Nature-based Solutions for Flood Resilience

Engagement Study

July 2025

Exploring landowner perspectives, barriers and opportunities around Nature-Based Solutions (NbS) implementation in Otago.

Beca

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Acknowledgements

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Contents

This report shares findings from the ORC Nature-based Solutions Engagement Study. It is designed to inform planning and thinking around Nature-based Solutions activity and support the national shift toward climate-resilient solutions.

THIS DOCUMENT MAY BE REFERENCED AS:

Beca Ltd, 2025. Nature-based Solutions for Flood Mitigation: Exploring landowner perspectives, barriers and opportunities around Nature-Based Solutions (NbS) implementation in Otago.

Prepared by Beca for the Otago Regional Council.

Executive summary

Around the world, Nature-based Solutions have been credited with saving billions of dollars in flood damage costs - by working with nature instead of trying to control it.

Nature-based Solutions are practical approaches that harness nature's own processes to address climate challenges. They include restoring wetlands to absorb floodwaters and filter pollutants, using bioretention techniques that combine plants and specialised soils to soak up rainfall, planting to prevent erosion, and naturalising rivers and streams to improve water flow and stability.

Nature-based solutions are embedded in key global and national frameworks, and are included in ORC's guiding framework (Strategic Directions 2024 - 2034) as tools for climate resilience, ecosystem restoration, and community wellbeing.

There is an opportunity, and growing expectation, for the Otago Regional Council (ORC) and other councils to play a role in regional delivery.

This report is part of the ORC's efforts to explore how Nature-based Solutions could play a part in reducing the effects of flooding in Otago, helping to protect people, infrastructure and property.

It is part of a wider Nature-based Solutions Study - 'Wai i te reporepo, wai i te wao: What Nature tells us about how to understand and prepare for flooding' and was funded through the Ministry for the Environment's Essential Freshwater Fund and Jobs for Nature programme.

This report highlights the value of working with willing partners, embedding nature-led responses, and unlocking co-benefits through integrated planning, funding and leadership.

By enabling locally led delivery, aligning policy and funding streams, and actively brokering partnerships, ORC can help transform exploratory interest into measurable results. The opportunity now is to move from insights to action – building a more resilient Otago through shared leadership, transparent co-investment and nature-based design.

Engagement study purpose

Around the world, Nature-based Solutions are implemented across both public and private land. Collaborative projects involving landowners, government, iwi, and community groups deliver benefits that extend beyond property boundaries —protecting ecosystems, infrastructure, and people.

This Engagement Study is part of a national Ministry for the Environment (MfE) initiative exploring how Nature-based Solutions could support flood mitigation across Aotearoa New Zealand. Focusing on Otago, the study sought to understand landowner perspectives and uncover challenges and opportunities for implementing Nature-based Solutions on private land.

The study is exploratory —not formal consultation — and is designed to inform. Through interviews, surveys, and review of existing reports, it builds a regional picture of awareness, motivation, barriers, and opportunities.

This report offers a starting point for future collaboration, consultation, and initiatives that support the further integration of Nature-based Solutions into Otago Regional Council (ORC) strategies and actions.

Readers are encouraged to consider how these findings might support regional planning, partnership and funding development, and policy design — and to reflect on their role in enabling Nature-based Solutions for flood resilience.

Findings

The Engagement Study highlighted the region's strong history and shared commitment to working with natural systems to solve challenges.

People are aware of the flood risks and are interested and open to having a conversation about Nature-based Solutions for flood mitigation. Almost everyone could see the benefits and supported ORC investigating them further.

Most people were either open to having a hypothetical Nature-based Solution on their property or interested in discussing it further. They wanted to understand costs and funding, maintenance or access agreements, and to better understand data and modelling. Some landowners indicated they had land they were ready to offer for discussion and potential implementation now, signalling strong early-stage interest.

There were firm ideas about who should lead future work, with the majority suggesting a catchment- or community-led approach, and ORC's role being to provide a regulatory framework, funding, and technical advice.

Some preferred ORC to take the lead, noting the in-house technical expertise that exists.

There were also suggestions to form regional or catchment-level partnership groups, including mana whenua, landowners, non-government organisations (NGOs), and private organisations—that could contribute funding, technology solutions (e.g., AI), and technical expertise to overcome challenges.

The study revealed significant opportunities to 'work with the willing' and build on the region's enthusiasm for natural solutions. There are significant opportunities to weave Mātauranga Māori and contemporary science together. Co-designing processes that pair cultural indicators (tohu) with scientific datasets would unlock deeper, place-based understanding of flood resilience.

By fostering collaboration and addressing gaps in funding, governance, and technical expertise, Nature-based Solutions could begin to be implemented on privately owned land - helping to create a more resilient and adaptable Otago.

The following themes, along with others, are explored further in this report.

Barriers

Awareness gap (flood benefits): People already value the environmental benefits of Nature-based Solutions however initial awareness of their potential for flood mitigation is low.

Technical language: Technical terms, including 'Nature-based Solutions', and unfamiliar phrasing can be a roadblock to understanding. People suggested talking about individual solutions (wetlands, river naturalisation) rather than using the term 'Nature-based Solutions. Graphics and images were seen as helpful.

Trust and relationships: Building trust with landowners is key to implementing Nature-based Solutions. ORC could consider partnering with third party groups, like NZ Landcare Trust, to support engagement.

Regulatory uncertainty: Inconsistent and evolving regulations create challenges and pessimism, with landowners seeking stability and set rules to enable long-term planning and investment.

Lack of local evidence: A lack of local data, modelling, and New Zealand case studies undermines confidence in Nature-based Solutions for flood management.

Expert advice: Free or subsidised access to technical experts could help landowners confidently implement Nature-based Solutions.

Financial constraints: Compensation was not a primary driver for all landowners, with both productive and unproductive land already being fenced off or offered for projects led by catchment groups and other organisations. For some, however, cost-related concerns remain a significant barrier.

Land access and maintenance concerns: Some people want to discuss possible access, maintenance, and reporting agreements with ORC before considering Nature-based Solutions on their property.

Opportunities

Mātauranga Māori and contemporary science: Conversations with members of the Ōtākou and Puketēraki hapū and whānau highlighted the need to merge Māori environmental knowledge and science. Co-designing processes and pairing cultural indicators (tohu) with contemporary datasets can unlock a deeper understanding of flood resilience.

Build on existing enthusiasm: Many landowners are already engaged with wetland and planting projects and are open to future initiatives, if supported with clear guidance and funding.

Scalable implementation: A tiered approach, where ORC leads high-risk interventions and community groups manage smaller or medium-sized projects, could create a balanced strategy. Identifying natural areas to protect can be as important as finding areas to create new projects.

Clear communications campaign and case studies: Providing local case studies will build confidence and interest among landowners. People emphasised the need for short non-technical documents and videos they could understand quickly. A communications campaign was suggested by some landowners.

