New Zealand's Biological Heritage National Science Challenge Strategic Outcome Two (SO2) Scoping Panel Report

Section 1: Creating Impact

HE PAO

Pua te kōwhai ngawhā te kōrari

(The blossoming kōwhai and the bursting flowers of the harakeke)

He tohu Kōanga

(Sure signs of Spring)

Tau mai e Tui ki tō kāpunipuni honihoni kohikohi

(As the Tui flock to the kōwhai, nibbling and collecting, partaking in the nectar)

Hei oranga hei rongoa pania te kiri ki te kōwhai kura

(Obtaining sustenance and wellbeing as they brush against the precious kōwhai)

Haurangi e Tui i te tākoha o te Atua

(Tui becomes satiated and intoxicated on this treasured offering of the Atua)

Rere atu hoki mai

(Flying away and returning)

Parea te ua ki te kōwhai kura

(The precious kōwhai warding off the rain)

Ka whiti mai te rā e ...

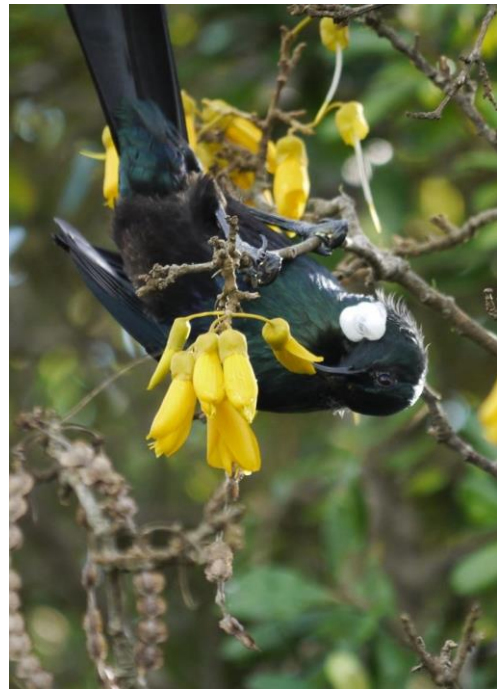(Giving way to the shining sun ...)

Figure *1* - Photo credit: Helen Bucksey

Vision and link to the Challenge mission

This work lies within Impact 1 of the Biological Heritage National Science Challenge: **Whakamana/Empower.** The aim of Strategic Outcome Two (SO2) is to **empower New Zealanders to demand and enact environmental stewardship and kaitiakitanga**. This is an enormous task, but a hugely important one given the crisis we are facing in protecting and restoring our biological heritage. Unprecedented numbers of species are at risk, being threatened or endangered, the loss of significant natural ecosystems continues and, despite our best efforts to halt this loss, we face ever-increasing biosecurity threats exacerbated by globalisation and climate change.

Addressing this significant challenge is critical to the environmental, economic, social, and cultural wellbeing of Aotearoa New Zealand. Success will require that New Zealanders are supported to act and be connected to each other. Providing the necessary tools, capabilities, and tikanga frameworks as a foundation for stewardship action is an essential part of cultivating whakamana under SO2.

Unless New Zealanders are inspired to action and to working together for a common goal, the risk is that the response to our biological heritage crisis will be disjointed, and potentially counter-productive. This need for collectively inspired action and connection is well recognised and called for in national biological heritage strategic documents such as the Biosecurity 2025 Direction Statement. Furthermore, without a connected and coordinated approach we will be unable to achieve the Challenge's objectives of:

- Protecting and managing our biodiversity
- Improving our biosecurity
- Enhancing our resilience to global threats and pressures

Our vision for success within SO2 is illustrated through Te Puāwai – an unfurling koru that means to bear fruit, to blossom, the realisation of latent potential. Te Puāwai (Figure 2) personifies SO2's kaupapa, through which our outcome statement will be achieved. Importantly Te Puāwai not only represents our strategic outcome to realise and empower kaitiakitanga and environmental stewardship in all New Zealanders, but it also represents our commitment to Te Tiriti o Waitangi and the fundamental connection to te taiao, the natural environment.
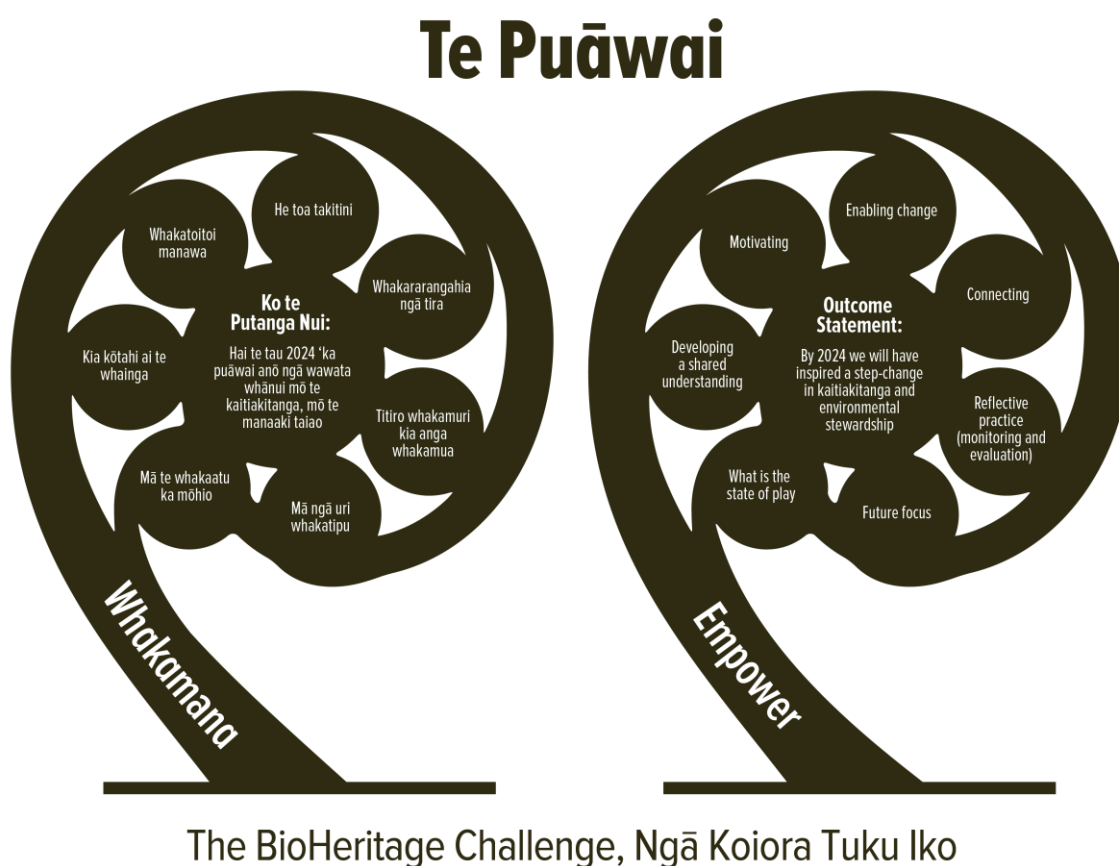

