

Awheto Farming

This project will develop a research collaboration between Plant & Food Research Ltd (PFR) and the Rotorua-based iwi Ngati Kea Ngati Tuara (NKNT) in the areas of sustainable awheto production and sustainable horticultural production. Awheto were used traditionally by Māori for ta moko (tattoo) and rongoa (medicine) and are the immature stage of an indigenous forest moth that has been killed by an indigenous fungus. The analogous species growing in mountainous areas of Asia is prized for its medicinal properties in China, Korea and Japan.

NKNT wishes to develop a sustainable awheto harvesting method that would facilitate supply for export. The project will develop a series of meetings and placements of research staff between PFR and NKNT that will result in the development of a research strategy for sustainable awheto harvest and other areas of interest around sustainable horticulture.

PFR staff placed within NKNT will learn about Vision Mātauranga values and aspirations. NKNT staff placed with PFR will learn the basics of scientific method, and specialist skills (pathology, entomology) pertinent to awheto research. Ngati Whare (Minginui) and possibly other local forest-based iwi will be invited to participate in discussions around sustainable awheto production and other areas of interest in which PFR can offer R&D guidance.

The principal outcomes from this project will be

- 1) a joint NKNT-PFR plan of research to develop sustainable awheto harvesting,
- 2) NKNT-PFR plans for conducting research into other areas of primary production, probably related to hydroponic and biologically-based horticulture,
- 3) NKNT staff trained in scientific method,
- 4) PFR staff familiar with the requirements to achieve effective VM-outcomes for Maori,
- 5) joint proposals for ongoing research collaboration between NKNT and PFR,
- 6) engagement with Ngati Whare and other interested iwi around R&D collaboration to achieve VM-outcomes.

Driving innovation in the functional food-nutraceutical- agribusiness industry

This project is about building capability in the Māori agribusiness space, so that Trusts have the ability to develop R&D plans which utilise western scientific frameworks to translate unique indigenous knowledge into commercially feasible products with sound commercialisation pathways, while developing a robust intellectual property (IP) position.

In addition to knowledge transfer, the expected outcomes from this work-plan are the creation of a range of novel product formulation concepts, with clearly defined market needs and commercial pathways. This project aligns with each of the 4 themes of the VM fund; contributing to indigenous innovation and mātauranga in the short term, and longer term gains will be obtained in taiao and in hauora, so that Māori benefit significantly as partners and end users of the project outcomes. While the ultimate goal is creating a new revenue stream for iwi and Aotearoa, the successful implementation of a VM-funded work programme where Māori are able to generate economic returns from land use, derive social and cultural benefits and manage the environment sustainably, will provide a framework for other organisations.

In addition, the Trust reinvests commercial dividends back into training programmes for rangatahi and in the ecological restoration of tribal lands, and by sharing its models with other roopu. The likelihood that we will deliver on the outcomes of this work programme, both in terms of the development of a key range of novel formulation concepts with a robust IP management, R&D plan and business case, and in the longer-term the generation of revenue through product sales and IP licensing, is very high because both parties have strong track records and this placement will enable the interchange of these capabilities leading to the very growth which is the ethos of the VM fund initiative.

Environmental monitoring of water quality impacted by iwi farm developments.

Ngāi Tahu Property Ltd proposes an environmental monitoring programme to investigate the contaminant fluxes leaving their lands to provide information that will inform and guide the iwi on compliance and kaitiaki. The measures need to incorporate matauranga Maori, represented by measures such as the Cultural Health Index and State of the Takiwā reporting. Reconciling Ngāi Tahu values on fresh water and the economic use of water applied to their lands is a major challenge for the iwi, as it is for NZ.

This project starts with trusted monitoring, and having mechanisms by which land managers can respond to adverse signals. This placement project lays the foundations for long-term major land development sanctioned by iwi and is a collaboration between a research organisation (Lincoln Agritech Ltd, LAL) and iwi land managers (Ngāi Tahu Property Ltd, NTP).

LAL has a number of programmes and projects in groundwater contaminant science, including the MBIE funded GWAC programme with ESR. This research has long-term implications for all iwi with an interest in the impacts of land use on water quality. An investment in understanding matauranga Maori is essential in informing LAL's research.

