Feasibility Study of Nature-based Solutions - Otago

Wai i te reporepo, wai i te wao | What nature tells us about how to understand and prepare for flooding

Otago Regional Council (ORC) is exploring the potential of Nature-based Solutions to help manage flooding. The Te Hakapupu | Pleasant River Nature-based Solutions Feasibility Study explores the potential of using Nature-based Solutions to manage flooding and associated hazards in the Te Hakapupu/Pleasant River catchment in East Otago. The study, commissioned by ORC, and funded by the Ministry for the Environment's Essential Freshwater Fund, aims to build evidence for the use of Nature-based Solutions in flood hazard management across Otago.

What are Nature-based Solutions?

Nature-based Solutions are actions that seek to restore, protect, and use natural ecosystem features to address hazards in an area. Instead of using infrastructure such as large drainage schemes to manage flood hazards, Nature-based Solutions like wetland construction and restoration and river naturalisation can help to manage flooding, while improving biodiversity and water quality.

Which Nature-based Solutions are most suited in the catchment?

Three Nature-based Solutions were assessed to understand their feasibility within Te Hakapupu/Pleasant River catchment. These were:

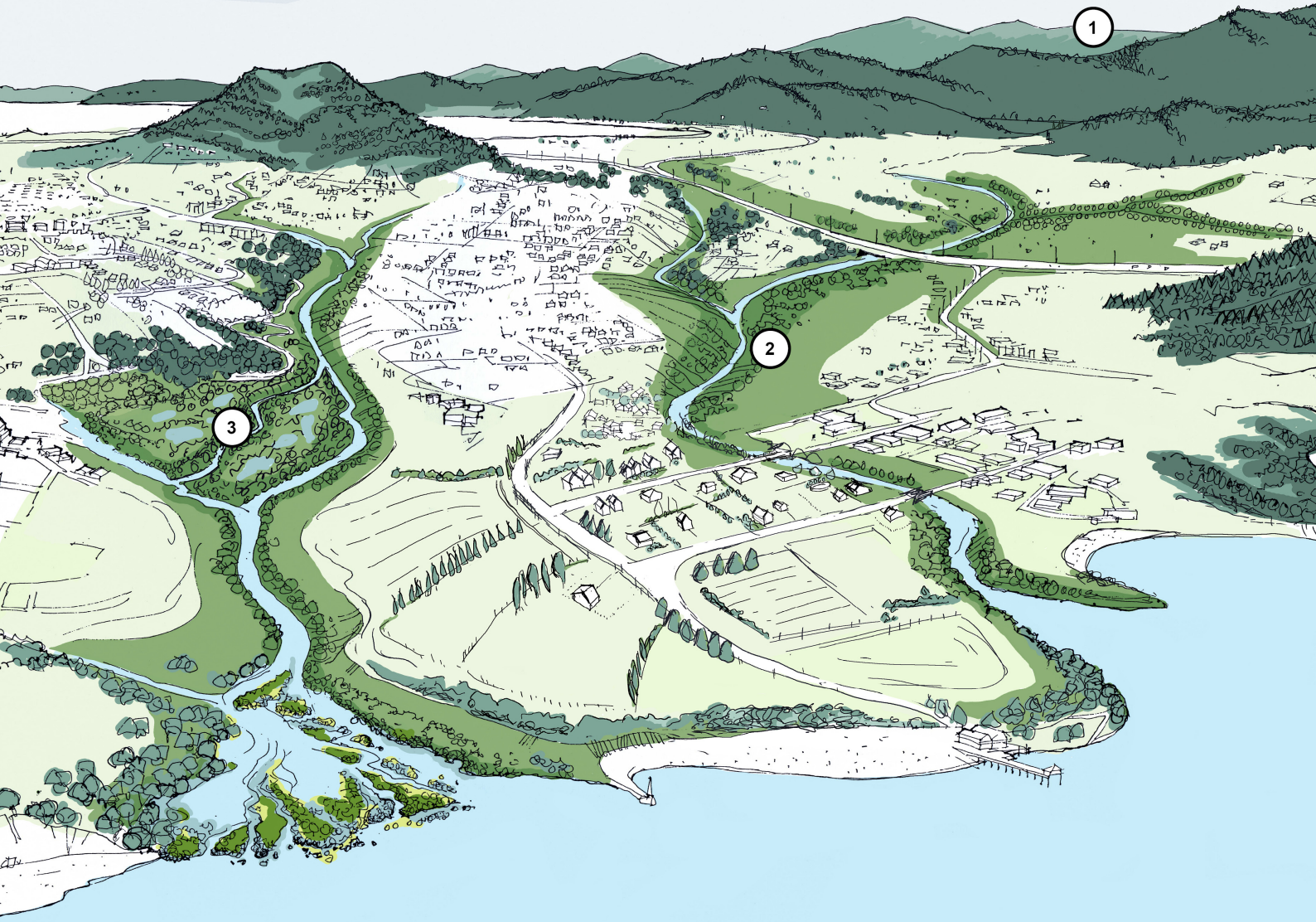
Landcover Management

River & Stream Naturalisation

Wetland Restoration & Construction

Challenges and opportunities for using Nature-based solutions

The feasibility study confirmed that during extreme rainfall events, Te Hakapupu/Pleasant River catchment faces significant challenges caused by flooding and erosion. The study found that Nature-based Solutions can help manage these challenges and provide co-benefits like improved water quality and enhanced community well-being.