Strengthen strategic partnerships: Nature-based Solutions can help various people meet their goals - from flood resilience, water quality, biodiversity to building social licence. Partnering with diverse groups can open up new pathways for implementing Nature-based Solutions.

Crown landowners and larger Otago landowners: Focus on Crown landowners such as NZ Transport Agency Waka Kotahi (NZTA), Department of Conservation (DOC), Pamu and other councils, along with larger Otago landowners such as Ngāi Tahu / Kāi Tahu, forestry, stations and those with land in the upper catchments to scale-up Nature-based Solutions.

Provide clear, practical guidance: Developing plain language resources that explain the benefits, planning and consent processes, and practical steps for implementing Nature-based Solutions will help landowners navigate implementation.

'Normalise' Nature-based Solutions: Integrate Nature-based Solutions into council functions. Prioritise or include green infrastructure in investment decisions and ensure funding supports delivery.

Innovative funding and co-investment: Explore new ways to fund projects, including private investment, co-funding and alternative government funding.

Introduction and context

The climate is changing and so must our responses. Globally and in Aotearoa, more frequent and intense weather systems are already impacting communities and ecosystems.

Local landscapes, coastal systems, and freshwater catchments are facing pressure, and the interconnected risks of climate change, biodiversity loss, and land degradation demand integrated solutions.

Nature-based Solutions are recognised, nationally and globally, as effective tools for climate adaptation. Often described as 'Indigenous knowledge in action', they offer practical and adaptable additions to complement traditional and often rigid 'hard engineering' flood mitigation options.

They are included in national direction, with Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy, the National Adaptation Plan, and the Climate Change Strategy all calling for their integration into adaptation planning. Globally, they are aligned with frameworks such as the Kunming–Montreal Global Biodiversity Framework, which prioritises equitable, nature-led responses to climate impacts. They are also highlighted in ORC's Strategic Directions 2024–2034 as key tools for building climate resilience, restoring ecosystems, and supporting community wellbeing across Otago.

Strengthening climate responses through nature

In late 2023, the Ministry for the Environment provided funding to allow 15 councils to explore how nature-based interventions might be used to mitigate river or coastal flood risk.

The Otago Regional Council (ORC) commissioned two related studies:

- a **Feasibility Study**, modelling the potential flood mitigation benefits of three Nature-based Solutions interventions in Te Hakapupu / Pleasant River catchment, and
- this **Engagement Study**, exploring landowner perspectives on implementing Nature-based Solutions on private land.

The Engagement Study and this report build insight from surveys, interviews, and existing reports. It reveals high interest in exploring Nature-based Solutions for flood mitigation but also highlights where systems are not yet ready—whether due to the lack of national direction, policy and funding, policy ambiguity, lack of knowledge and technical guidance, or gaps in long-term funding pathways.

The focus is primarily on freehold land, though the findings may have relevance for leasehold, Māori land, and Crown-owned areas, particularly where collaborative or catchment-level approaches are possible.

The study, and this report is intended to start conversations and inform ORC's strategic planning and investment, support region-wide implementation efforts, and contribute to the broader national conversation about how systemically enabled, locally led Nature-based Solutions can build climate resilience in Aotearoa.

Facing the future

Flooding is Otago's most frequent Civil Defence emergency, threatening homes, land, infrastructure, and the environment. ORC is seeking smarter, more sustainable ways to manage and reduce this risk.

For generations, iwi, landowners and communities in Otago have worked with nature—restoring wetlands, planting, and managing land—to protect waterways and biodiversity. While not always aimed at flood resilience, these efforts show a strong local legacy of using natural systems to solve complex challenges.

ORC's strategy already blends hard infrastructure (like culverts and floodbanks) with natural tools (like planting and river restoration), supported by drainage management, community education, and emergency response.

As climate change intensifies flood risks, traditional engineered solutions alone won't be enough. They'll need to be supported by adaptable approaches - like Nature-based Solutions - that can flex, absorb, and respond to a changing environment.

Flooding is Otago's most frequent Civil Defence emergency—putting homes, land, and infrastructure at risk.

What are Nature-based Solutions?

Nature-based Solutions harness the power of nature to tackle environmental challenges like flooding, erosion, and water quality issues.

By working with natural systems instead of trying to control or override them, Nature-based Solutions offer practical, sustainable ways to help protect people, property, and ecosystems.

These solutions involve actions like restoring wetlands to soak up floodwater, planting trees to stabilise soil and reduce sediment runoff into rivers and estuaries or creating riparian buffers to protect riverbanks from erosion and improve water quality. But they don't stop there, Nature-based Solutions often bring extra benefits, like boosting biodiversity, creating habitats for native species, and even supporting new economic opportunities through eco-tourism or sustainable farming.

Nature-Based Solutions don't just manage water, they can help restore mahinga kai, enhance biodiversity, and regenerate native habitats. They also support opportunities for eco-tourism and regenerative farming.

Flood mitigation

Flood mitigation is a prime example of how Nature-based Solutions can be put into action. These solutions work by harnessing ecosystem services (the benefits provided by healthy natural systems) to manage water flow, reduce flood risks, and protect people, property, and infrastructure.

Examples of Nature-based Solutions for flood mitigation include:

- **Wetland restoration:** Wetlands act as natural sponges, absorbing excess water during heavy rainfall and reducing flood peaks downstream.
- **Planting trees:** Trees in catchment areas help slow water runoff, stabilise soil, and reduce the impacts of flash floods.
- **River naturalisation:** Restoring rivers to their natural courses allows them to meander and overflow into floodplains, reducing the impact of flooding downstream.

A nature-based approach to flood resilience in Otago

The diagram below, shared with participants during the Engagement Study, highlights the types of Nature-based Solutions that could support flood mitigation in Otago.

Potential additional benefits

Nature-based Solutions improve water and air quality and enhance biodiversity by creating space for threatened native species. Internationally, we've seen benefits to farmers and communities, and opportunities in areas such as restoration, sustainable farming and eco-tourism.

- Slow water runoff
- Biodiversity enhancements/ habitat creation
- Erosion control
- Carbon sequestration/ climate mitigation
- Improved soil quality
- Stormwater management
- Improved air quality
- Filter contaminants
- Improved water quality

Elasticity in flood management

Unlike traditional flood infrastructure, which is built for fixed capacity, Nature-based Solutions are integrated into the landscape and designed to absorb, store, and redirect excess water. While they also have a maximum capacity, their placement often means that overflow affects less critical areas, such as fields or pasture, rather than infrastructure, homes and businesses. They can work alone or alongside floodbanks, drains, and other hard-engineered structures, easing pressure on these systems during intense rainfall. This layered approach reinforces existing flood defences, helping them cope with changing conditions while reducing long-term damage. By working with natural processes, it can also make flood management more durable, cost-effective, and environmentally sustainable.