Figure 2 - The kaupapa of Te Puāwai link to the Challenge mission through their support for a national partnership (2. *shared understanding*, 5. *connecting*) to deliver a step change in research innovation (1. *what is the state of play*, 6. *reflective practice*), globally-leading technologies (7. *future focus*), and community and sector action (3. *motivating*, 4. *enabling change*).

The transformational impact will be a meaningful shift towards greater kaitiakitanga and environmental stewardship through the development of resources and processes that continue to contribute beyond the life of the Challenge. This is encapsulated in our goals for 2024.

2024 Goals

By 2024 we will inspire step changes in kaitiakitanga and environmental stewardship, through:

1. Helping local communities to develop and realise their biological heritage aspirations.
2. Developing and supporting the adoption and scale out of tools, capabilities and tikanga frameworks to help agencies, sectors and organisations as they work to exemplify, encourage and enable kaitiakitanga and environmental stewardship.
3. Linking with tool and framework development in other Strategic Outcomes (SOs) to ensure that design and implementation protocols, including related engagement processes, take account of the social and cultural considerations that underpin kaitiakitanga and environmental stewardship.

Research setting

In this section we briefly outline kaitiakitanga, te ao marama, environmental stewardship and behaviour change research to provide a sense of how these concepts are used in this prospectus.

Kaitiakitanga

Relationships are fundamental to the Māori view of the world. Kaitiakitanga exemplifies this as can be seen in the etymology of the term: tiaki (verb); kai (prefix) and tanga (suffix). Definitions of tiaki range from 'to guard', 'to keep', 'to preserve', 'to conserve', 'to foster', 'to protect', 'to shelter', and 'to keep watch over'. The prefix kai denotes an agent of the act of tiaki, hence a kaitiaki is a guardian, keeper, preserver and protector. Adding the suffix, tanga to kaitiaki transforms the term to mean guardianship, preservation, conservation, fostering, protecting, and sheltering.

Within the Māori view of the world, kaitiakitanga can be described in terms of whakapapa (the genealogical origin of all living things) and whanaungatanga (kinship relationships) and is intimately tied to values such as mana (spiritual authority) and mauri (the essential life-force present in all living things). This underpins how we codify, understand and interpret the environment and the part we play as human beings in caring for the environment. Moreover, it fosters intergenerational obligations arising from kinship relationships with the natural world.

For Māori, a spiritual dimension in the kaitiakitanga ethos exists, where Māori recognise the presence of spiritual kaitiaki and the role of atua (gods, spiritual guardians of distinct parts of the natural world) wherein we, as human-beings, acknowledge the presence and role of spiritual kaitiaki and our role as their assistants in caring for the mauri, tapu (sacredness) and mana of the natural world.

Kaitiakitanga exists within Te Ao Māori (the Māori world) view. In this document we employ the term 'Te Ao Mārama' which is often expressed by whakapapa (genealogies) to mean a world of light. Whakapapa is what connects all life forms, such as plants, birds and animals in the environment, together in a symbiotic way. Te Ao Mārama conveys knowledge of the interaction between human beings and the environment, and provides the basis for Māori kinship relationships to all living elements in the environment. Te Ao Mārama acknowledges the Creation and the Creator in the whakapapa and practice of karakia (traditional forms of sacred chants that acknowledge the Creation and the Creator) and all other forms of oral narratives. We are not separate from the environment – we are one with the environment.

These terms convey knowledge about existence itself and reiterate the interconnection between human beings and the environment as fundamental for food, shelter, recreation, cultural practice, arts, and human well-being, providing the basis for human survival; inferring human obligations to the natural world; and giving meaning and relevance to the spiritual and tangible dimensions of life.

Supporting stewardship in action

Environmental stewardship is becoming popular as a concept for describing well-meaning action in pursuit of sustainability. Within the sustainability and resilience fields particularly, recent interpretations of environmental stewardship refer to the active shaping of trajectories of social-ecological change, in ways that take account of complexity and the intertwined relationships between humans and nature, and support social justice and well-being.

Stewardship actions can be taken at a number of scales – from local to global – and in both urban and rural contexts. While global efforts are certainly required, they need to be supported (and even catalysed) by local actions. One way that people get involved to respond constructively to external drivers of change, and promote and demand sustainability, is by using their own skills and knowledge to contribute to local environmental and conservation stewardship activities. Thus, Strategic Outcome Two has a focus on enabling and empowering the central role of local people in caring for the environment that surrounds them, that they feel connected to, and in some contexts that they depend on for their livelihoods, culture and food.

Environmental stewardship actions can be carried out by individuals, groups and communities, or multi-stakeholder networks and partnerships – all operating at a range of decision-making levels and at different geographic scales. Often stewardship concepts are articulated as bounded by either intrinsic (nature has inherent worth) or instrumental (nature is useful for humans) values. However, recent research suggests that stewardship actions may be better understood in terms of valued reciprocal relationships between humans and non-human life. This focus on the relational aspect refers to a range of values including a human sense of connection or kinship with other living things, and it is reflexive and expressive of care, identity, belonging and responsibility.

Taking action is the central focus of any discussion of environmental stewardship. The stewardship actions of local actors can emerge informally through day-to-day decision-making, can be based in formal or informal decision-making processes involving local collectives or partnerships, or can be mandated from formal governmental requirements. Within Strategic Outcome Two there is an emphasis on a number of activities that support social stewardship – as indicated in Te Puāwai. These activities are fundamental to local stewardship, however these activities alone do not improve the environment or social wellbeing. The premise is that through supporting activities such as developing shared understanding, motivations, and building networks we can indirectly encourage and enable the direct actions of a range of actors to protect, restore or more sustainably use the environment. In many cases action on the ground may also include intermediate outcomes from other Biological Heritage SOs in addition to operational resources from a range of stakeholders.

