Managing & Designing Stress, Disturbance & Succession of Urban Wastelands for Biodiversity

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Flockhill Workshop
19th November, 2009
Wasteland/greyfield Succession:
Bare -> Forbs -> Grass -> Shrubs -> Trees
What’s up with Wastelands/Greyfields for Biodiversity?

• Lowland biodiversity under greatest threat
• Extinction of experience (need to see it; to identify with it; to protect it)
• Nature Deficit Disorder (Louv)
• >50% world population in cities
• >30% of international ecological congress remits now relate to urban biodiversity

• **Footnote:** NZ Central Government agencies seem oblivious to this!
Lowland Herbaceous Biodiversity & seedlings …

… squeezed out between intensification & rank tall grass
Types of Urban Biotope/Plant Community available for Biodiversity

- Natural Remnant (mainly indigenous)
  - Forest, shrubland, grassland, fw wetland, salt marsh, etc
- Spontaneous (mainly exotic)
  - Wasteland (grey/brownfields), wall, pavement cracks,
- Planted (mainly exotic but changing)
  - Parkland, woodland,
  - Garden: bush, shrubbery, hedge, herbaceous border, vegetable garden, lawn, green roof, living wall
  - Restoration planting
- Mixed (increasing indigenous)
  - Abandoned or neglected garden
Greyfield Vegetation/Environment patterns in Christchurch (Greenep)

- **Exotic spp (119) dominant** (clover, plantain, hawkbit, Yorkshire fog, vulpia hair grass, cats ear) over natives (20) (*Pseudognaphalium*, *Cotula*, *Oxalis*, *Lachnagrostis*, *Epilobium*, *Pteridium*, *Senecio*, *Geranium*, *Poa*, *Acaena*, *Euchiton*, *Hydrocotyle*, shrubs)
- **Plant Community** differentiation is weak – reflecting random associations in non-competitive situations
- Dense grassy/wooded sites on loamy/gravelly soils
- Sparse forbs/grasses on stony/rocky/sealed substrate
- **Natives more on bare, stony, rocky to sandy soil**
- Acaena & bracken fern in grassy places
Spontaneous wasteland native plants

Poa imbecilla
Oxalis exilis
Deyeuxia avenoides
Geranium sessiliflorum
Ozothamnus leptophylla
Pteridium esculentum
Likewise on walls

*Blechnum penna-marina*

*Psilotum nudum*

*Coprosma repens*

*Earina mucronata & Pyrrosia eleagnifolia*
Green roofs & Living Walls
(*Beyond Aesthetics – Co Ltd*)
Where are all these Threatened Herbaceous Species ...?

The Natural Origins for Urban Surrogates

Riverbeds, deflation hollows – rapid & prolific seeders & quick growth for frequently disturbed sites
Low-Subalpine rock outcrops

Lowland limestone & rock outcrops, canyons

Alpine scree & fellfield

Cold & drought-stressed environments & young/disturbed surfaces!
*Leptinella nana & L. minor*

stressed environment on banks & ledges

low competition
Recent soils, danthonia & savannah grassland
Salt marsh & coastal envts

Glasswort, succulents & interdune slack
Shingle beaches, coarse sand dunes, sand planes

Leafless pohuehue
Pingao dune

Rare shrub pohuehue
Zoysia minima
Silver tussock
Ecological Opportunities
Need Seed sources & Seed banks

• Plant
• Sow
• Natural dispersal
• Field Trials to test establishment and seeding from planted material (Janic Slupski & Helen Greenep)
Grimeian Stress-Disturbance Ecological Framework for designing right places & management for right plants

NZ Herbaceous Vegetation Matrix
Geranium sessiliflorum

Dichondra repens

Viola cunninghamii & Haloragis

Leptinella minor

Geranium retrorsum
Design Opportunities

Rock & scree gardens, herb borders, front yard prairie
Scree, Swales, Grams & Forbs on the Wellington waterfront

Design Opportunities
Conclusions

- Biodiversity crisis (especially herb plants & dependent fauna)
- Cities – where most people live; personal engagement with nature part of sustainability of biodiversity
- Need to exploit every opportunity …
- … increase seed sources/banks throughout cities for a level playing (grey) field
- Have demonstrated ecological potential – fit species into stress x disturbance niche
- Transport corridors & industrial sites the opportunity
- Have shown some design concepts
Postscript

• Principal author: the field trial was one of the most valuable experiences of his LA university training!

• Importance of direct experience of nature and practical implications of planning and design in education – virtual reality isn’t reality!
Borrow pit – for stopbanks, McLeans Island

*Raoulia haastii, Luzula celata, Epilobium spp.*