Adaptive resilience means strengthening existing flood defences so they can respond to change—not just withstand it. It's about bending with the pressure, absorbing shocks and adjusting to reduce long-term costs and damage.

The official definition

Ministry for the Environment
Manatū Mō Te Taiao

Te Mana o te Taiao-Aotearoa New Zealand Biodiversity Strategy 2020 defines Nature based Solutions as "solutions that are inspired and supported by nature, cost effective and simultaneously provide environmental, social and economic benefits and help build resilience."

UN environment assembly

Internationally, the Fifth Session of the United Nations Environment Assembly formally adopted (in its UNEA-5 resolution) the definition of Nature-based Solutions as "actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits". The UNEA recognises that Nature-based Solutions "respect social and environmental safeguards, including those for local communities and Indigenous Peoples".

Case studies

There are hundreds of case studies globally which showcase how governments and landowners have collaborated to significantly reduce flood risks.

Websites such as this provide an overview: www.nature4climate.org/nature-in-action/case-studies/

This image of a digital case study map from the Nature4Climate website showcases global examples of nature-led flood mitigation.

Whangārei Urban Awa Project – New Zealand

Lead agency

Northland Regional Council (in partnership with Whangārei District Council, hapū, and community groups

Approach

Collaborative urban stream restoration using riparian planting, fencing, and landowner engagement to improve water quality and flood resilience.

Land use

Mix of public and private land across four urban catchments, with up to 80% subsidies offered to landowners for fencing and planting.

Outcome

Improved flood buffering, reduced sediment and nutrient runoff, enhanced biodiversity, and strong community ownership of local waterways.

Lower Danube Green Corridor – Bulgaria, Romania, Ukraine, Moldova

Lead agencies

World Wildlife Fund (WWF) and four national governments

Approach

A multi-country restoration of floodplains and wetlands along the Danube River to reduce flood risk and support local economies.

Land use

Governments worked with landowners to re-flood former agricultural lands, often through voluntary agreements or compensation to re-introduce natural flooding patterns in areas that were previously drained.

Outcome

Over 600,000 ha of floodplain restored or protected, reducing flood peaks, improving water retention, and boosting biodiversity across four countries.

Wallasea Island Wild Coast Project – United Kingdom

Lead agency

Royal Society for the Protection of Birds (RSPB) in partnership with UK government and Crossrail

Approach

Managed realignment of coastal land to create wetlands, mudflats, and saltmarshes for flood protection.

Land use

Agricultural land was purchased and repurposed for habitat restoration and flood mitigation.

Outcome

It's one of Europe's largest coastal habitat restoration projects, reducing flood risk while enhancing biodiversity.

Darkwoods Forest Carbon Project – Canada

Lead agency

Nature Conservancy of Canada

Approach

Large-scale land purchase to prevent development and restore natural forest and watershed functions.

Land use

Privately owned land was purchased to protect 17 watersheds and improve flood resilience.

Outcome

Enhanced water regulation and biodiversity protection across 54,000+ hectares.

Gathering insights - how we engaged

This engagement study set out to capture a high-level snapshot of perspectives on Nature-based Solutions.

Rather than aiming to represent every stakeholder or landowner, the study gathered indicative insights to inform next steps and spark further conversations and collaboration.

Because of the exploratory nature of the project our engagement strategy was to:

- Build on the relationships ORC has in Te Hakapupu / Pleasant River catchment and work with the Partnership Group.
- Involve organisations or individuals already working with ORC, within catchment groups or on regional projects such as Hill Country Erosion and Wetland Mapping.
- Ask people we interviewed to share the survey and suggest others to take part in interviews.
- Include larger landowners or organisations ORC might want to partner with in the future.
- Share information via ORC and partner communication channels, encouraging people interested in taking part to contact us.

A targeted list of landowners, individual members of the Ōtākou and Puketēraki hapū and whānau and key organisations was developed with ORC staff and catchment advisors. Of those approached, most agreed to take part, resulting in 26 interviews.

Responses have been anonymised and grouped into key themes. This ensures individual privacy while still reflecting the valuable insights shared during the engagement process.

A digital survey was shared via ORC channels such as Onstream and to individual landowners via the catchment coordinators, with 18 people filling in the survey. Some of the individuals who were interviewed also shared the survey with contacts and other individual landowners. The survey was live from January until 30 June 2025.

Interviews

In-depth interviews with landowners and regional stakeholder representatives.

Digital survey

Shared via catchment groups, people we interviewed and targeted landowners.

Communication channels

- ORC and partner newsletters
- Social media posts
- Media release

Past insights, present perspectives

This report also draws on insights from past engagement and existing reports.

Sources reviewed include:

- Toitū Te Hakapupu Restoration Project
- Otago Catchment Stories Summary Report
- Forestry Catchment Plan
- Indigenous Pacific Approaches to Climate Change: Aotearoa/New Zealand (2018)
- NIWA Literature Review
- MfE NbS for Flood Mitigation Workshop Summary
- ORC NbS Engineering Approach and Strategic Plans

Insights from hapū: Foundations for collaboration

Insights were gathered from individual members of the Ōtākou and Puketēraki hapū and whānau, contributing personal perspectives to the engagement process. While these voices reflect lived experience and local knowledge, further co-design and consultation with Iwi and hapū will be required.

What people told us

"We need councils to make it easier for landowners to use Nature-based Solutions for flood protection. Right now, the planning and consent process feels designed for big developers, not locals trying to protect their land."

"Aren't we really talking about traditional indigenous knowledge? Are Nature-based Solutions our indigenous knowledge put into practice?"

"I think the response from the community would be positive."

"This kind of thing is already happening but not for flood resilience. If some mapping were done and some places found that could make a difference, with a bit of funding we could do this ourselves. Maybe government and council is the technical support and funder rather than the leader?"

"Building trust with landowners would be crucial. There is often suspicion towards council and the government. There is too much change. We start things, then things get stopped and it is hard to trust. I'd even suggest government and council take a back seat on this."

"They need to be in the upper parts of the catchments to help reduce flood risk in the lower catchment."

"Our environment can teach us how to adjust if we pay attention to it. How do we better merge science and traditional knowledge?"

"It is a hard ask for farmers to take on another responsibility, if they were expected to maintain a Nature-based Solution on their farm, unless the financials stacked up."

"Maintenance of the solution in terms of weed or pest control, access by the public and the legal structure of how ownership of the land might change are my worries."

"Do we really know how effective they are? That seems important."

"There is a constant 'flip-flop' on government regulations, which makes work for ORC and landowners. People are tired of keeping up. Is this just the next shiny thing? If I put effort into this, will it lead somewhere?"

"I have a lot of land that I have been wanting to plant out, but I just have not got the spare money. I believe there are lots of us who would do more of this type of work ourselves if there was more funding"

"I would want proof, not from other parts of the world but from New Zealand. Does this stuff really work and would it work here in Otago? How much would it cost and is it worth investing in?"

