The Long & Winding Road from ‘Extinction of Experience’ to Restored Cultural Landscapes

Arise Oh Lady Nature - in our Otautahi-Christchurch!

This is an illustrated narrative about the remarkable eco-restoration journey from microbes to herbs to trees to wildlife; from habitats to ecosystems to landscapes gaining ecological integrity, functionality, natural character & legibility; from nature to people gaining eco-cultural literacy ... in one of the most ecologically depleted regions in the Country... A work in progress!

Colin D Meurk
meurkc@landcareresearch.co.nz

7th June, 2019

For the Christchurch Urban Restoration Workshop
Loss of Biodiversity & Natural Character is too easy in a flat landscape due to land use Intensification

- Degraded
- Fragmented
- Disconnected
- Disintegrated

Lowland Herbaceous Biodiversity & seedlings

The Cultural landscape is at Ecological Ground Zero

Extinction of Experience

- > 50% of flora exotic
- No native land mammals
- > 75% indig. biota endemic, ancestral

... squeezed out between intensification & dense tall grass competition

Extinction of Species
Relevancies to Changing World

Arrest decline in biodiversity

Reverse globalisation/homogenisation (celebrate place-making/turangawaewae)

Carbon sequestration

Reduce resource use & work with nature for Ecosystem Services

Employ, Engage & Upskill Labour (work ethic/social cohesion) – not just labouring!

Restore human communities as well as ecosystems

Demonstrate life processes – realism about limits & potentials – through legible meaningful landscapes to achieve ecological literacy

Transition to sustainable, less materialistic (western), kinder world - Forest Bathing – Shinrin-Yoku
What are we restoring?

Restoring **processes** versus a Static Picture of some past state

Accelerating **plant succession**

*Priming the pump* - *Kick starting* ecosystem recovery, with the hope that a structure & function becomes self-perpetuating – provide the ingredients & let nature sort itself out

**Recombinant ecosystems** everywhere (semi-natural ecosystems to plant signatures)

Adding **design elements/symbolism/metaphors**
Values, Resistance & Conflicts

Socio-Political Considerations - A minefield of Values, Therapy & Action
- aesthetics
- physical recreation
- spiritual healing (restoring the soul & ecology)
- education
- science
- tourism
- vandalism/theft
- human ‘predation’

Safer Parks response - official vandalism
History – Milestones & Restoration Stages

- Chalice represents buried forest; Riccarton Bush is remnant primary forest; Ongoing attrition for 800 yrs ‘left cupboard near bare’, growing imperative to restore lost arc
- Botanical Gardens, Barker, Ilam & Ashgrove 100-150 years old
- F&B post war plantings on Port Hills (70 yrs old)
- Kaiapoi Pa (1988) 32 years
- Sesqui-centennial plantings - 30 years
- Hinewai – facilitation 31 years
- Travis - 25 years
- TAK/Greening Waipara - 10-15 years
- Post Earthquake - 10 years
- **Local Podocarps**, planted earlier than mid-1990s, now fruiting & regenerating (seedlings)

**Stages/Assembly Rules:** Primary/Structural spp (Day 1); Secondary (3-5 yrs) tender spp/canopy thinning-under-storey planting/vines; Tertiary (5->10 yrs) mistletoes/epiphytes/ground covers/wildlife translocation

... in Canterbury
Ancient floodplain Kahikatea Forest – Putaringamotu & Buried Forest scripted in Chalice

Ashgrove Park 1920s

Kaiapoi Pa 1980s

Post-EQ Red Zone – manatu regen 2012

F&B 1950s non-local akiraho
Ref Eric Godley

Travis totara sold 2017

1990

2014
Facilitation — remove unwanted organisms/processes eliminating pests thru active removal or succession

Make use of exotic nurse crops – work with nature – support regeneration

**BUT** prerequisites: seed sources, pest control, moist climate & no fire

- Offshore Islands
- Mainland islands
- Predator proof fences

The Hugh - Hinewai Experience
The Travis Experience

Wetlands

Sedges & rushes

Salt marsh musk

Swamp nettle

Harakeke & toetoe
NZ Bioclimatic zones in relation to latitude & altitude – **Regional Scale**

**Models**

Fitting Species Niches to topo/hydro/edaphic/climatic Patterns

Restoration Ecologists are landscape artists – painting plant patterns across a topographic/textyured canvas
Condensed profiles of small & ephemeral streams/urban elements – **micro-scale** models
Philip Grime’s Stress-Disturbance concept – with stress tolerators, ruderals & competitors (CSR Theory)

Theoretical Framework for Niche Species Choices & Management

Forests & Swamps
Easy!

Lowland Forbs
Difficult!