Creating a step change in action

In the past we have relied on three key approaches to bring about change: legislation and regulation; market forces and material incentives; and (largely one-way) communication and education programmes. However, recent research is highlighting that we need to move far beyond these largely one-way communication-based approaches to seeking practice changes. Our choices are not made solely on the basis of fully conscious, deliberate, or even rational processing of information. We are emotional, we are embedded in social and cultural networks, and are influenced by the context of decisions and the way choices are presented.

Building on these new behavioural insights can enable the step change we are looking for. They remind us to focus on non-conscious as well as conscious drivers of behaviour, the need to focus on the setting of our behaviours as well as internal motives and drivers, and the need to focus on behaviours rather than solely beliefs, attitudes or intentions. Conventional legislation, incentives and education still have their place and may still be the most effective intervention in some situations. However, where that is not the case, or where implementation and enforcement is impossible, these behavioural tools offer both an alternative and a new lens through which to evaluate the use of conventional tools. Similarly, if

we are to support place-based stewardship practice in local landscapes that account for the growing range of functions such landscapes perform, then of necessity we need to consider how to more effectively harness and coordinate across the multiple stakeholders who live in, work in, manage, utilise and govern these places.

Key areas of research

From a science/mātauranga landscape perspective a great deal of thought already exists in a range of areas that relate to environmental stewardship and kaitiakitanga. In terms of science this includes studies on disciplinary areas such as environmental ethics from humanities and social sciences, learnings on adaptive management, transdisciplinary and interdisciplinary approaches, collaboration from, for example, the sustainability and resilience fields, values from psychology, community and place-based work, and indigenous studies.

In the last 3-4 years some initial attention has been given to develop framing that brings these diverse research interest areas together under the concept of environmental stewardship (Enqvist et al. 2018, Bennett et al. 2018). Such a framing is not supposed to be definitive – but to support the concept of stewardship as a boundary object and form a basis for dialogue across different knowledge systems, cultures and research disciplines. As figure 3 shows, one emerging framework is based around three main dimensions: care, knowledge and agency. This can also be seen as similar to the concept of recognising the need for heart, head and hands.

Care
(desire to look after something – informed by values, meanings, emotions, sense of attachment, kinship, etc.)

Motivation

Ethics

Knowledge
(refers to information, know how and ways of knowing that inform and characterize different types of stewardship action, also includes processes and practices of knowledge management and sharing. Recognises local, traditional, science knowledge systems)

Stewardship action

Agency
(abilities and capacities of individuals, groups and networks to engage in collective action, as well as capitals - economic, technological, etc. Power and politics are important.)
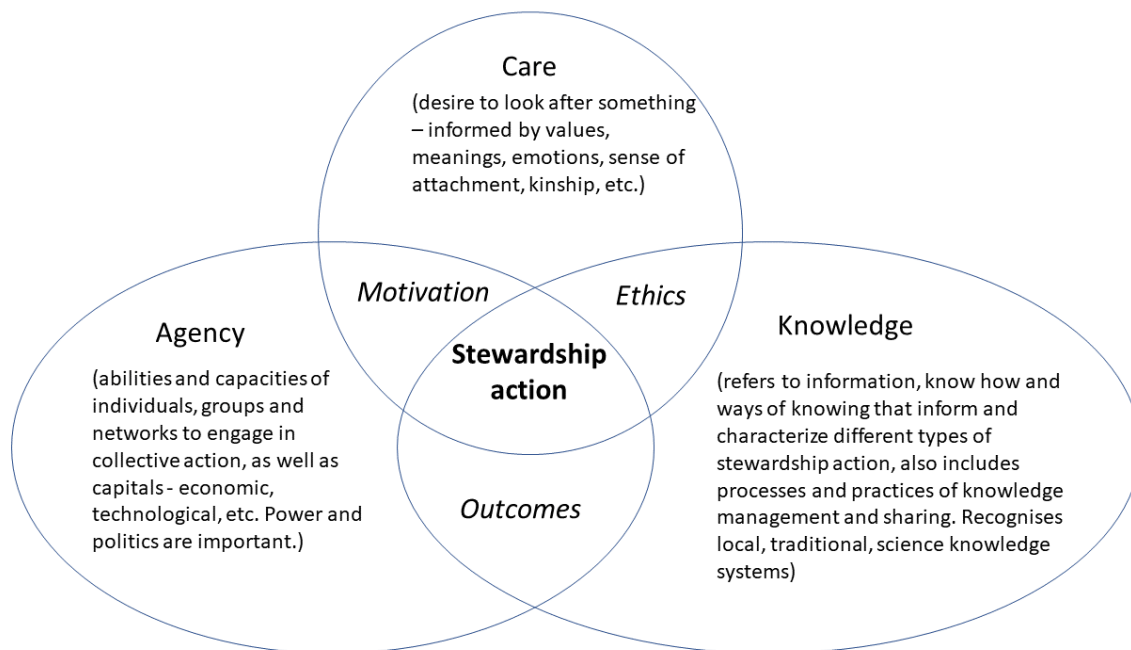
Outcomes

Figure 3: Stewardship as a boundary framework for bioheritage research: linking care (hearts), knowledge (heads) and agency (hands). Source: Enqvist et al. 2018.

Such a framework also needs to highlight a place for different disciplines to see how they may best contribute and fit. By encouraging the mutual consideration of care, knowledge and agency, the framework as a whole points towards the importance of developing more holistic, non-hierarchical and non-linear understandings of stewardship.

Essential activities and key steps

This section outlines the principles that underpin SO2 research, the methodological approach that helps the research team to embody these principles through the research, and the broad sequence of research steps involved in achieving the goals.

Guiding Principles

- We give effect to Te Tiriti o Waitangi.
- We give equitable consideration and implementation of Te Ao Mārama (including understanding, values, approaches, and opportunities).
- We value relationships, collaboration, partnerships and empowerment.
- We value human-centred design.