"ORC has a poor reputation amongst some landowners, partly due to compliance and enforcement roles conflicting with technical advisory roles. This has led to trust issues, which could make this a challenge. Getting the right staff involved and senior leaders will help with this."

"Honestly, if the consent form template was better set-up for community and catchment groups rather than developers and this stuff was strategically fast-tracked it wouldn't be so painful, and more people would just do it. There is a fair bit of unproductive land out there that would make sense to do this on, and we all worry about our property and our community."

"Regional rates have increased dramatically in Otago and farmers are concerned about where that is heading. I'm not sure whether Nature-based Solutions for flood mitigation is the best use of ratepayers' money, or if they were best implemented by ORC."

What people told us

"These solutions are not new to Māori. They reflect a chance to return to what we had and there are opportunities to include mātauranga Māori in them"

"I think most people will be happy to put some skin in the game for the good of the region, if ORC and others put some in too."

"Maintenance could be an issue, although landowners do sign maintenance agreements for other projects to get funding, so it is possible."

"My first thought is: 'Sure, I could retire this piece of land, but what am I getting in return?'"

"They can take up space that can be used for farming, it reduces land you can make an income from and growing native plants in central Otago climate is slow and expensive. Anything built needs to fit in with and complement the core basics of farming."

"It would be good to take a more holistic view and be ready to adapt. I worry about all the concrete and how that will adapt to our changing climate."

"Flood risk is not a primary concern for forestry landowners in Otago due to the location of forestry estates, which are typically not in low-lying wetland areas. Work could be done to educate and engage forestry about the broader impacts of flood risk and the benefits of Nature-based Solutions for water management, but we would need solid proof it works."

"I support ORC looking into Nature-based Solutions, but I think the final fix will be a mix of these and traditional methods. I suspect it will be hard for those who have seen other methods work to be open to rates and effort going to something else."

"I do not need data and more and more research. We know this works, let's focus on the outcomes and do it. Instead of spending money on gathering more and more proof."

"I'd want to know if the land would still belong to me or if council or the general public would have access to it before I went too far."

"I'm definitely worried about flooding and forestry slash. Our stream is a trickle but rages at times. We have moved the fencing to suit. Others are doing the same."

"I think this is a good approach but there are a lot of fine details to consider."

"We want solutions that work with the land, not against it, but right now the system isn't set up to support us. Make Nature-based Solutions easier and more accessible, and we'll do the rest."

"Financial constraints are huge. We have done some environmental projects on the farm and have a list of others but can't do them all because of money."

"I think myself and a lot of others would be open to this, but a real concern is who would come on our properties, when and what for. I wouldn't want someone from council or the community showing up whenever they liked. Having agreements around this would make it possible and wouldn't be too hard to agree on."

"I think language is important. You call it a Nature-based Solution, I call it a swamp where I lose my lambs most years. I'd be happy to have someone sort it out, especially if would help with flooding down the way."

Survey snapshot

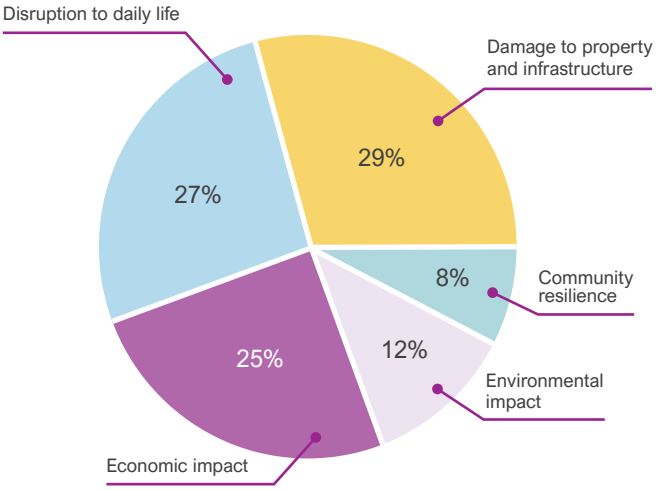
These graphs highlight some of the insights from the digital survey.

Most participants have experienced flooding on their property and expressed support for a variety of Nature-Based Solutions. People felt Nature-based Solutions could work together with existing or new flood infrastructure.

Many also showed interest in participating in education initiatives or pilot projects, in collaboration with iwi and community groups.

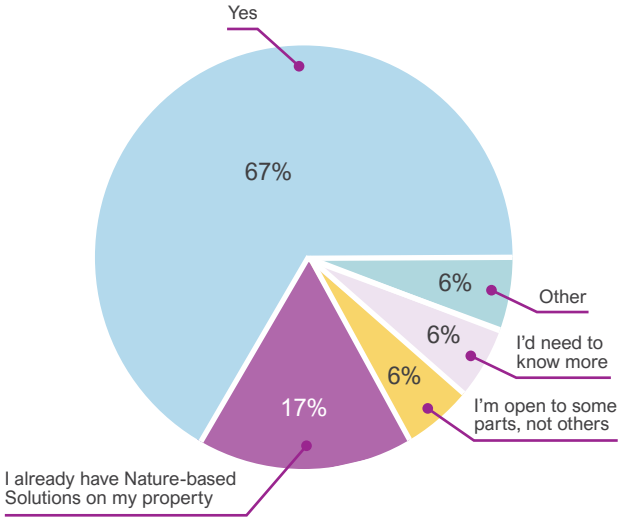
What specific concern(s) do you have about flooding and its impact on you or your community?

The most frequently selected concerns included damage to homes, businesses, infrastructure, and public facilities, power outages, and general disruption. Most participants were less concerned about environmental impacts and biodiversity loss. Highlighting how Nature-Based Solutions can help protect homes and infrastructure by slowing and holding water could help ORC gain support for future projects.



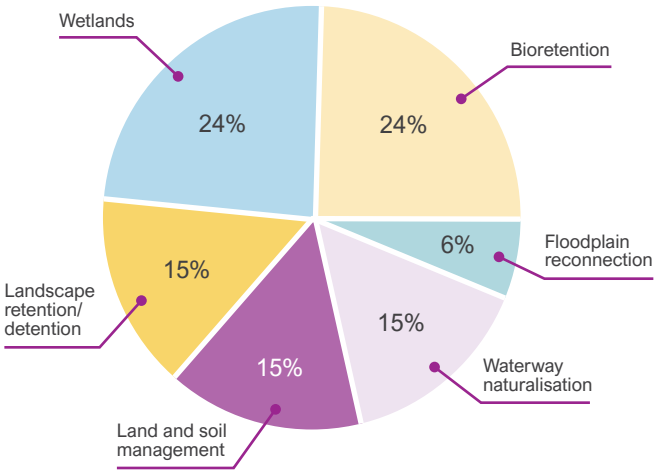
Assuming you were adequately compensated, would you consider making some of your land available for Nature-based Solutions, if it could help reduce flood impacts in the Otago region?

