Murihiku Slow the Flow Upper Mataura Pilot

Mid-Project Technical Summary

July 2024

Purpose: Brief report/visual summary of compiled and groomed data and information.

Murihiku Slow the Flow is a pilot of an integrative and collaborative approach to testing the feasibility of nature-based solutions (NBS) for flood risk and achieving other values related to water and communities. A key part of the project is to explore the application of the hauora wellbeing framework.

Stage 2 of the project has focused on the development of the data and modelling programme, assisted by Dr Melissa Robson-Williams, an environmental scientist and interdisciplinary researcher from Manaaki Whenua Landcare Research.

The components of this stage are to:

1. Identify outcomes to test NBS against.
2. Develop an assessment framework.
3. Form a technical team to undertake the modelling and assessment.
4. Undertake modelling and assessment.
5. Present results to steering group.
6. Communicate results.

Steering group set-up

Pilot objectives are to foster a collaborative approach whilst conducting feasibility studies of the selected nature-based solution options, whereby the learnings and outputs inform future regional climate adaptation planning and decision-making. Engagement has been a central part of the project; a summary of this work including learnings, can be found in the Project Engagement Plan.

Representatives from various organisations and the community, agreed to form the project steering group[1], to inform and guide the pilot, test ideas and approaches and help evaluate the piloted approach. They have been involved in the Stakeholder workshop on outcomes and building the assessment framework. They also reviewed and feedback on the draft project plan so it could be finalised. This includes the collaborative process to decide on which NBS will be chosen for the project and the proposed design assessment framework. An important balance

[1] Te Ao Mārama Inc – Rebecca Blyth, Southland District Council – Rochelle Franscis, Gore District Council - Jason Domigan, Thriving Southland – Cain Duncan, Mataura Catchment Liaison Committee Chair – Hugh Gardyne, Catchment Group Chair – vacant, Manaaki Whenua Landcare Research – Melissa Robson-Williams, Environment Southland – Ella Lawton Project Lead, Karen Wilson Chief Scientist, Anke Habgood Climate Change Lead.

is the need to move 'at pace' due to time and resource constraints, whilst ensuring the project outcomes fulfil the objectives.

Design assessment framework

A broad range of stakeholders with knowledge of the Mataura were invited to a Stakeholder Hui in May 2024. To support the designing of the assessment framework we initially needed to get a good understanding of the conceptual model of the Mataura catchment. In pairs participants drew their conceptualisation of what happens when there is excessive rainfall in the Mataura, Figure 1. This helped build an understanding of the catchment and impacts of excessive rainfall from multiple perspectives.

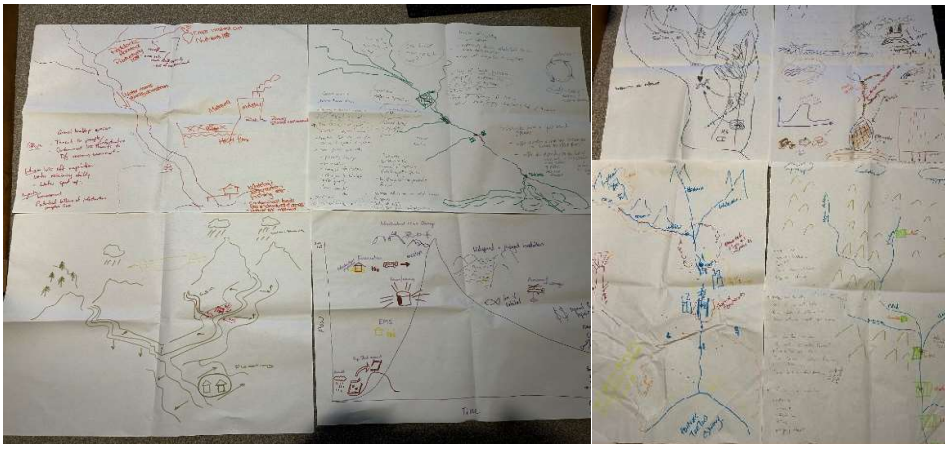

Figure 1. Images of conceptualisations of the Mataura when there is excessive rainfall.

The four aspects to the assessment framework are: outcomes; indicators, data and modelling and scenarios.

1. <u>Identify outcomes</u>

NBSs may be effective in delivering multiple benefits. Identifying desired outcomes at the beginning of the project helps set the scope of the work and give it focus to ensure that when NBSs are assessed that it is against a range of outcomes that are important. Given the time constraints we used existing published outcomes and tested/augmented these with the Steering Group. Draft outcomes were synthesised from existing documents from Environment Southland, Southland District Council, Te Ao Mārama, and the Reimagining Mataura community project. These were tested and augmented at the May Stakeholder Hui (which include the steering group).
We used these outcomes identified for the Mataura, to adapt the 'More than Water' tool[2].

[2] Jonathan Moores, J., Ira S., Batstone C., & Simcock, R. (2021) The 'More Than Water' WSUD Assessment Tool. *Activating WSUD for Healthy Resilient Communities.* Funded by the Building Better Homes, Towns and Cities National Science Challenge. March 2019.