For Cultural Landscape

Gradient Management for all combinations of S X D

Fine scale substrate/aspect, placement, management

Poa imbecilla stressed on tree roots
Ellerslie International Flower Show
Demonstrating urban niches in Stress x Disturbance space

Heritage Rubble
Hi Stress
Motorway biodiversity – anywhere is ok & necessary for dry plains spp lost to cultivation/irrigation! On manufactured, stony porous substrate for stress-tolerators (Geranium, daisies, grasses)

Shrubs on unconstrained topsoil

Hi Stress + Periodic disturbance = weeding
Rock Gardens – Stress Islands for Meta-populations of invertebrates & lizards

2011

Silver tussock, div shrubs

2014

BP Myosotis, Geranium & pohuehue
Rare plants – Species Recovery

Stress
Steep/Shallow soil

Leptinella nana on Wellington eroded coastal hill

Butterflies, adders tongue fern, sand twitch in golf courses
Swan plucking pond margin maintaining native turf (Disturbance)

Lobelia angulata, Centella uniflora & Eleocharis acuta

Mazus novae-zeelandiae in lawn

Ranunculus glabrisolius & Hydrocotyle within the pluck zone
Disturbance in The Matrix

*Dichondra repens* in roadside lawn

Leptinella & Mazus
Grazing marsh – can be richer still

Lo to Med Stress
Hi Disturbance
Med Competition

Leptinella dioica at Travis Wetland
Even Bowling Greens are 99% indigenous!!
Silver tussock needs grazing/weeding

Forest Climate – Lo Stress Lo Disturbance need more of both to retain tussock against Hi grass Competition
Absence of Grime …
Silver tussock overtaken by exotic grass – a maintenance nightmare
Riparian Planting Rules
Plant reeds near water when it’s at its lowest.
Plant tussocks densely at base of bank - down to low water edge – to suppress weeds, provide shade & shelter for 2nd stage ferns & forbs

= Mod Stress x Mod Disturbance
Natural colonisation occurs around lakes & wetlands – through waterfowl dispersal.

Lake/River variation & grazing = Disturbance -> maintains turf.
Diversify Wastelands/Greyfields!

Arrested Primary Succession after disturbance - with stress too!!

Diversify Wastelands/Greyfields!
Urban Wild
Forests –
canopy closure is first step

= Low S X D
= Competition
Otamahu-Quail Island restoration & only (nearly) predator-free sanctuary >10ha in Canterbury
Maritime – salt marsh

Hi Stress (Saline/wind)
X Mod Disturbance
Coastal Foredune

Hi D X S (Mobile Sand, Drought)
Sand dune woody vegetation
- coastal bush

Medium Stress
Dry grasslands/savannah & shrublands

- Hi Stress
- Drought

- Olearia adenocarpa
  protected from grazing

- Carmichaelia australis
  protected from grazing

- Aciphylla subflabellata
  protected from grazing
Ecological Principles as Basis for Visioning & Managing an Eco-City

CHRISTCHURCH LIVE
Colin Meurk, Biodiversity Partnership, Waitakiri Eco-Sanctuary group, GTRZ, AOFP

Ellerslie International Flower Show Experience
Urban elements

Forest Bathing
Shinrin-Yoku

Path cracks

APPLICATIONS to Design in the Real World

Urban Matrix of fine scale Canterbury nature

Green lungs for small spaces

Treatment Train

Cultural harvest

Tapestry lawn

Green roof & cascade

Atua – Rongoa protector of gardens & medicinal plants on moss bed in fern frame
The Pocket Park – entirely of indigenous plants – the interior patio
ES – Stormwater Treatment Train from green roof, trickle down, swales, rain gardens, wetland filters, detention ponds
Living Walls & Railway Tracks
A Bit of Both Stress & Disturbance
The Bush Garden – max structure in non-limiting conditions

Atua – Rongoa god/protector of gardens & medicinal plants … on bed of moss & frame of ferns
Green Roofs – shallow soil/stress & colonising orchids
Urban Surrogates of Threatened small Nature in gardens large & small - *Domain of Cultural Landscape*

Prairies, Railways, Footpaths, walls & gutters
Various states of stress & disturbance!
**URBAN WILD!**
Early stage evergreen canopy suppresses grass (*shade stress*) & seedlings until canopy ages & opens - then plant the undergrowth in light gaps
Regenerating & planted understorey & ground covers … under exotic deciduous canopy

Many opportunities in English parklands & riversides
Natural Regeneration of the ‘unusuals’

Tawa (south of natural range)

karaka

mahoe & five-finger

Coprosma rotundifolia

kaikomako

lancewood

broadleaf

titoki

kahikatea
Adding the Fine Structure Translocating Biodiversity Elements

Ground moss, orchids, ferns & graminoids
Epiphytes & lianes
Mycorrhizae
Invertebrates, lizards
Birds
Sensitive plants
Species recovery
Vines, mistletoe & bird colonisation
(epiphytes v limited in Canterbury dry climate)
Indigenous fungi - *Lepista fibroissima* especially Ecto-Mycorrhizae (Photo Jerry Cooper)

Proving very difficult to establish the native species in face of already established exotic competition
Stream ‘Islands’ – refuge for rare Canterbury Mudfish – with reduced eel predation

... use fish-ladders as selective barriers
The UnWanted: scales & caterpillars attacking planted kanuka/manuka – packed with nutrients before natural biocontrols have arrived
Meurk & Hall (2006) proposed **spatial optimum** for forest habitat patches in urban environments equated with: **groves a few minutes walk** from each residence; **habitats within 10 minutes** walk (max distance = 0.5 km); & **sanctuaries within 45 minutes walk** or 10 mins bike (max distance = 2.5 km).
Dry Woodland Restoration

Stepping Stones for Te Ara Kakariki

Med Stress
Drought
Small Patches
Forest Experience
in a Courtyard
Green roofs, Roof Gardens & Traffic Islands – as predator-free refuges for alpine birds, lizards & macro-invertebrates?