The majority of people would consider making land available, if they were adequately compensated.



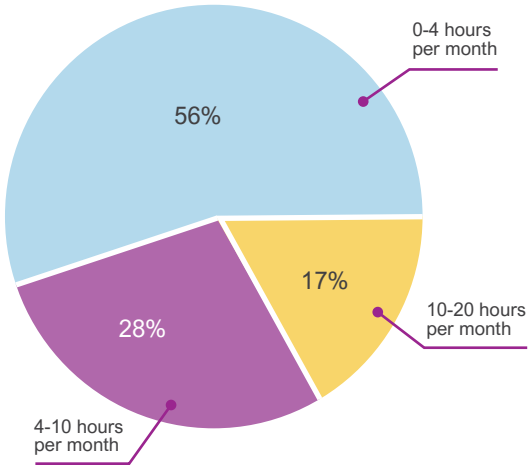
What types of Nature-based Solutions (e.g. wetlands, riparian buffers) might you be open to having on your property?

People shared the kinds of Nature-based Solutions they'd be open to on their land, revealing openness across a range of options.



Assuming you were adequately compensated, how much time and effort would you be willing to put into maintaining a Nature-based Solution(s) on your property?

Most people would be happy to put in their own time to maintain a project on their property. More than half of participants felt that up to four hours a month would be fair, with others happy to do more. Answers to another question in the survey showed more than half of the respondents would be open to allowing council staff or volunteers onto their property to maintain a Nature-based Solution for flood mitigation.



Key findings: Barriers

Limited awareness of flood mitigation benefits

Most landowners were familiar with the environmental benefits of Nature-based Solutions and the various approaches (bioretention systems, wetlands and planting) but some were unaware of or had not considered their flood mitigation potential.

During the interviews and conversations, it did not take long to build understanding, especially with those who work with catchment groups or who had experienced flooding.

Private property access, liability and maintenance

Access, liability, and ongoing maintenance present significant barriers to implementation on certain lands, particularly for forestry and farms. Concerns centre on legal and safety implications when permitting external activities. Some landowners prefer to establish formal agreements - such as MOUs - outlining liability, safety, and maintenance responsibilities before considering access for projects. Others are open to exploring existing models, highlighting successful private land projects and agreements as reference points. Developing clear frameworks that address these concerns collaboratively will be essential.

Lack of local evidence

Locally relevant data, modelling, and case studies were important to some landowners. They are interested in finding out more about global case studies, but the lack of local 'proof' limits some landowners' confidence in adopting Nature-based Solutions for flood management.

Some landowners expressed a desire to see modelling to better understand value.

Some suggested modelling existing projects not originally meant for flood mitigation to gather data about benefits.

Others felt it was more important to be outcomes-focused and 'just get on with it'. There were concerns about spending money on constant investigations when funding could go towards interventions and pilot projects.

Financial considerations

Some landowners highlighted the need for financial incentives to offset the upfront costs associated with implementation. They expressed interest in grant programs, rates relief, subsidies, or tax breaks that could help reduce any financial burden.

Others need to see clear financial benefits or financial support to justify any kind of participation, even future engagement.

Some people raised concerns about loss of income from productive land, issues with future buyers if they sold their land and the cost of their time if they got involved. Some landowners noted that they already engage with ORC and other groups for free, when others are paid for their time.

However, compensation was not a primary driver for all landowners. In Otago, land is proactively being fenced off or offered to catchment groups for projects.

Some landowners we spoke to have land that they would discuss giving up for a Nature-based Solutions to benefit the wider community if there was help to cover the costs of implementation (materials, some labour and professional expertise).

Regulatory uncertainty

New, complex and changing regulations from central and local government, and the uncertainty and complexity they create is a real challenge.

> ***"Look over here, now look over here, now this way. No, back here now."***

Inconsistent and evolving regulations create challenges and pessimism, with landowners seeking stability and clear, consistent strategy and policies around Nature-based Solutions to enable long-term planning.

Councils are not seen as always being equipped to provide the necessary technical support and guidance because central government changes so often. The cost of this to ratepayers and councils, along with wasted time and effort was highlighted often, with landowners commenting on how tired they are.

Accessing technical expertise

Landowners highlighted the complexity of implementing Nature-based Solutions, particularly when involving technical aspects like soil management, wetland restoration, or riparian planting. Some lack the knowledge and skills to effectively design and implement these.

Some people would like to 'get stuck in' but want to check things first to avoid wasting money.

Having access to technical experts quickly and in a more casual environment would be helpful. MfE's Access to Experts, which offered free technical advice, was seen as a successful tool in the Otago region.

Councils are not always seen as equipped to provide the necessary technical support and guidance needed. Or if they are, there are not enough staff to go around. Some landowners noted that ORC staff had the technical ability but some felt that they could not provide advice due to liability issues. Clarifying the type of technical advice ORC staff can give, and which staff can offer expert advice would be beneficial.

> ***"Sometimes I just want to have a 10-minute coffee with someone to check that I'm on the right path. It can be hard to find the right person and I don't want to wait for months or end up with a $20,000 report. I've moved on already."***

Technical language

Many people find the term Nature-based Solutions confusing or too technical. They suggested using plain language and focusing on specific examples such as wetlands, river naturalisation, native planting, or bioretention. Clear, community-friendly definitions, supported by visuals and video, were seen as essential for effective communication.

Different landowners are motivated by different outcomes: some by resilience, property protection, and cost-effectiveness; others by water quality and biodiversity. Tailoring messages to reflect what people care about, and avoiding jargon, will support better understanding and uptake.

> ***"We have enough in our heads, please don't make us learn a new language. Help us understand quickly and we will be keen."***

Trust and relationships

Building more trust and being transparent with landowners is crucial. Suspicion towards the government, ORC and other regulatory bodies could hinder collaboration.

Many individual ORC staff are highly trusted and have good relationships in the community but there is some distrust towards the organisation as a whole.

Landowners are open to discussing Nature-based Solutions further but some fear regulatory repercussions or loss of control over their land if they participate in future projects. Someone asked if ORC or the government could take a role as funders and let community or catchment groups, or an organisation like Landcare take the lead on implementing Nature-based Solutions.

There is a need to foster long-term relationships with key landowners and build trust to get support. ORC could choose staff with solid existing relationships to lead the work or collaborate with trusted third parties or organisations, such as NZ Landcare Trust, Fish & Game or catchment groups and allow them to take the lead on landowner engagement.

Bureaucratic challenges or perceptions of challenges

Regulatory processes are complex and not always fit for purpose.

Landowners said that consent forms and paperwork often feel designed for developers, not for community groups or individuals. Even the perception of difficulty can deter action. Some had tried and found it hard; others had not looked into it because it seemed too complex.