1

Landcover Management

Planting and expanding native bush in hilly areas and around waterways, to slow water runoff and reduce erosion.

2

River & Stream Naturalisation

Restoring riverbanks with native vegetation, creating meandering streams, and reconnecting wetlands, to intercept run off and slow river flows.

3

Wetland Restoration & Construction

Restoring existing wetland areas and constructing new wetlands with deep sediment ponds and vegetated areas to contain floodwaters.

Key findings

Five key findings were identified during the feasibility study of Nature-based Solutions in Te Hakapupu/ Pleasant River catchment:

1. **Nature-based Solutions are feasible:** Nature-based Solutions can be effective methods for managing flooding and associated hazards.

2. **Landcover management in the upper catchment is important:** Landcover management solutions in vulnerable upper catchment areas will reduce flooding hazards in the long-term.

3. **Economic support is needed:** Innovative economic approaches are needed to address the current financial barriers that might stop landowners using Nature-based Solutions.

4. **Scale is important:** To effectively manage flooding hazards, Nature-based Solutions work best when used over large areas. For example, the size of a constructed wetland should be 1-5% of the catchment area to effectively manage flooding and water quality.

5. **Integrated planning of solutions:** Nature-based Solutions can provide the greatest benefits when they are joined up across a catchment, connected to each other and supporting other land uses.

Technical extract: The influence of landcover management in the upper catchment

At present, exotic forestry is the most widespread land use in the catchment, mainly situated in the steeper upper catchment. Landcover management in upper catchment areas would work to expand pockets of permanent native forest to reduce flooding and associated hazards in Te Hakapupu/Pleasant River Catchment.

By creating a flood model of Te Hakapupu/Pleasant River catchment, the study was able to test how different landcover types effected flooding. Modelling shows that a mature exotic forest can help moderate water flows within the catchment. However, during forestry harvest and replanting cycles, the exposed ‘bare land’ increases flood hazards in the lower catchment. Whereas, when areas in the upper catchment are restored with native bush, the flood hazards in the lower catchment are reduced compared to exotic forest cover.

During a forestry harvest and replanting period, peak flows of flood water increase 25-28%

When native bush covers the landscape, peak flows of flood water decrease 6-7%

Predicted changes in peak flows of flood water from the upper catchment during a 100-year storm event, compared to the current exotic forestry landcover

Recommended actions

Five actions are recommended to support the practical use of Nature-based Solutions in Te Hakapupu/ Pleasant River catchment and other similar catchments across Otago:

1. **Strengthen governance:** Form partnerships between government agencies, landowners, and communities to ensure the challenges and benefits of Nature-based Solutions are shared.
2. **Provide economic incentives:** Introduce grants, tax incentives, and payment schemes for land used for Nature-based Solutions to support private landowners.
3. **Promote credit markets:** Enable landowners to gain revenue from land used for Nature-based Solutions by supporting access to biodiversity and carbon credits.
4. **Develop standards and policies:** Create regional Nature-based Solutions guidelines to build a common understanding of their use and streamline implementation.
5. **Integrate Nature-based Solutions into planning:** Embed Nature-based Solutions into catchment management plans so they can be strategically planned for at large scales.

Case study: Economic incentives in other countries

Scottish Rural Development Programme – United Kingdom

The Scottish Rural Development Programme promotes land management practices which protect the natural environment, improve water quality, and manage flood risk. Landowners were supported with funding packages where land was protected, restored, and maintained to provide benefits for water and biodiversity. Funding was provided as either a one-off payment for capital works, or annual payments for specific land management activities, like maintaining a wetland.

More than 13,000 projects were supported by the Programme, restoring 19,875 hectares of native woodlands across Scotland (2014-2020) and creating and safeguarding 8,245 jobs.

Agricultural Conservation Easement Program – United States of America

The Agricultural Conservation Easement Program helps landowners, land trusts, and other groups to protect, restore, and enhance wetlands or protect working farms and ranches through conservation easements. The Program financially supports landowners to restore and protect areas from the impacts of farming and development through the creation of easements. The Program funds up to 100% of the market value for the purchase of the easement and helps fund restoration costs on the easement.

Since its creation in 2014, the Program has supported the preservation and restoration of nearly 323,750 hectares of agricultural land and wetlands.

Conclusion

Using Nature-based Solutions in Otago to manage flood hazards is possible and beneficial but currently requires significant changes that would cost landowners. To make these solutions viable, innovative economic approaches and strong support from the government and community are needed. Work is required to establish accessible funding models for landowners that will encourage investment in Nature-based Solutions.

For more information, please visit: www.orc.govt.nz/environment/biodiversity/nature-based-solutions-study

Project funders, partners, & collaborators

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