

Ecological Regeneration Options for the Ōtākaro Avon River Corridor

A Summary from Avon-Ōtākaro Network Strategic Steering Group

Following the Canterbury earthquakes a large tract of damaged land along the lower Ōtākaro Avon River corridor from city to sea was red zoned, acquired by the Crown, vacated and cleared of housing.

Historically this area was part of an extensive network of riparian floodplain wetlands supporting a rich mosaic of eco-systems. When colonised by pākehā, the river was regulated with stopbanks and the majority of the land was drained, raised and developed. There is now an opportunity to return at least some of this land to reflect its indigenous ecological values.

In early 2017 an analysis was undertaken of options for ecological regeneration of these lands and waterways. This is a summary of that analysis contained in 3 reports commissioned by Avon-Ōtākaro Network in 2017 (in collaboration with Avon-Ōtākaro Forest Park and Greening the Red Zone):

1. [A review of floodplain restoration principles based on overseas experience](#)
2. [A study of restoration opportunities, benefits and possible strategies](#)
3. [An exploration of frameworks for integrated assessment of these](#)

“Ecological restoration activities in the Ōtākaro Avon River Corridor offer an unprecedented opportunity to address national priorities including the remediation of legacy effects on lowland biodiversity and associated cultural values.

Through attention to design and integration of compatible activities and co-uses, ecological restoration can be achieved alongside, or incorporated within, other beneficial land use options.”

Lessons from Overseas

Key Principles & Recommendations

- Regeneration of more natural self-maintaining hydrological regimes including a degree of reinstatement of natural erosion and deposition processes and tolerance of channel migration;
- Continuous or periodic reconnection of floodplain remnants such as old tributaries, meanders and still water bodies via the progressive retreat of flood defences;
- Focus on high value habitat to address conservation priorities, and on the flood-dependency of some natural values;
- An adaptive management approach to address unknowns and challenges of predicting complex interdependencies, ecological succession and the impacts of climate change;
- Pilot studies and exemplars can be useful in this regard;
- Investment in comprehensive long-term monitoring and evaluation programmes using multi-disciplinary expertise coupled with local and traditional knowledge;
- Inclusion of community via citizen science and other educational and experiential opportunities encourages participation, buy-in, ownership and hence the socialisation of restoration outcomes;
- Robust governance and leadership to achieve interagency coordination and strategic oversight.

Identified Benefits

Of Ecological Regeneration

Environmental	Biodiversity Restored Natural Values Water Quality Stormwater Management
Social	Access Aesthetics Educational/Experiential Health Benefits Recreation Stormwater Management Water Supply
Cultural	Community Identity/Sense of Place Cultural Values Heritage & History Wild Harvest
Economic	Adjacent Land Values Avoided Costs Branding & Marketing Business Opportunity Carbon Employment Fisheries & Aquaculture Forestry Visitation
Resilience	Food Resilience Mental Resilience Natural Hazards Buffering Research & Exemplar Value

There are a wide variety of identified potential **benefits** of ecological regeneration that need to be considered in any assessment of opportunities and implementation strategies. These encompass all four wellbeings and resilience.

Furthermore a broad range of **strategies** may be applied to generate these benefits all involving aspects of a potential renewed natural ecology in the corridor. These may be combined at a range of scales to create scenarios, quantify benefits, and explore the potential for synergies between different land use options.

Implementation strategies can be plotted in three dimensions:

1. **Level of Community Participation:** The degree to which community volunteers are engaged to undertake labour-intensive tasks. This ranges from little or no participation where all labour is undertaken by paid professionals, through subsidised labour/training schemes (eg the old Taskforce Green initiative) to coordinated volunteer labour.
2. **Level of Human Agency:** The degree to which intensive human intervention is required to engineer an outcome or at the other extreme the degree to which nature is allowed to run its course and find its own way via more natural processes; eg actively planting and then intensively maintaining this with active management (weed and pest control) is at one extreme with a high level of human agency required, this then progresses through controlled removal of hydrological barriers and ecological succession, to simply allowing natural seed banks and existing patches of native regeneration to grow.
3. **Level of Adaptive Management:** The degree to which the strategy is predetermined at the outset with little room for change or at the other extreme the degree to which an iterative 'suck it and see' experimental approach is possible in which lessons are learned that guide next steps;

"A key finding of this study identifies godwits as a potential flagship species with considerable marketing potential for the city.