Methodological approach

In keeping with our guiding principles, we are taking an 'action research' approach and developing our work around active case studies. Action research comprises a family of research methodologies which aim to pursue action and research outcomes at the same time. It therefore has some components that resemble consultancy or change agency, and some that resemble field research. The focus is action to improve a situation and the research is the conscious effort, as part of the process, to provide new knowledge (e.g. research papers). Within this broad definition there are four basic themes:

i)   Collaboration through participation
ii)   Acquisition of knowledge
iii)   Social change
iv)   Empowerment of participants

The basic research methodologies used are similar to those used in other social science and kaupapa Māori approaches (e.g. interviews, participant observations, focus groups, workshops, hui, etc.)

A kaupapa Māori approach advocates research for Māori by Māori, and is underpinned by principles such as tino rangatiratanga (the self-determination principle) and taonga tuku iho (the principle of cultural aspirations). Research for Māori, by Māori, carried out in a kaupapa Māori way and a Māori lens ensures the integrity or mana of the knowledge and data collected. Research conducted in this manner is transformational for both local communities and researchers. It maintains the sovereignty (tino rangatiratanga) of that body of knowledge (mātauranga) that has been passed down to the current generation – the generation that are now the kaitiaki of that knowledge. Knowledge, the way that local communities such as whānau and hapū know that knowledge, contributes to and underpins a 'way of being' and forms the backbone of the mātauranga Māori research approach. Therefore, operating within a kaupapa Māori framework demands a research process that not only asserts kaupapa Māori ethics informed by tikanga Māori, but allows for a collaborative approach where key stakeholders have input into the final development of the proposal (Pihema, 2003). The collaborative process aligns with the wider kaupapa Māori approach to research.

Any kaupapa Māori research approach adopted within this SO will utilise a social science, mixed methods approach (Golafshani, 2003). This employs quantitative and qualitative methodology that overcomes inherent limitations associated with each approach, and builds on their respective strengths. This combination of methods can be used to cross-check the validity and reliability of the research or the evaluation of its findings (Golafshani, 2003). Qualitative action research predominates, where an

interactive inquiry process is underpinned by qualitative techniques such as interviews, focus-groups and narratives, to measure attitudes, values or trends (Pihama, 2003). Quantitative research will provide a direct measure of attitudes, values or trends via surveys and data analysis. Action research aims to solve particular problems and produce guidelines for best practice, while keeping the 'community of practice' at the heart of the research.

These relational approaches to research offer significant potential here, in conceiving of the world not in terms of static or categorical identities, but rather in terms of "dynamic, unfolding relations" (Emirbayer, 1997, p. 281). Relational approaches to social–ecological phenomena are advancing in a number of different areas. These include relational values in conservation and ecosystem management to account for the reciprocal flows between nature and human well-being (Chan et al., 2016; Pascual et al., 2017), and sense of place research to better assess the dynamic relations between mind, body, culture and environment (Raymond et al., 2017). Adopting relational approaches in stewardship practice might entail a greater emphasis on building meaningful and sustained connections between people and their environment, and an equal focus on the quality of social processes as well as environmental and social outcomes (e.g. Caillon, Cullman, Verschuuren, & Sterling, 2017).

Our case-based approach to stewardship is place-based and action oriented. It aims to link social sciences (looking at improved management processes for involving multi-stakeholder parties) with technical research and operational practice. We think this approach will be particularly relevant for exploring the potential in simultaneously pursuing the 'low-hanging fruit' of incremental change, and encouraging thinking around identifying the system-level changes towards the transformative shifts that long-term sustainability is likely to require.

Goals 1 and 2 (essential activities and critical steps)

Goals 1 and 2 are linked through methodology – they look respectively at how kaitiakitanga and environmental stewardship can be expressed. In Goal 1 this is through place-based, bottom up initiatives; and Goal 2 through top-down, regional or sector-wide initiatives that can link across communities, hapū and rūnanga. The underlying premise of the research is that both top-down and bottom-up perspectives are important for supporting New Zealand's biological heritage to flourish. The table is indicative, rather than prescriptive.

Goal 1: Helping local communities to develop and realise their biological heritage aspirations.

Goal 2: Developing and supporting the adoption and scale out of tools, capabilities and tikanga frameworks to help agencies, sectors and organisations as they work to exemplify, encourage and enable kaitiakitanga and environmental stewardship.

Goals: 1 and 2	Improving opportunities for kaitiakitanga and environmental stewardship
	These goals are presented from both a stewardship and kaitiakitanga perspective. They are designed to work in parallel and will have deliberate nodes of interaction that are designed to be efficient, allow cross-fertilisation and innovation.
Year 1	**Laying the groundwork – Kohikohi ngā kākano, whakaritea te pārekereke, kia puāwai ngā hua (gather the seeds, prepare the seedbed carefully, that you may reap the rewards of much food).**

The fundamental first step is forming the research team and building relationships and expectations with potential case study actors, along with the wider end user community interested in this research. Developing framings and understandings around environmental stewardship via literature reviews, interviews and analysis. Developing a way of understanding the systems involved and agreeing on useful framings and questions to ask. Holding initial workshops with:

i) key agency and sector organisations; and
ii) communities to identify case studies that provide opportunities to work at these different decision-making levels.

Developing wider practitioner participants to support analysis, and identifying individuals who form the key communities of practice (networks) in this area as part of scaling out results. Subsequent workshops will be held with individual case study actors to build relationships and shared agreements on research interactions and engagement.

Kaitiakitanga as a system of localised knowledge and practice is already well established and expressed amongst mana whenua groups who have authority over this body of knowledge. Therefore, establishing relationships with those communities is a critical first step towards establishing and confirming shared expectations of any collaboration under this SO. This will be achieved using kaupapa Māori approaches that will, where possible, be conducted using approaches and locations that are conducive to those communities of kaitiaki. Beyond questions relating to establishment and operation of a research team, it is expected that questions to be addressed would include developing a process for identifying and selecting case studies that provide insight and opportunity to work at different levels of kaitiaki expression and impact. These will provide valuable information on how to leverage and power-up kaitiakitanga more broadly.