People asked whether councils could make it easier to get approval for projects that protect land and communities from flooding. Suggestions included simplifying guidelines, updating templates, and exploring fast-tracking for Nature-based Solutions. The Fast-track Approvals Act 2024 was mentioned as a missed opportunity, with some wondering why Nature-based Solutions aren't included.

Developing catchment-wide consents for Nature-based Solutions such as planting and wetland restoration was suggested.

Key findings: Opportunities

Leverage existing networks and allow others to lead

People emphasised the importance of leveraging existing networks and community groups to facilitate outreach and support for Nature-based Solutions.

Organisations like Fonterra, Landcare, Ravensdown, Fish & Game are already working in this space, and are well respected and connected.

People noted that allowing others to own relationships, working with catchment advisors and catchment groups, or using trusted third parties can make projects move faster.

Some believe initiatives should be community-led or driven entirely by catchment groups.

Embed Māori environmental knowledge

> ***“This is not new to us. It is a return to what was.”***

Insights were gathered from individual Ōtākou and Puketēraki hapū and whānau members, who emphasised the importance of incorporating mātauraka Māori into decision-making from the outset. Meaningful integration requires involving Māori leaders in strategy development and working alongside Māori researchers and institutions from the start.

Participants highlighted the need to acknowledge whakapapa and honour the deep ancestral relationships Māori hold with land, water, and ecosystems. These connections should guide how Nature-based Solutions are designed and implemented.

There is strong interest in partnering with Otago Regional Council to explore ways of weaving contemporary science with Māori environmental knowledge, unlocking a deeper, more holistic understanding of flood resilience.

> ***“It is not science or traditional environmental knowledge - it is science AND traditional environmental knowledge together.”***

RAG the region

Some landowners and community groups are ready to take action, especially in lower-risk areas with the appropriate support. ORC’s existing RAG (Red-Amber-Green) framework offers a practical way to prioritise catchments by risk level. This could be strengthened by explicitly integrating Nature-based Solutions.

- **Red Areas (High Risk):** ORC takes the lead in managing NbS projects in critical zones with high exposure to natural hazards, such as flood-prone areas near infrastructure or dense populations.
- **Amber Areas (Moderate Risk):** ORC collaborates with trusted groups like catchment organisations, iwi, and environmental groups to co-design and implement NbS projects.
- **Green Areas (Low Risk):** Community groups, landowners, and organisations lead initiatives, with ORC providing guidance, resources, and occasional oversight.

Funding and technical assistance would be tailored to risk levels, empowering landowners to take action while ensuring ORC’s resources are focused where they are most needed. This aligns with global best practices that advocate for a diverse portfolio of Nature-based Solutions to address various scales and contexts of flood risk.

Clear and consistent strategy and regulations

There is a need for clear, consistent policies that support Nature-based Solutions.

Some people suggested that Nature-based Solutions be added to Regional and District Plans and make them the go-to option for resource consents. Others emphasised the need for regulatory certainty and alignment across planning functions.

> ***“I would help, but not if there is a paperwork hurdle around every corner from council or government – the very people asking me to do it. Clear the path for us.”***

ORC has started reviewing policy and strategy frameworks to better support Nature-based Solutions.

GIS and data

People noted the amount of data that is readily available which could help identify high-priority sites for future intervention:

- **Wetland and riparian areas** – Existing wetlands, potential restoration sites, and buffer zones.
- **Flood-prone locations** – Historic flood data, hydrology models, and floodplain maps.
- **Historic wetlands** – GIS layers identifying historic wetlands that could be restored to act as natural buffers
- **Catchment insights** – Land use, soil permeability, terrain, and water flow patterns.
- **Interested landowners** – Mapping those keen to take part in Nature-based Solutions projects.
- **Existing research** – Studies like Dr. Sami Khan's wetland work for Otago and Hill Country Erosion.
- **Mātauranga Māori perspectives** – Incorporating Māori knowledge of ancestral flood pathways, wetlands, and traditional ecological indicators to align NbS efforts with cultural and environmental values.

By combining these layers and partnering with Crown and private researchers, ORC could pinpoint priority sites for wetland restoration, reforestation, and river naturalisation—creating a targeted, data-backed plan for flood resilience.

A spatial planning and prioritisation approach, underpinned by GIS tools, would help ORC pilot projects, guide funding decisions, and collaborate effectively with landowners, catchment groups, and experts.

Work with the willing

Many landowners already contribute land and their own funds to wetland and planting projects for biodiversity and water quality.

People said the existing willingness could be expanded to include Nature-based Solutions for flood mitigation with the right guidance, regulatory support and funding.

Catchment groups and organisations such as Fish & Game, Landcare and Fonterra have put out Expressions of Interest for partially funded projects and have been inundated with interested landowners, who in some cases have invested their own time and money to fence off areas and maintain wetlands and other projects.

Explore what exists

People highlighted available resources and existing information that could help implement Nature-based Solutions for flood mitigation, including:

- The University of Canterbury are developing tools to enhance the accuracy and efficiency of flood modelling: **New flood technology to prepare communities | University of Canterbury**
- Other crown researchers (Scion, NZTA) who have flood modelling and data to build a bigger picture.
- $5 from each hunting licence goes towards projects like wetlands, why not expand it to flood resilience - Fish & Game
- Can resilience funding be expanded to include Nature-based Solutions, or can projects be retrofitted to gather proof for future work?
- Expanding the carbon trading system to wetlands and flood resilience projects.
- Opportunities to add flood modelling into wetland projects to act as case studies.
- Focus on natural areas we have already that may play a part in flood mitigation and protect them.

Build awareness and understanding

Landowners emphasised the need for clear and concise information about the potential benefits of Nature-based Solutions. They noted that information is often hard to find, long winded and technical and does not suit the audience. Others noted that information was often in numerous places online.

> ***"I don't want to go looking for it and read these huge reports that are written for some technical expert's ego. I want to talk to someone, watch a 2-minute video or read something short and helpful that fits the situation I am in."***

People suggested the ORC work with others to agree a one-stop shop to host information and compile best practice, case studies and evidence from MfE pilot studies. This should be led by non-technical people or communications experts, who will focus on the audience needs.

Social licence and community perception

Social licence remains a challenge for industries such as insurance, banking, farming, engineering, and infrastructure and forestry. People wondered if Nature-based Solutions could offer an opportunity for these groups to build and strengthen trust and social licence by delivering visible environmental benefits and responding to community concerns.

By actively contributing to (land, expertise or other) or funding Nature-based Solutions projects or research, these groups could be positioned as partners in regional resilience, benefiting them and Otago communities.

Landowner-led Community of Practice

There was strong interest in connecting with other landowners to share knowledge and experiences. Many saw value in learning from both the successes and challenges of others, and expressed support for fostering a community of practice around nature-based solutions (NbS).

