available for ecological restoration work. Your local council and the Waikato Biodiversity Forum website are good places to start. Generosity New Zealand has a comprehensive list of funding bodies and is accessible through subscription or for free at many local libraries and council offices. As part of the Hamilton LIBS project, HCC and WRC developed a biodiversity funding toolkit and calendar (see section 10 Funding for more information).

Education

Ecological restoration can provide enriching educational experiences for all involved. If you have an opportunity to link your project with a local school, the enthusiasm and influence of children will spread throughout your community and the benefits will be numerous. Programmes such as Enviroschools and Trees for Survival support schools to engage in conservation activities and may provide opportunities for you to connect with keen students and staff. Suggested resources: Nature Space Resource Centre under "advocacy" or your local council education team.

10. Resources & references

The following are a selection of relevant resources and references but it is not comprehensive. There is a lot to be gained by seeking advice from people with restoration planning experience in your area, including tips on the best local resources.

Where to find local experts/advice (a selection):

- Crown Research Institutes and Universities
- Department of Conservation
- Ecological restoration groups
- Native plant nurseries
- Nature Space, NZ Landcare Trust, local biodiversity forums
- Professional restoration practitioners
- Regional and district/city councils

Presentation about restoration plans:

- Hartley & Forsyth 2013. "Restoration Planning - closing the loop" presentation: https://www.victoria.ac.nz/sbs/research-centres-institutes/centre-biodiversity-restoration-ecology/pdfs/Restoration-Planning-Silverstream-2013-wb.pptx

Guidebooks:

- Auckland community ecological monitoring guide. A framework for selecting monitoring methods: https://knowledgeauckland.org.nz/publications/auckland-community-ecological-monitoring-guide-a-framework-for-selecting-monitoring-methods
- Community Urban Restoration & Education Guide: https://www.landcare.org.nz/file/community-urban-restoration-ed-guide/open
- Gully Restoration Guide: http://www.gullyguide.co.nz/files/Gully_Guide_Mar07.pdf
- Restoring Waikato's Indigenous Biodiversity: Ecological Priorities and Actions: https://www.waikatobiodiversity.org.nz/resources/
- Taranaki Restoration Planting Guides: https://www.restoretaranaki.nz/resources
- Wetland Restoration, a Handbook for New Zealand Freshwater Systems: https://www.landcareresearch.co.nz/publications/books/wetlands-handbook

Online resource hubs:

- Department of Conservation Stream Protection: https://www.doc.govt.nz/get-involved/run-a-project/restoration-advice/stream-protection/
- Ecological restoration in the Waikato: https://www.doc.govt.nz/get-involved/run-a-project/restoration-advice/native-plant-restoration/local-planting-guides/ecological-restoration-in-the-waikato
- Nature Space Resource Centre: https://www.naturespace.org.nz/resource-centre
- NIWA Restoration Tools: https://niwa.co.nz/freshwater-and-estuaries/management-tools/restoration-tools
- NZ Landcare Trust Resources: https://www.landcare.org.nz/resources
- People, Cities & Nature - Urban Restoration Research Programme: https://www.peoplecitiesnature.co.nz
- Society for Ecological Restoration, Restoration Resource Center: https://www.ser-rrc.org
- Waikato Biodiversity Forum: http://www.waikatobiodiversity.org.nz

Examples of restoration plans

- Nature Space examples of restoration plans: https://www.naturespace.org.nz/resource-centre/examples-restoration-plans
- Mana Island Ecological Restoration Plan: https://www.doc.govt.nz/globalassets/documents/parks-and-recreation/places-to-visit/wellington/mana-island-restoration-plan.pdf
- Sanctuary Mountain Maungatautari Restoration Plan 2019-2029: https://www.sanctuarymountain.co.nz/vdb/document/58
- The Ōkahu Catchment Ecological Restoration Plan: https://ref.coastalrestorationtrust.org.nz/documents/the-okahu-catchment-ecological-restoration-plan

Hamilton Gully Restoration Groups:

- Mangaiti Gully Restoration Group: http://gullyrestoration.blogspot.com
- Mangakotukutuku Streamcare Group: http://www.streamcare.org.nz/gully.htm
- Riverlea Environment Society: https://www.resi.org.nz
- Fairfield Gully Project: http://www.thefairfieldproject.co.nz/

Pest animals and weeds:

- Controlling weeds in riparian margins: a guide to restoration projects and other plantings: https://www.waikatoregion.govt.nz/assets/WRC/Services/plant-and-animal-pests/weeds-and-riparian-margins.pdf
- Pest animal resources and advice, Waikato Regional Council: https://www.waikatoregion.govt.nz/services/regional-services/plant-and-animal-pests/animal-pests
- Vertebrate pest control decision support system: https://pestdss.landcareresearch.co.nz
- Weedbusters: https://www.weedbusters.org.nz

Native flora and fauna:

- Bats/pekapeka: https://www.doc.govt.nz/nature/native-animals/bats-pekapeka
- Hamilton's native bats: http://www.waikatoregion.govt.nz/environment/natural-resources/biodiversity/project-echo
- New Zealand Birds online: http://nzbirdsonline.org.nz
- Insect overview: https://teara.govt.nz/en/insects-overview
- What is this bug?: https://www.landcareresearch.co.nz/resources/identification/animals/bug-id/what-is-this-bug
- New Zealand Plant Conservation Network: https://www.nzpcn.org.nz
- Native lizards: https://www.reptiles.org.nz/herpetofauna/native
- Lizards: https://teara.govt.nz/en/lizards
- Freshwater fish: https://www.doc.govt.nz/nature/native-animals/freshwater-fish
- Freshwater fish species list: https://niwa.co.nz/freshwater-and-estuaries/nzffd/NIWA-fish-atlas/fish-species

Funding:

- Generosity New Zealand: https://generosity.org.nz
- Hamilton City Council Biodiversity Funding Toolkit: https://www.waikatoregion.govt.nz/assets/WRC/WRC-2019/LIBS-Restoration-Funding-toolkit.pdf