Years 2-3	**Understanding the system – Kia mārama ai te horonuku (awareness of the landscape).**
	Initiating work with community- and agency-based case studies (looking for a few in each area), looking at interactions between actors and different levels, priorities, etc. Research methods to include systems analysis, focus groups, ethnographic fieldwork, participant observation, etc. 'Making sense' workshops will involve case study participants and other stewardship community of practice members in the synthesis and analysis of the research. We will identify barriers and leverage points for change. We will synthesize and analyse via 'making sense' workshops at both case study and collective case study levels. The expression of kaitiakitanga in Aotearoa New Zealand today is directly linked to our colonial history and decision-making by the Crown. Understanding the legal and policy structures that inhibit the expression of kaitiakitanga by communities is a crucial piece of the puzzle towards re-establishing kaitiakitanga as an approach for reversing our bioheritage issues. The research methods detailed above will also be incorporated within a kaupapa Māori framework and be followed by hui at the case studies, aimed at identifying barriers for participation and opportunities to leverage positive change. Similarly, the analysis and synthesising will be supported via 'hui whakamārama' at the case studies.

Years 3-4	**Improving the system – Ko te piko o te māhuri tērā te tupu o te rakau (the way the sapling is shaped determines how the tree grows).**
	Undertaking research to identify how to improve the support of environmental stewardship activities. Working within individual case studies to help key actors characterise processes and how they could be optimised to be more supportive. We can work with linked sets of instructional and assessment tools to provide tailored guidance that can be adapted for use in different settings. This approach can focus on the lessons from specific stewardship elements – such as actors, actions, local capacity, governance and interventions – and synthesise these findings to better understand the effects of different elements on stewardship outcomes. Both planning and evaluative methodologies will be used – theories of change, logic models, rubrics (performance assessment tool), etc. – to encourage and support change at a systemic level. Empowering kaitiakitanga through targeted support will be the focus of investigations with our kaitiaki community case study partners and key actors/enablers. This will improve the efficiency and nature of any support. We will adopt similar approaches and methodologies as described above.
Year 5	**Scaling out – Mā ngā pakiaka e torona atu rā ka tū pakari te rākau (it is the extensive spread of the roots that enables the stand of the mighty tree).**
	We will develop both products (guides, indicative tools, training workshops, etc.) and (learning-based) processes that can be used by DOC, MPI and other agencies to scale out the research outlined here. We will document the lessons learnt in various ways, such as refereed journals, seminars, etc.

Goal 3 (essential activities and critical steps)

This goal recognises that many of the SO2 areas of research can be utilised to support the more technical orientation and outcomes of other SOs.

Goal 3: Linking with tool and framework development in other SOs to ensure that design and implementation protocols, including related engagement processes, take account of the social and cultural considerations that underpin kaitiakitanga and environmental stewardship.

It also recognises that there are areas within the wider BioHeritage Challenge where different applications can contribute towards a set of case studies, through which best practice learnings can be developed. Figure 4 illustrates an example of this cross-challenge approach. Such approaches contribute both to the range of desired Challenge outcomes, but also to this new way of developing inter- and trans-disciplinary research approaches. Areas where we could look for a step change can focus on areas that have been identified as challenging. For example, how to more closely link across the biophysical and social sciences, and the biophysical and traditional knowledges systems and cultures.

The genuine inclusion of communities in research and stewardship practices has the potential – if done well – to help improve the fit of stewardship interventions and increase the likelihood of success. In particular, they will look to well-implemented participatory methods of engagement – human-centred

design thinking (co-design), adaptive co-management, integrated knowledge management etc., for innovation in the design of stewardship programmes.
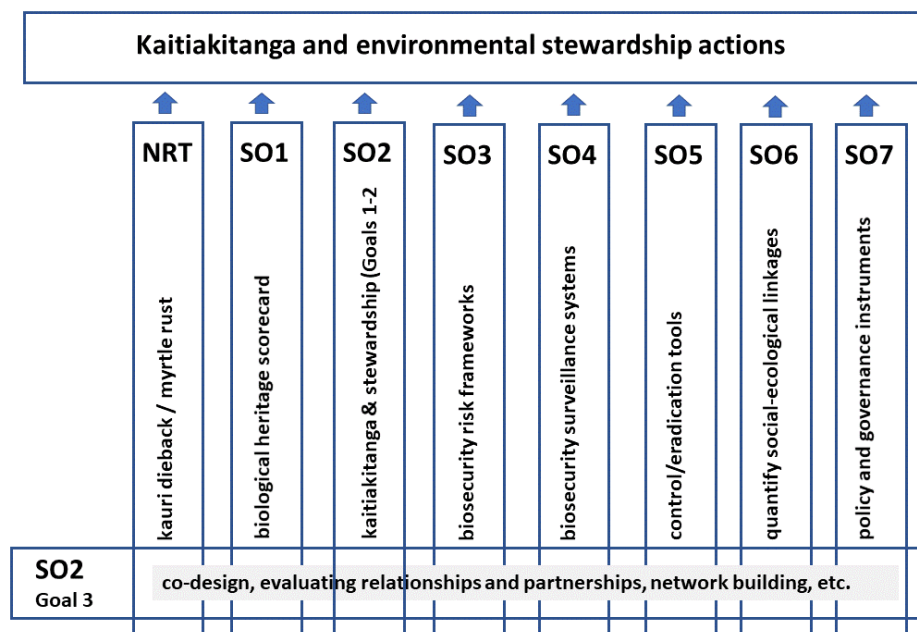

Figure 4: Managing selected social process elements as a Challenge-wide learning opportunity

For example, a number of SOs are looking at including co-design with stakeholders in the development of tools and technologies. The approach to co-design could become a research topic in its own right, viewing each separate SO as a different case study.

Goal 3	Co-design – building cultural and social considerations into technology and tool design
Year 1	Making the links
	An initial workshop with the technical, design and implementation teams will build relationships and shared agreements on interactions and engagement. Subsequent meetings and hui will be held as the research progresses.
Year 2-3	Identifying social and cultural considerations
	Run co-design processes and discussions with potentially interested and affected stakeholder groups. This will involve interviews, focus groups, design workshops and hui.
Years 3-4	Design thinking
	Utilise a set of "design implication" working groups involving technical researchers, designers and end users. These would identify approaches to mitigate or avoid issues raised by communities, operators and end users. Contributes directly to tool development in other SOs.

	Co-development of implementation protocols for use in operational setting completed with technical design team members – with a focus on addressing social and cultural considerations and engagement issues.
Year 5	**Systemic co-design: learning the lessons**
	A series of "after action reviews" have been completed with each research team and key stakeholder representatives, to learn lessons from each critical step above. These will help to: i) refine the use of tools/processes in situ; and ii) document lessons in at least one journal article, in seminars and share them through hui/workshops.

Note: The activities here are acknowledged as potential activities – to be developed in conjunction with Challenge leadership and other SO areas.