The corridor has a role in supporting this opportunity by providing a resilience benefit for long term sustainability of wading bird habitat.

This is of critical importance for the migratory species with regards to management of climate risks"

the latter approach provides for pilot and trial programmes and interim uses; continuous monitoring and evaluation are key characteristics of this approach.

All three dimensions may be combined to create a framework for defining any particular implementation strategy.

Supporting Processes For Ecological Regeneration

Planning

- Planning frameworks
- Spatial planning
- Resilience planning
- Maintenance planning

Funding & Governance

- Funding models
- Governance models

Baseline Assessment

- Baseline assessment and mapping
- Values mapping and assessment
- Assessment of wider catchment

Knowledge Gaps and Technical Investigations

- Address knowledge gaps
- Extract learning from relevant examples
- Technical investigations
- Investigate carbon potential
- Investigate ecological engineering technologies
- Investigate health benefits of forest and green spaces
- Techniques to intercept surface water run-off
- Research value

Modelling and Options Assessments

- Development of conceptual models
- Modelling
- Scenario modelling and impact assessment
- Investigate low impact designs for intensive and built land uses
- Identify low cost high impact activities
- Address value to future generations in assessment of benefits
- Utilise local knowledge

EOCR

Ecosystem Types by Hydrosystem

Wet & Salty

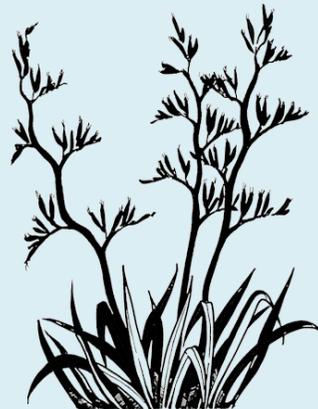
- Estuarine mudflats
- Lower Saltmarsh
- Upper Saltmarsh
- Estuarine Margins

Floodplain Swamp & Forest

- Riparian (riverine) Margins
- Lake & Wetland Margins
- Floodplain Wetland & Small Trees
- Floodplain Tall Forest

Higher & Drier

- Low Terrace & Landfill Forest
- Dry Forest
- Inland Dune Forest
- Gravel (eg stopbank) Communities



Implementation Strategies For Ecological Regeneration

Stakeholder Participation

- Stakeholder identification, engagement and participation
- Acknowledge previous history

Planting

- Develop nursery models
- Make linkages to potential labour sources: paid professional, subsidised, sponsored and volunteer
- Nodal planting to assist species dispersal

Working with Nature and Natural Hydrology

- Allow natural hydrology and associated morpho-dynamics, remove hydrological barriers
- Retain existing vegetation, control invasive species
- Fence sensitive areas

Targeted Investment (Species & Habitats)

- Invest in key species: fauna and flora
- Specific habitat enhancements including microhabitats using shelter
- Landscape manipulation options

Adaptive Management

- Staged approach to implementation
- Pilot programmes and interim uses

Educational Opportunities

- Establish educational partnerships
- Raise awareness of NZ conservation values
- Exemplar value

Monitoring Programme

- Development of a monitoring programme including water quality and waterways monitoring

Integration & Synergies with Co-Uses

- To minimise opportunity costs
- Integrate access & recreation
- Develop tangata whenua values and aesthetic gains
- Tourism (incl cultural tourism) & aquaculture

