Introduction to Ecological Restoration

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Introducing:

people+cities+nature

Restoring Indigenous Nature in Urban Environments
PROGRAMME STRUCTURE

1.1 Plantings
Optimise urban restoration plantings to maximise efficiency and success across NZ

1.2 Lizards
Understand native urban lizard fauna and methods for restoration

1.3 Predators
Understand and manage unique predator profile of urban habitats

2.2 Green space benefits
Understand NZ's urbanite engagement with nature and the biodiversity value of green spaces

2.3 X-sectoral alliances
Optimise cross-sectoral alliances to achieve effective urban ecological restoration

2.1 Māori values
Understand Māori restoration values, priorities and approaches in urban contexts

LEGEND

BC - Bruce Clarkson
CF - Claire Freeman
CW - Cilla Wehi
DL - Daniel Lauglin
DW - Deb Wilson
EC - Eva Collins
HW - Hemi Whananga
JI - John Innes
NN - Nicky Nelson
SH - Stephen Hartley
YvH - Yolanda van Heezik

Social Research Cities

Ecology Research Cities

Programme Leader: Bruce Clarkson
Project Manager: Catherine Kirby
New Zealand’s Biodiversity

Unique and fascinating

But widely threatened with extinction:

• 41% of plants
• 80% of birds
• 88% of lizards
• 100% of frogs
Aotearoa/New Zealand
1000 AD

(Stevens et al 1988)
Canterbury Plains
2000 AD
Pests

Stoat

Ship rat

Feral/Domestic cat

Brushtail possum
Weeds

Japanese Honeysuckle

Woolly Nightshade

Gorse

A. Chapman

J. Raby
Extinction

57 species

5 species

?? species

Sue Wickison
Conservation biology and ecology before urban ecology

Richard Henry (1894)

Offshore islands/NZ Wildlife Service (1970s)

DOC mainland islands (1995)

Sanctuaries (73 as of 2014; 42 community led)
Precious & Unrepresentative
Why 10%?

- Semi-arbitrary but:
  - Species area curves and fragmentation (Hanski 2000-2015)
  - Forest cover & pest control study: restoration should be a priority in landscapes where cover is near or below 5–10%.

  “Further forest clearance in these low cover landscapes is likely to have large impacts on native bird communities, while even small increases in forest cover may produce large benefits”
  (Ruffell & Didham 2017: New Zealand Journal of Ecology)
Habitat fragmentation and species richness

[Hanski 2015: Journal of Biogeography]
What is ecological restoration?
**Ecological restoration** is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. (SER 2004)

**Ecological reconstruction** is a restoration approach where the appropriate biota need to be entirely or almost entirely reintroduced as they cannot regenerate or recolonize within feasible time frames, even after expert assisted regeneration interventions. (SER 2016)
Restoration of extant patches

- Removing weeds and pests
- Buffering
- Expanding and connecting
- In cities like Hamilton, Napier, Hastings and Christchurch reconstruction/retrofitting of indigenous habitat is needed
Reconstruction

- Moving beyond revegetation
- Target ecosystems/habitats
- Full assemblages and species occupancy
- Building habitat for all components of ecosystems; not just bringing back birds
Waiwhakareke Natural Heritage Park - Hamilton

2004: 0 ha

2018: 32 ha
Principle 1:
Successional Framework
Natural succession as a framework for restoration

“The ultimate challenge for ecologists is to reconstruct ecosystems”

(AD Bradshaw: 1983)
The diagram illustrates the fluctuation of temperature and humidity over time. It shows the transition from pioneer vegetation to intermediate successional community and finally to climax vegetation. The graph on the right indicates a decrease in high levels and an increase in low levels over time, with corresponding changes in shade and humidity.
Principle 2:

Reference ecosystems
Feasibility and intent to restore based on local indigenous reference ecosystems.

Ecological restoration
- Restored local indigenous ecosystems

Rehabilitation
- Enhanced (but not restored) indigenous habitat

Reduction of impacts
- Reduced impacts from transformed ecosystems

Increasing similarity to reference ecosystem
Visit your nearby bush patches

e.g. Tangoio Falls
Principle 3:

Right Plant in the Right Place
A profile of mature riparian/lakeshore vegetation
Target or reference ecosystem

Illustration by C. Beard, from Gully Guide
Principle 4:

Catchment Function
Catchment Function

- Restoring function requires understanding of catchment-wide processes
- Catchment vegetation plays many important roles
- Although urban catchments are highly modified, there are many management options that improve sustainability
Reduced time to peak

Pre-development
Post-development

Shorter recession

Lower Baseflow
Larger Baseflow

Runoff

Liu et al. 2014
Stream Shade from trees and other plants at toe of slope provide fish habitat and reduce algae growth.

Riparian woodland plants provide needed shade, shelter and food for wildlife.

Tree and shrub roots help filter out pollutants from water run-off on banks and prevent soil erosion.
Water troughs so livestock don’t need to access the river

Logs for fish and bug habitat

Fencing to protect river banks from livestock and stop effluent from going into the river

Screens around pumps and off-take channels to stop fish and platypus from being drawn into mechanical equipment and channels

In-stream vegetation for fish and bug habitat and food

Pest control for animals like rabbits, foxes and carp

Water for the environment

Weed control

Revegetation for habitat and to prevent erosion

Fishways to allow fish to move through weirs
Thank you