Other potential areas for linking learning across Challenge SOs include:

Potential Activity 1 – Knowledge management: Knowledge brokering, translation and communication activities are crucial to these complex programmes. They need to be designed into research, tailored to the needs of different stakeholders, and supported through the development of long-term relationships. There is no one model for how to do this, but rather an acknowledgement that multiple engagement processes, both voluntary and statutory based, can help to engage local, regional and national actors at different spatial scales.

By using the programme as a set of knowledge management case studies we gain the potential to learn from a range of these explicit and significant investments. These are being designed and developed to ensure that end users are appropriately engaged with the research process, and that outputs are tailored to the different audiences. The case studies must be set up at the start to involve collaboration, outreach, adoption, scale-out and community empowerment.

Potential activity 2 – Whakamana system design: Design a template that enables other SO groups, future project managers and researchers to incorporate people-centred design and build whakamana with local communities. This template or process will give confidence to users by enabling effective formulation of engagement strategies that have individual project outcomes in mind.

Potential activity 3 – Scorecards: There seem to be close synergies between SO2 goal 1 and the development of scorecards in SO1. At a regional/local level stewardship involves understanding the different benefits (services) that bioheritage contributes to, in terms of both the environment and social development as linked elements.

Potential activity 4 – Links to SO6: SO6's goal 3 states their intention to develop diverse, successful, practical pathways for those wanting to regenerate ecosystems and culture. Given the close synergies between this goal and SO2's goal 2, there are clear opportunities for the project teams to collaborate. For example, potential case studies for SO2's goal 2 could be identified out of SO6's adaptive management network (AMN), and the findings from these case studies could then be fed back into the information sharing processes of the AMN, strengthening both streams of work.

Potential activity 5 – Links to SO7: Developing good governance regimes and embedding this within a system that can see where it fits, links SO1 and SO7 as two sides of the same endeavour.

Beneficiaries

The primary beneficiary of this work is our Aotearoa New Zealand bioheritage taonga, the multitude of terrestrial and freshwater realms that they occupy, and the communities that live in those places.

This benefit will be affected through the medium of kaitiakitanga and environmental stewardship (SO2) that will be empowered, armed and scaled out across Aotearoa New Zealand through strategic connection with the other SOs, especially SO7.

To be successful this approach needs to:

- Capture the spirit of inter-generational change
- Be innovative in ways that remove barriers and challenges allowing inspired New Zealanders to act without impediment
- Be inclusive of all sectors of the community (e.g. less able-bodied people and time-poor people) (nāhau te rourou, nāku te rourou ka ora ai a tātou taonga koiora, taonga tuku iho)

In the long term

We expect to see benefits for local people and places, as well as on a national scale, led by iwi and hapū, involving marae and being inclusive of mokopuna and tamariki aspirations and leadership.

Key contributors in inspiring inter-generational change, developing resources and socialising Te Puāwai will be schools, universities, researchers and research entities, and bio-physical and social scientists.

We will require the support and innovation of leaders in technology fields, working with programme governance, project managers and coordinators for a collaborative approach.

Within the life of this Challenge

The beneficiaries in this work grow over time. In the first instance we see the case study participants as being immediate beneficiaries. They are involved in the research by providing information about, and co-reflecting on their own situation – opportunities and challenges, and how they see their priorities and relationships. An initial set of case studies to work with through the programme will be identified during the first year, and relationships and co-research expectations will also be developed with key individuals in each study who would like to be involved as co-researchers. While numbers are still to be determined based on initial scoping discussions, we envisage that this might involve 4-6 cases at both local and agency/sector level.

Beyond the "making sense" activities that will be carried out with case study participants, we plan a wider set of "making sense" workshops to involve participants from the wider stewardship community of practice. Again, these participants are direct beneficiaries by virtue of their involvement in the co-research process.

As the work continues, lessons will be actively shared and socialised through the wider community of practice. The stewardship community of practice will be facilitated to transition to a model that can be sustained beyond the life of the Challenge.

The research team

An outline of the proposed research indicating essential activities and critical steps is set out above in this prospectus under the table heading "Goals 1 and 2 (pp. 7-9). We envisage that research team members have experience in working in place-based and action research orientated settings. They can demonstrate that they can constructively contribute in inter- and trans-disciplinary teams and research settings. They have experience in co-producing and documenting research knowledge with end-users. Collectively the team will require experience and skills in:

- Co-design with multi-stakeholder communities
- Social science areas (action research, participation, behavioural psychology etc.)
- Kaupapa Māori research
- Facilitation
- Expertise/experience in integration, engagement, and collaboration
- Identifying the right people as co-researchers – for points of leverage at both community and organisational levels
- Demonstrated relevant international research and practitioner networks

Co-led research - The Goals 1 and 2 table highlights environmental stewardship and kaitiakitanga as two separate but parallel research strands. Accordingly, we envisage this work being co-led by research leads with experience in participatory action research and kaupapa Māori research approaches respectively. We also see the imperative to include early-career and/or post-doctoral researchers within the team as budgeted.

Succession planning – This is regarded as important and we have built in additional funding for capability development which should improve both both academic and operational capability. The accompanying budget line indicates funding tagged to capability-building activities including mentoring, students and internships.

International partnerships – We have developed this environmental stewardship and kaitiakitanga research as cutting-edge. This work is designed to build on, and be complementary to, related work in New Zealand and emerging practice and research internationally. An accompanying budget line is designed to support the development of international partnerships in both the environmental stewardship and kaitiaki strands.

Delivery pathways

This SO research will deliver impact to NZ through four primary pathways:

- Participatory and kaupapa Māori research with case studies
- Development and support of an environmental stewardship agency/sector community of practice
- Linkages and collaboration with key Māori networks (including Te Tira Whakamataki)
- Through the wider BioHeritage Challenge programme

Case study participants: The overall kaupapa Māori and social science research approaches are participatory, and with an action research focus are designed to provide constructive help to participants in case study settings.