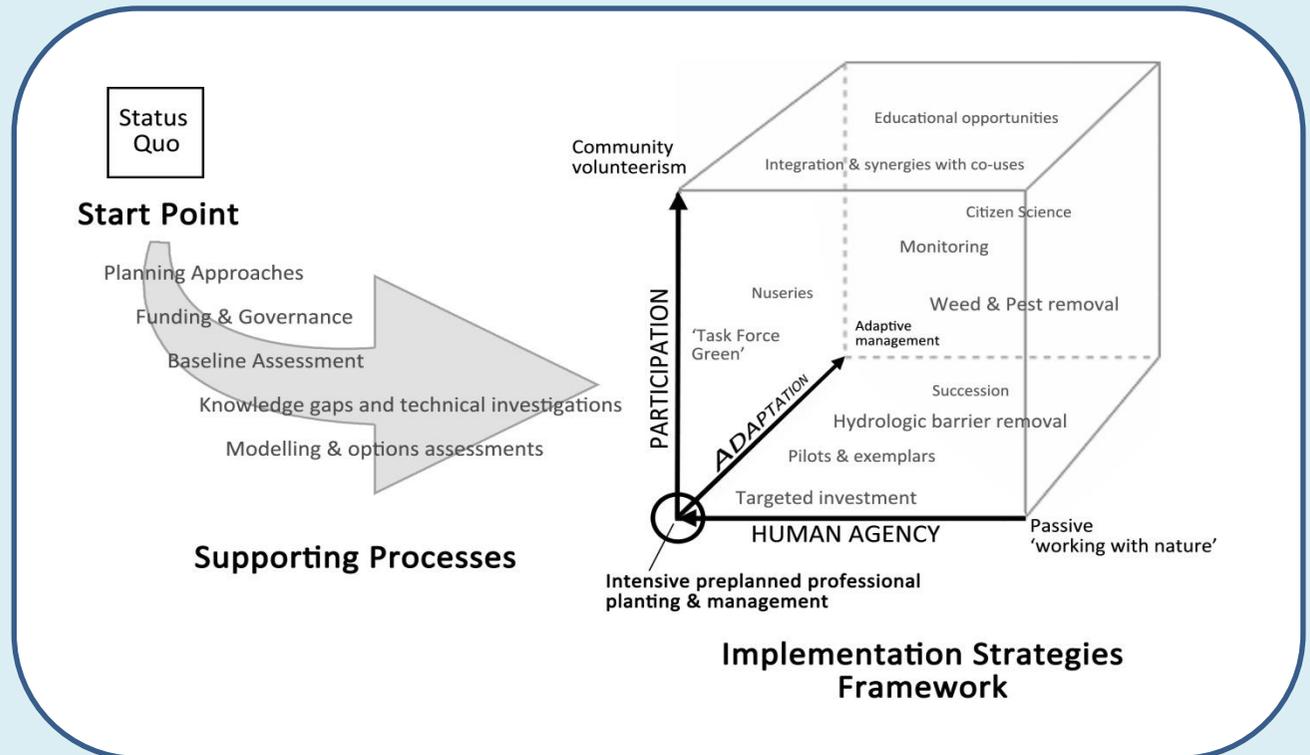
In many instances it may be difficult to identify a clearly preferred option for an implementation strategy.

The notable exceptions are mainly in the wet and salty environments where hydrological manipulation offers a powerful strategy to bring about change. Additional aspects such as the use of a staged approach and attention to invasive species control can be evaluated using this core strategy as a potential starting point.

For other ecosystem types and parts of the corridor there may be no one optimum strategy and the best option will likely evolve over time.

In considering options for assessment and cost-benefit analysis it may be useful to scope and assess an intensive upfront pre-planned professional planting and maintenance regime as a reference for comparative purposes.

Inputs for this reference scenario should be sufficient to cover all site preparation and commercial establishment costs for the full area to be treated as well as the maintenance requirements for the period until the restored site is expected to be self-maintaining. The remaining step for the specification exercise will then be to identify one or more other strategies that may represent better investments as alternative scenarios, which may include the status quo.



Integrated Assessment Frameworks

- Integrated assessment is a suitable approach for the evaluation of land use options to support planning.
- Effective methods are needed to incorporate stakeholder input directly in the design of the assessment.
- In options evaluation, the process of developing the options is critical. In complex planning processes such as those involving a high diversity of environments or anthropogenic interests, the specification of the options for assessment is likely to be the single most important step in delivering the best outcomes. Good ideas missed at that stage may be disabled or otherwise never revisited.
- An appropriate spatial framework can assist in the development of scenarios and improve the ability to identify the impacts, including both trade-off and synergies between overlapping land use options.
- Resilience has been identified as one of the top-level considerations for regeneration planning of the Avon-Ōtākaro river corridor. Exposure to sea level rise is a particular consideration for planning in the corridor.
- Ecological regeneration activities include blue and green infrastructure proposals that may potentially occupy a large proportion of the corridor. In combination these land use options are likely to make a major contribution to the future value of a regenerated river corridor. The assessment framework applied to support planning must be fit for purpose to account for the potential benefits and enable meaningful comparisons to be made.