Even Smaller patches!
Linear Corridors - woods, hedges, walls, edges, streams, streets linking patches, joining the dots - critical visual symbolism
totara, rata, tarata, manatu, horoeka, putaputaweta, kanuka, ti kouka suitable noble trees/distinctive forms for streets, parks & portals!

Visibility is Key
Key Message: Plant at stream edges, tall & dense (during low water/summer time) – but provide windows for access & views
Mainland Island **Patches** - not enough on own for vulnerable wildlife

Need fenced **Sanctuaries/Sources**

**Maungatautari** – 2000 ha

**Riccarton Bush - Putaringamotu**

**Zealandia**

**Halo Effect**

**Predator-proof fence**
150ha Predator-Proofed Eco-Sanctuary Anchor Project – Aspirational - Charismatic
- with Wildlife Bridge
- Added Biodiversity value/transformational visitor experience ... feeds Green Corridor
- Environmental Ed centre – with Eden?
- Canterbury is only population centre without experience of our charismatic, rare wildlife
- A permanent commercial difference

- Travis Wetland 120ha, 20 years track record
- + Red Zone 30 ha
- + Red Zone Halo + 400ha + steps to city

Eco-Center
Water Crossing
Red Zone Corridor
Red Zone Halo 

Mark Anderson
Mahinga Kai Exemplar
Wildlife

- Translocation
- Poison
- Trapping/hunting
- ‘Island’ Sanctuaries
- Cross-fostering
- Hi-Tech intervention

& surrogates
Moving Forward
Recapturing all Heritage
Legible Cultural Markers

Pegasus – Kaiapoi Pa

Mahinga Kai Exemplar
Taitapu Sculpture Garden

All about connecting people to nature thru art – the socio-cultural halo effect
All Heritage Layers reflected in **Heart of City** (Cityhood)

- Geo-tectonic history
- Canterbury Bush City (all Canterbury habitats)
- Tangata Whenua
- Colonial Cathedral & 1st 4 ships
- Multi-cultures & taonga – a fusion

**Time travel** through natural layers of city - with Maori & Colonial Reflections

**All at the Heart** – not out the back, out of sight, out of mind!
Last year San Francisco won the Global City Nature Challenge with 3211 species recorded in 4 days.

We know from iNaturalist records there are over 5000 species of plants, animals and fungi in greater Christchurch (including Banks Peninsula);

London has around 4000 species, and our National Parks 2-3000 species.

A launching pad for Christchurch!

Hey Christchurch, let’s show off our unique and plentiful biodiversity and take on the world in this global contest.

Anyone can take part. It’s really easy, whether you’re a nature newbie or a life-long biodiversity buff, no matter where you are in Christchurch (including Banks Peninsula).

Our goal is to find and observe every animal, plant and mushroom in our city.

To be part of this exciting international competition, all you’ve got to do is add observations to the free iNaturalist app.

In 169 cities globally, 33 000 people recorded 912 000 observations of 32 000 spp in 4 days!

How: Follow these four easy steps:

Step 1: Grab your smart phone with the free iNaturalist app installed, or grab your camera
Step 2: Find some nature - a species of anything, whether you know it or not, from our hilltops to gardens to beaches.
Step 3: Take a picture.
Step 4: Share your findings on the iNaturalist app or upload them to the iNaturalist NZ website.
Did we Prove we are National Park City?

City Nature Challenge 2019: Christchurch

Overview

17,573 Observations
2,389 Species
369 Identifiers
320 Observers

We did it! 16th
Recent Observations

… & ChCh was 1st-5th in world when adjusted for city population & area
WHAT?

ChCh ready to be a NZ NP City
... with anyone else who wants to join us 😊

National Park City Festival: Community Activity Grants
Community Activity Grants are now closed. Thanks to all those who applied - we will be in touch soon.

Submit Your Activity

*LET’S MAKE LONDON GREENER, HEALTHIER AND WILDER

London National Park City
How the Mayor is helping to make London the world’s first National Park City.

Greener City Fund
Mayor Sadiq Khan’s fund to create and improve green spaces and encourage more tree planting in London.
An Overall Vision for CHCH!

Joined-up city - based on Eco-Structure & (all) cultural layers

Heart of the Matter

Waitākiri Eco-Anchor

Ti kouka etching out ancient Maori trails

Cityhood!

https://www.facebook.com/ecocitynz/