Developing a stewardship community of practice: As the work continues, lessons will be actively shared and socialised through the wider agency/sector-based community of practice. We note that there are a number of technical expert groups in agencies and councils, but currently none specifically looking at stewardship and kaitiakitanga practices, and their elements, as set out in this prospectus. The community of practice will be supported throughout the life of the programme and its growth managed through a four-phase approach:

i)   Community of practice initiation and agreement of focus, member selection, etc.
ii)   Community development – establishing value and resourcing continuity of engagement
iii) Managing knowledge – sharing, co-production, stewardship of community of practice knowledge resources
iv)   Transformation – developing a sustainable future

Linking with Māori networks: It is important to have a Māori implementation pathway. We will partner with Te Tira Whakamātaki (TTW) and EPA's Te Herenga network as key conduits for Māori perspectives on biosecurity, to ensure kaupapa Māori, both in process development and in implementation. A number of Challenge researchers are also involved in TTW governance and management. TTW tracks all biosecurity science that is of importance or pertains to Māori interests, encourages kaupapa Māori in biosecurity responses, and links Māori landowners to biosecurity researchers when/where relevant. Researchers and TTW will partner on the learning journey.

Through the BioHeritage Challenge: The Challenge already has networks, relationships and delivery pathways for work in this strategic outcome area, and we would look to maximise the use of these in addition to more specific SO2 opportunities.

Within these broad delivery pathways a number of forums and approaches will be used. These delivery pathways include:

- Kanohi ki te kanohi (face to face)
- Marae symposiums
- Wānanga and noho
- Workshops and seminars
- Innovative ways of employing social media
- Training programmes

Wider adoption of research tools and findings will also be achieved through training methods such as internships and mentoring, and connecting local communities with service providers engaged in the overall process.

We also need to investigate the use of other digital communication methods, e.g. virtual reality, augmented reality, videos, web and social media platforms, as well as develop future-proofed communication tools. Collectively these approaches contribute to the likelihood of research tools and lessons being scaled out to maximise impact beyond the 2024 Goal timeframe, to ensure enduring national benefit.

Communications and relationship management

To achieve our 2024 Goals we will need to manage a complex web of relationships and associated communication activities. We do note that the underlying methodology and research approach for the environmental stewardship and kaitiakitanga strategic objective is based around relationships and communication processes on an ongoing basis. These are not seen as an add-on to the research process and methodologies we see that would contribute.

Our guiding principles are fundamental in the area of communications and relationship management. To give equitable consideration and implementation of Te Ao Mārama (including understanding, values, approaches, and opportunities) it is essential that iwi decide how their relationships will be managed and what communication channels are used.

Valuing relationships, collaboration, partnerships and empowerment will be key to the establishment of successful communication strategies. We will need to join scientific disciplines with local communities to ensure that there are no silos, and seek out partners who may not otherwise be included or considered.

We need to be mindful of ownership and use of community data. Relationships built on trust will be quickly undermined if security, ownership and integrity of data belonging to, and contributed by, the community is not maintained. And similarly, we note that there will be an expectation from Māori and other communities that these relationships are not just for the length of the programme – but should be undertaken with a long research time frame in mind.

Essential partnerships and relationships

To achieve our 2024 goals we will need a range of partnerships and relationships. We note that the underlying methodology and research approach for the environmental stewardship and kaitiakitanga strategic objective is based around relationships and the management of these on an ongoing basis. These are not seen as an add-on to the research process and methodologies that are already described, but they form the underpinning basis for their success.

Our guiding principles are fundamental in the area of partnerships and relationship management. Key areas for partnership and relationships include Māori, on-the-ground communities, agencies/sectors and other researchers (both external and internal to the Challenge).

Māori

To give equitable consideration and implementation of Te Ao Mārama (including understanding, values, approaches, and opportunities) it is essential that iwi decide how their relationships will be managed and what communication channels are used. The TTW and Te Herenga networks are seen as crucial to the ongoing research and its delivery pathways.

On-the-ground communities and networks

Our case study approach has been designed to support local communities as they strive to undertake stewardship activities in their locality. We envisage working with them in a partnership-based approach to our social and kaupapa Māori research.

Agencies/sectors

Nurturing incremental and systemic change that better supports environmental stewardship and kaitiakitanga, in agencies, sectors and other broad governance and policy bodies, is a key area to deliver the practical step change that this strategic objective is designed for. We will look to develop trusting relationships in organisational settings with an interest in improving stewardship, and to initiate and support a community of stewardship practice that crosses agencies, organisations, local government and sectors.

Science

Internally, researchers in this strategic objective will look to develop and maintain partnerships and excellent working relationships with other researchers across the BioHeritage Challenge.

Externally, researchers in this strategic objective will look to maintain and grow their partnerships and relationships with other researchers working nationally and internationally in this area.

Key partners that will help to create impact include Ministry for Environment, Ministry for Primary Industries, Department of Conservation, regional councils, local authorities, Crown Research Institutes, central government, the prime minister, industry bodies and other non-government organisations.

Partners responsible for key research activities not funded by the Challenge include private research entities, exporters (invested in "brand NZ") and technology companies, often in association with philanthropists, national and international funders.

We also recognise the importance of partners whose focus is on the international brand reputation of Aotearoa New Zealand, which is heavily reliant on our unique bioheritage. Collaborative relationships with regional tourism and development agencies, Tourism NZ and private tourism operators will be beneficial for promoting local and national-scale initiatives.

Risks and mitigations

Risks

Much of the work proposed is transdisciplinary (involving participants with different world views and knowledge cultures) and has its own set of risks around the need for relationship building, learning and integration of knowledge, and setting realistic expectations. This means:

- There will be high set-up costs associated with relationship building and scoping research setting and context, as well as ongoing maintenance of these activities (albeit at lower resourcing levels). These relationships need to be built to be long-standing.
- The case study and change orientation of the research asks participant co-researchers not just to be involved in developing descriptions of their social situations, but to actively engage in supporting change in their communities and/or organisational settings. This can be difficult, and asks a lot of participants.
- It is important to create time for reflection – for individual researchers, as well as research teams on their own and with stakeholders.
- That the Challenge needs to appropriately consider and acknowledge that all knowledges are given equal weighting and respect, and that mātauranga Māori is afforded mana under Te Tiriti o Waitangi.
- Because such projects are emergent, project review and reporting procedures should evaluate progress towards achieving the overall project objectives, rather than achieving specific milestones and producing specific deliverables.
- We need to allow for a range of ways of reporting back – not just scientific outputs.
- There are risks that political or work realities will curtail the amount of participation and engagement by non-research stakeholders.
- That we need to ensure appropriate communication and connection is occurring with other strategic objectives.
- The cost of establishing and nurturing networks and communities of practice is often underestimated, or funds are cut back at inopportune times in the programme. A risk with such research relationships is that if they are not managed well, people will feel less empowered.