Participants were keen to build this community through pilot projects, local and national case studies, and peer-led events. Practical formats such as on-land gatherings, webinars, and 'lunch and learn' sessions were seen as especially useful for encouraging engagement and shared learning.

Normalise Nature-based Solutions

People asked if or how ORC would make Nature-based Solutions an everyday core part of council functions.

One interviewee, who has past experience working in local government, highlighted the importance of embedding Nature-based Solutions in regional and district plans, prioritising them in long-term investment planning and procurement, and ensuring funding streams support delivery.

> ***"It needs to become so normal, so second nature that we do not even name it. That starts from the inside out and flow through every part of government and council."***

Larger landowners and crown land

People discussed larger landowners in Otago and how they could get involved in large scale projects. Some people felt it would be better for ORC to concentrate on these groups, although it was noted that the formal agreements required could slow things down.

The Crown, Ngāi Tahu, privately owned forestry companies, University of Canterbury, and University of Dunedin along with Dunedin City Council (including council-owned City Forests Limited) are some of the larger landowners in Otago.

This 2019 RNZ article provides a comprehensive list of the type of information that is publicly available, and which could support future research: https://www.rnz.co.nz/news/in-depth/401186/nz-s-top50-private-landowners-revealed

Address the finer details

People talked about the need to start looking into the practical things early - like possible access, maintenance, safe access and financial agreements.

There was interest in reviewing global case studies and further engagement to begin to explore possible frameworks, MOU agreements and ideas together.

It was noted that some Otago catchment groups and organisations such as NZ Landcare have experience in this space and can share what works.

For some landowners, less formal agreements were considered suitable, while others (such as forestry) will require formal agreements covering access, liability and other aspects.

Explore financial incentives with landowners

People encouraged ORC to look into funding options—grants, tax breaks, and compensation schemes—that would make it easier for landowners to adopt Nature-based Solutions. A focus group was suggested as a good way to figure out what could work.

Many felt that aligning council funding with Nature-based Solutions would help, with ideas to include them in existing grants, biodiversity funds, and budgets.

Some pointed out that the way funding is structured now makes it harder for landowners to get involved, and that criteria and project evaluation processes need updating.

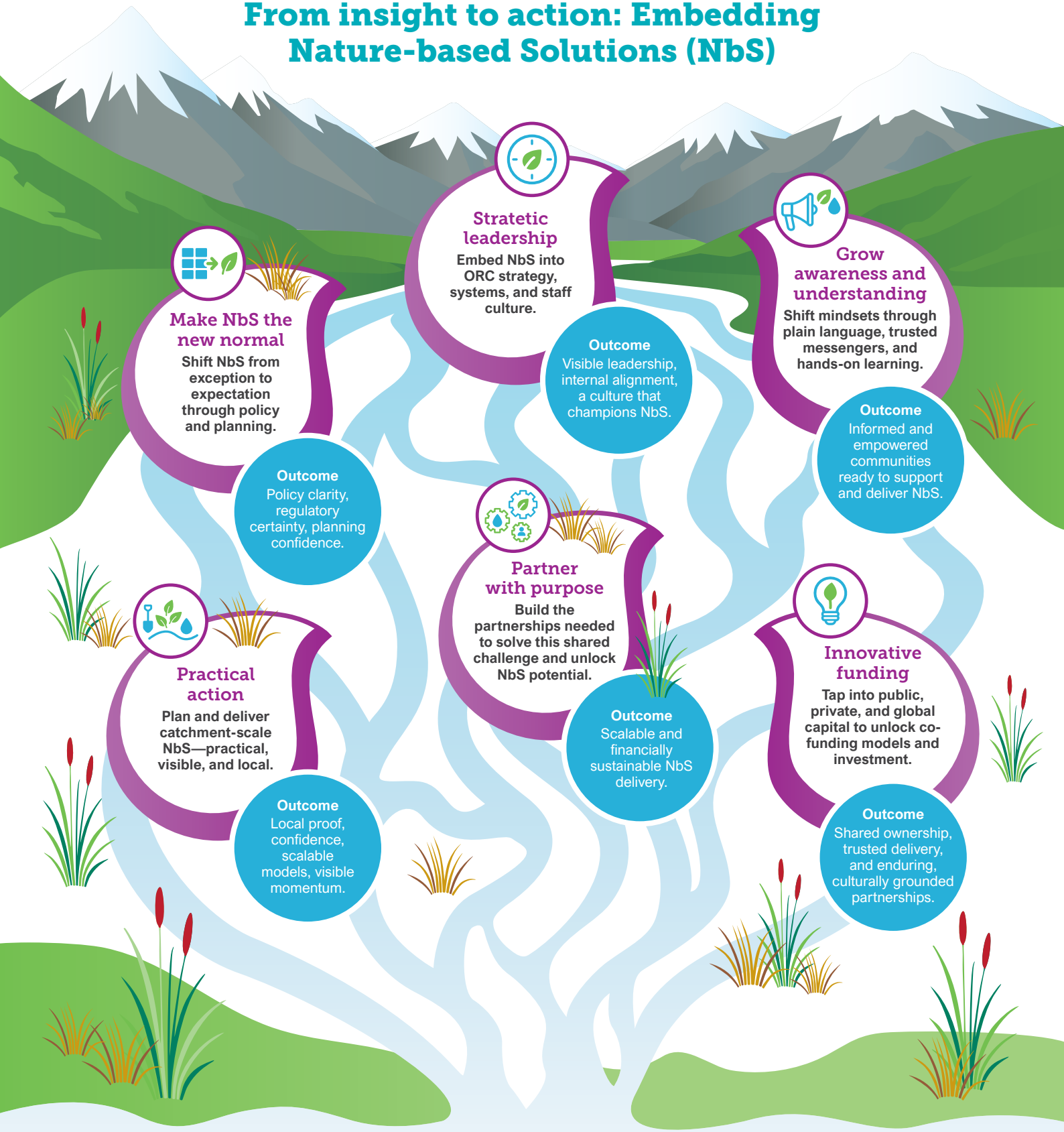
Expanding Nature-based Solutions eligibility in resilience, climate adaptation, biodiversity, and water quality funding was also mentioned, along with a review of community funding sources like the EcoFund.

Innovative ideas

People highlighted ideas for the government or council to consider, which have been built on below:

- Develop data-driven flood mitigation strategies, combining Mātauranga Māori insights, GIS and AI modelling, and hydrological research
- A region-wide approach to funding applications to access both government and private streams.
- Landowners join a regional flood resilience co-op where councils or government provide equipment, seedlings, hydrology modelling, and technical expertise for projects.
- Councils or government collaborate with insurers to create Nature-based Solutions-linked discounts for landowners who implement flood-mitigation projects.
- Wetlands and riparian buffers reduce flood risks, so insurers could offer lower premiums or risk-sharing incentives for private properties that contribute to resilience.
- Councils or universities help track data and prove effectiveness, making it easier to get funding.