2. Indicators

Based on the outcomes agreed, we identified several indicators to inform against each outcome to be considered at the May Stakeholder Hui. Then we further adapted the 'More than Water' tool to better represent rural based nature-based solutions.

3. Modelling

Based on the outcomes agreed and the indicators, we have identified what modelling capability is available (internal and external) and the indicators it can inform against (see Table 1). The project is building on existing models and modelling capability, and where possible partnering across projects to create a more integrated and collective approach.

4. Scenario development

We plan to test 1-2 nature-based solution packages across 2 or 3 event sizes generating 2-6 scenarios.

To develop the nature-based solution packages we:

1. Generated ideas (or look at existing ideas) for elements of nature-based solutions (from steering group, broader community, technical experts).
2. Invited researchers and holders of science in the Upper Mataura to a collaboration hui in June to explore what information was available and where.
3. Short-listed four NBSs and tested these with the Steering Group who were supportive of pursuing these.

The proposed nature-based solutions that will be looked at are:

- Detention bunds (earth bunds designed to temporarily hold water during high rainfall events)
- Wetlands, (existing and constructed)
- Planting native vegetation
- Allowing room for the river through re-establishing flood plans

Next steps

The next steps of the project are to:

- Finalise the technical team,
- Finalise the scenarios,
- Decide what climate and weather events are being run.
- Develop NBSs
    - Consider which elements can be modelled and what will be qualitative.
    - Curate 1-2 NBS packages also considering practical and technical feasibility of these) plus a possible anticipatory scenario.
    - Test with project steering group and wider community.
- Run scenarios
    - NBS solution package x climate weather events (numeric modelling plus conceptual and qualitative assessments).
- Assess scenarios

- Assess scenarios using adapted ‘More than Water’ tool and report to steering group.
- Possibility for an iteration on the modelling.

Table 1. Adapted More than Water tool for Mataura Slow the Flow – still to be completed.

Possible benefits of NBS	Modelled	Qualitatively assessed
Hydrology	Runoff/infiltration (rainfall/runoff model)	Groundwater recharge, drought resilience
Water quality		WQL river and estuary (N, P, sediment, e coli)
Aquatic habitat quality including wetlands		Habitat quality including for taonga species
Aquatic ecosystem connectivity		Barriers to flow passage
Natural character and flows (water bodies)		Natural character, historic flow patterns
Flood management	Flooding (Mataura Flood model)	
Climate change adaptation	Flood peak flow/transit time/hydrograph characteristics	Drought resilience (impact on baseflows)
Recreation		Recreational use
Provisioning and mahinga kai gathering		Food (wild food) gathering, and Mahinga kai are assessment)
Connectedness with nature (water bodies)		Access, risk to important sites
protection against soil erosion		Impact on erosion risk
Microclimate management (UV, temperature, air quality)		Microclimate impacts of NBS e.g. Shading for ar NBS is riparian
Carbon sequestration and mitigation	Carbon storage (i tree)	Carbon storage
Terrestrial habitat quality		Indigenous vegetation, soil health
Terrestrial ecosystem connectivity		Indigenous biodiversity, pollinators, ecosystem
Natural character (land)		Re-establishment of natural features (e.g., Wetl
Infrastructure resilience	Riskscape (roads, bridges, rail energy infrastructure)	

Food & fibre production		Impact on productive capability of land (source of NBS and receiving environment)
Public safety	Riskscape (homes/populated areas impacted)	
Connectedness with nature (land)		Urban access to nature, access to river, nature-based school trips)
Community health and wellbeing		Strength of EMS systems, access to drinking water, community network strength, social cohesion/inclusion
Property values		Insurance premiums, house, and land value
Job creation		Job creation (e.g., through building NBS)
Tourism		Impact on tourism
Biosecurity		Impact on biosecurity (e.g., Exotic species, deer, goats, pigs, possum)
Animal welfare		Impact on animal welfare
Costs and avoided costs of NBS		
NBS project cost (on farms)		Additional Set up costs, ongoing costs - is this affordable?
NBS project cost (off farms)		Set up costs, ongoing costs
Avoided costs by building NBS (on farm)		Avoided costs by building NBS (on farm)
Avoided costs by building NBS (off farm)		Avoided costs by building NBS (off farm)
Water quality cost effectiveness		Water quality performance of NBS qualitatively assessed against equivalent control measures
Hydrology cost effectiveness		Flood water management performance qualitatively assessed against equivalent control measures
Aquatic habitat quality cost effectiveness		Benefits to aquatic habitat qualitatively assessed against equivalent control measures
Terrestrial habitat quality cost effectiveness		Benefits to terrestrial habitat qualitatively assessed against equivalent control measures
Avoided environmental remediation costs		Avoided environmental remediation costs.

Avoided property remediation and storm damage costs (flooding)		Avoided property remediation, storm damage costs, infrastructure repair costs, commercial $ losses (e.g., rail), avoided $ for repairing flood risk infrastructure
Avoided costs of future proofing (climate change, resilience)		Avoided or reduced sediment meaning less build up and less potential future flooding, avoided new (increased) flood defence infrastructure
Avoided event costs		Avoided emergency services cost and pressure, avoided animal welfare issues, avoided impact from evacuations - $, human and animal anxiety and stress