Mitigations

The above risks are common to many projects that look to work "with" communities and organisations. One important area of risk mitigation is developing the right team, with the right people, skills and approaches to work in such participatory environments. Care must be taken to bring together a team with appropriate interpersonal and cross-cultural skills for the settings involved. Ethics and safety processes should be used as an ongoing guide to work in the research – and not just seen as a tick-box exercise. Good practice to mitigate these risks is also implicit in the guidance and approaches described in the above four prospectus sections: i) research team; ii) delivery pathways; iii) communication and relationships; and iv) essential partnerships and relationships.

The time taken to build relationships and trust is significant and must not be underestimated. We need to take opportunities to work within existing relationships wherever possible, as this will mitigate some of the risk involved.

A reputational risk is that we may not see any direct benefit to our biological heritage within the lifetime of the strategy, so New Zealanders will form the impression that there is "lots of talk and not enough action". Our links to the projects and programmes of other strategic objectives will help to mitigate this risk, however we will need to actively manage the work within specific timeframes linked to the Challenge's long-term goals and the BioHeritage mission.

Essential resources

The overwhelming requirement for resources to deliver and sustain impact in SO2 is for **human resources** – the right people with the right time. This reflects the importance of relationships, collaboration, partnerships and empowerment in achieving our 2024 Goals.

We will need to engage with people who do the work: people at place (local communities) who are involved in successful and emerging activities that align with, and are supported by, Te Puāwai and other elements of this research. From kaumātua, thought leaders and champions, leader 'magicians', through to kaitiaki, translators, communicators and storytellers; properly resourced community members will be pivotal in the adoption and scale out of tools, capabilities and tikanga frameworks.

Links between science and community will need to be developed that capitalise on goodwill and faith, utilising the work of social scientists and biophysical science providers, and people within agencies to participate in the co-design process.

Travel is another important budget item, especially as much of the proposed work is case-study and place-based.

Administrative support will be needed to assist with managing funding, providing places and support for hui and wānanga, establishing internships and mentoring programmes. The 'housing' of people who are doing the work will also need to be resourced.

Research services will be required. These will include meeting and hui venues, transcription services, and social science software licences for theme and statistical analysis.

The creation of a digital/spatial map of who is doing what and where, will provide an up-to-date glimpse at the state of play throughout the motu.

Funding for these resources are built into the budget table in the next section.

Budget details and cost narrative

Significant, but essential costs can be expected to be incurred for research and development activities associated with new intellectual property and/or technology. The success of partnerships and relationship management activities will ensure that at least part of this cost is met by willing partners in the science, technology and research funding sectors.

Budget line description *	2021	2022	2023	2024	2025	Total
Operating						
Network and community of practice maintenance	$30,000	$30,000	$30,000	$30,000	$30,000	$150,000
Administration & management	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
Research travel (domestic)	$125,000	$100,000	$90,000	$75,000	$75,000	$465,000
Conferences, international partnerships, publications	$25,000	$25,000	$25,000	$40,000	$60,000	$175,000
Research costs and services (software, transcription, statistics, theme analysis)	$25,000	$25,000	$25,000	$25,000	$25,000	$125,000
Hui, wānanga & workshops	$100,000	$95,000	$95,000	$95,000	$95,000	$480,000
Essential activities						
Researcher cost (salaries)	$500,000	$500,000	$500,000	$500,000	$500,000	$2,500,000
Mana whenua resourcing (subcontracts)	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
Stewardship/practitioner resourcing	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
Oversight and professional support (e.g. consultants)		$30,000	$40,000	$40,000	$20,000	$130,000
Capability development (e.g. mentoring, students, internships, training)	$75,000	$75,000	$75,000	$75,000	$75,000	$375,000
Total expenses	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$5,000,000

*90% of our budget is dedicated to Goals 1 and 2. The remaining 10% allocation to Goal 3 should be viewed as co-funding for shared work with other SOs, each of which will bring their own stream of funding.

Budget line description *	2021	2022	2023	2024	2025	Total
External contributions						
Sponsorship/leverage funding (external, **other SOs)	?	?	?	?	?	$-
In-kind contribution	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
Total external contributions	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000

**Jointly funded SO research workstreams will be explored during the next phases of operationalisation.

2024 Goal Metrics

An outline of the proposed research indicating essential activities and critical steps is set out above in this prospectus under the table heading "Goals 1 and 2 (pp. 7-9)". The steps in this table set out the main activities by which progress can be measured for both the environmental stewardship and kaitiaki research strands.

These metrics are output oriented. However, because the work in this SO is change-oriented the approach has outcomes-based monitoring and evaluation built in as an essential activity in the co-research process. Moreover, the research is both co-developed and emergent. This means that we cannot pre-define a set of outcomes, but we can work to collectively define the desired outcomes through the research process.

Accordingly, monitoring and evaluation form part of the investment included in this research prospectus. The effectiveness of local stewardship can be improved through participatory planning, monitoring and evaluation, and subsequently adapted based on this knowledge. This evaluative strand of the research can help us look at complex tasks or behaviours such as knowledge management, co-design or partnerships — so participants and researchers can better understand the effects of these different elements on stewardship outcomes.

The insights from evaluations can be applied to adaptively manage stewardship interventions or revisit an organisation or agency's "theory of change". They can even be used to reformulate entire interventions when they are found to be ineffective, or guide strategic investments of external organisations. Methodologies will include both planning and evaluative methodologies – theories of change, logic models, rubrics (performance assessment tools), etc. – to encourage and support change at a systemic level.

Working in this way can provide researchers, partners and stakeholders with several benefits:

- Developing a theory of change and accompanying logic models supports diverse stakeholders to work together and plan for outcomes. This will help stakeholders to envisage a shared 'big picture' view of how and why a desired change is expected to happen in a particular context.
- Attention to scoping and supporting an institutional culture that supports learning will help increase partner and stakeholder buy-in to the stewardship activities under consideration, and their monitoring and evaluation.
- It will build a greater appreciation for monitoring and evaluation as comprising both process (reflection and planning) and product (data gathering and report writing).
- It helps intervention planning. This process will provide an example of the use of systems thinking and outcomes-focused approaches within the immediate intervention programme. It will also build capacity for the use of these skills in other programme partner and stakeholder activities.

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