From insight to action: Embedding Nature-based Solutions (NbS)



Shaped by Otago voices and global insight, these six streams show what's needed to enable Nature-based Solutions (NbS). Like Otago's braided rivers, they must flow together to support a resilient future. They offer a framework to guide ORC's alignment, partnerships, and future investment in flood resilience.

Strategic leadership

Align ORC strategy, capability, and culture

ORC must lead by example—embedding NbS into its own systems, strategies, and staff culture.

Outcome
Visible leadership, internal alignment, a culture that champions NbS.

Key actions

- Establish a cross-departmental governance group and community of practice with mana whenua representation
- Embed NbS into the LTP, infrastructure strategies, and flood risk frameworks with dual knowledge systems (mātauranga Māori and contemporary science)
- Build internal capability through training, secondments, and shared language across teams.
- Identify ORC-owned land or upcoming projects to demonstrate NbS for flood mitigation
- Draft a relationship matrix for key stakeholders and landowners (compliance and engagement focus) to build trust and clarify roles

Mātauranga Māori is not an add-on

Māori knowledge systems are holistic, place-based, and relational—offering critical insights into land, water, and climate grounded in whakapapa and whenua.

Conversations delete with mana whenua highlighted how place names, oral histories and mātauranga Māori offer critical insights into flood behaviour and land use.

For NbS to be effective, mātauranga Māori must be embedded from the outset, alongside contemporary science, in strategy, planning, and the design processes.

ORC is committed to mana whenua partnership, as outlined in the Significance, Engagement and Māori Participation Policy. Embedding mātauranga Māori into strategy and operationalising it will be a key shift. A move towards NbS and a review of existing systems, and evaluation frameworks alongside mana whenua could support this.

Make NbS the new normal

Shift NbS from exception to expectation through policy, planning and investment.

Outcome
Policy clarity, regulatory certainty, planning confidence.

Key actions

- Integrate NbS into the Land and Water Regional Plan, floodplain strategies, and catchment management frameworks
- Ensure NbS is eligible across climate adaptation, biodiversity, and water quality funding streams
- Prioritise green infrastructure in consenting and infrastructure investment decisions
- Explore a regional catchment strategy using a RAG (Red-Amber-Green) rating system, prioritising high-risk flood zones for larger ORC-led interventions, identify areas where others can lead
- Explore global consents and revise templates to support community- and catchment-scale NbS
- Advocate for a national NbS strategy and long-term regulatory certainty
- Review evaluation frameworks to align with international standards (e.g. IUCN Global Standard) and mātauranga Māori

Grow awareness and understanding

Shift mindsets through plain language, trusted messengers, and hands-on learning.

Outcome
Informed and empowered communities ready to support and deliver NbS.

Key actions

- Launch a regional NbS communications campaign using plain language, local imagery, and relatable stories
- Co-develop “how-to” resources tailored to different audiences, with mana whenua
- Enable on-land learning through training days, drop-in sessions, and peer-to-peer exchanges
- Share case studies and modelling through ORC and trusted partner channels
- Celebrate local leadership through profiles and media opportunities
- Monitor public understanding and support - use the digital survey as a base to track shifts in awareness
- Align with national and other regional campaigns to reinforce messages

Practical action

Plan and implement NbS across whole catchments—integrating hydrology, land use, and community values.

Outcome
Local proof, confidence, scalable models, visible momentum.

Key actions

- Map catchment-wide opportunities (wetland mapping, GIS layers, existing data)
- Retrofit existing biodiversity or water quality projects to include flood resilience outcomes
- Prioritise pilots in upper catchments on large properties to maximise scale, visibility, and co-benefits
- Co-design pilots with landowners and mana whenua; test delivery system (access, maintenance, co-investment)
- Align catchment planning with infrastructure upgrades, climate adaptation, and biodiversity strategies
- Monitor, evaluate, and adapt each pilot to refine policy and delivery models

Partner with purpose

This is a shared problem and strategic partners are essential.

Outcome
Shared ownership, trusted delivery, and enduring, culturally grounded partnerships.

Key actions

- Establish a regional NbS Partnership Forum including mana whenua, Crown landowners (e.g. DoC, NZTA, MfE, LINZ, Kānoa – MBIE, Pamu, private sector and landowners
- Partner with large landowners - Crown, other councils, Ngāi Tahu, universities, stations, forestry and private industry (Santana Minerals) to unlock scale and mutually beneficial opportunities
- Establish catchment-level groups to co-design and co-deliver NbS locally
- Explore flexible leadership models (mana whenua-led, ORC-led, community-led)
- Develop partnership charters or MOUs to guide shared delivery and governance

Innovative funding

Innovative funding and co-investment

Tap into public, private, and global capital to unlock co-funding models and long-term investment

Outcome
Scalable and financially sustainable NbS delivery.

Key actions

- Establish a regional NbS Investment Roundtable with crown, philanthropic, and private sector partners and explore co-investment models and required measurable outcomes
- Host an annual “NbS Investment Forum” with iwi, insurers, philanthropic funders, and businesses to share data, pilot learnings, and co-design funding streams
- Explore co-investment models, ESG-aligned finance, and developer-funded offset schemes
- Co-fund projects with insurers to deliver NbS that reduce flood claims
- Work with central government to apply for global climate grants for large-scale projects (e.g. UNDP, World Bank, Green Climate Fund)
- Identify projects that could be community-led and broker access to funding streams
- Align ORC community funding, and biodiversity/climate grants with NbS outcomes
- Update procurement policies to prioritise NbS and contractors/suppliers who deliver them
- Incorporate climate finance literacy into council and community training
- Bundle projects across multiple catchments. Combine high-risk and medium-risk sites into multi-site funding proposals that attract larger investment pools and demonstrate system-wide impact
- Develop a regional NbS financing roadmap Set out pathways for co-investment, including timelines, partner roles, ROI projections (environmental and financial), and scalability options
- Pilot outcome-based payments and long-term maintenance support for landowners
- Allocate dedicated funding for mana whenua-led NbS projects and monitoring frameworks

Conclusion

On giants' shoulders - building on regional expertise and energy

Iwi, hapū, the ORC and local communities have a long history of working with natural systems to solve challenges in Otago.

While Nature-based Solutions have traditionally been used more to support water quality, erosion control, and biodiversity, this initial engagement shows there is clear interest in scaling up Nature-based Solutions on private property as part of the regional flood resilience strategy.

With some landowners already discussing potential sites on their properties and Nature-based Solutions embedded in national policy, ORC is well positioned to begin to move from exploration and strategy into partnership and delivery.

This is a chance to build on Otago's ecological legacy, enabling practical, locally led solutions through collaboration, innovation, and environmental leadership.

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