Through this project the farm management company, NTP, and the runanga will gain a deeper understanding of the impacts of land use practices on the leaching of nitrates, and subsequent groundwater flow paths. LAL scientists will develop a greater understanding of where matauranga Maori brings insights to 'mainstream' science. The work described will involve a Ngāi Tahu researcher being placed at LAL, where she will be supervised by a senior research staff from LAL and NTP. We propose a process where people work together in a collaborative framework with iwi and research organisation staff.

This project is founded on kaitiakitanga and matauranga Maori, is based on a genuine need identified by the iwi, and has significant economic implications for Ngāi Tahu and for the region.

“Hura Te Kokouri, Hura Te Kokotea”: Innovation for Ruatahuna Industry Development

The Tuhoe Tuawhenua Trust (TTT) is responsible for 9000ha of bush-clad lands about Ruatahuna, and aims to responsibly utilise the resources in its care for improving the lot of the people of their region. The TTT is implementing a long-term strategy for developing industries in Ruatahuna based firstly on the primary production of indigenous timbers and honey. Market research signals that significant opportunities exist for commercial development for the Ruatahuna region, particularly in export markets. These opportunities are based on branding, provenance, cultural distinctiveness of Ruatahuna, and value-add options associated with TTT’s core businesses and other forest resources and potential land uses.

The TTT is keenly aware that one of the keys to realising these opportunities is science and innovation that breaks new ground and gives products a competitive edge. At the same time, all the work of the TTT is underpinned by the mauri, tikanga and matauranga of Ruatahuna, and an automatic commitment to sustainable management of land resources for future generations, motuhake ake. The TTT seeks to realise the innovation potential of its resources and matauranga through forging critical relationships within the science and research sector, and launching a focused, informed and supported science and innovation strategy that takes their commercial development to another realm.

This proposal is for a two-way placement programme for TTT managers in collaboration with Plant and Food Research (PFR), with the aim of developing a Science & Innovation strategy that meets R&D needs of TTT and will lead to new research proposals and projects in the future.

For further information please contact Brenda Tahi at brenda@tuawhenua.biz

Increasing sustainable profitability in Tuhono Whenua Project kiwifruit orchards

This project aims to measure specific geo-spatial zones within high-performing Hayward orchards adjacent to Tauranga Harbour and participating Māori owned orchards of the Tūhono Whenua project to allow us to recommend and apply different levels of inputs and management techniques to develop the capability and capacity of the orchards and enhance prosperity.

Kiwifruit orchards are managed based on the average characteristics of the orchard soils, leaves, weather, canes and crop performance. Managing the different zones according to the average in the orchard loses potential for yield, and ultimately profitability. Specific blocks in Hayward orchards have produced over 19,000 trays per hectare, and return OGR of over \$100,000 per hectare, while the industry average Hayward crops returns an OGR of \$38,000.

We will and assess different soil zones in the orchard according to established BioSoil & Crop techniques. Fertiliser and lime will be applied according to these recommendations. We believe that the savings in lime application alone will justify the cost of soil mapping. The soil mapping will also allow us to apply nutrients according to difference in the field, maximizing results from application, profitability, while also minimising the possible detrimental effect of applying excess nutrients.

CORRELATE ASSESSMENT DATA

Once we have soil, canopy, climate and harvest performance data we will look for correlations between the data sets, which will then help identify management decisions that can be made to improve orchard performance. We will work with the subject orchardists throughout the work to incorporate their experience, and will provide guidance to orchardists on understanding and interpreting our findings.

For all enquiries contact Allister Holmes allister@plusgroup.co.nz

Increasing the effectiveness of Maori critical thinking strategies within an environment-focussed programme of research and enquiry

This proposal outlines a programme of work co-constructed between an individual researcher and the Education Committee of Ngāi Tūahuriri Rūnanga, to be carried out with a sample of schools within the Rūnanga's takiwā. The project supports teachers at schools from within the Rūnanga's takiwā to develop and deliver environmentally-focussed enquiry units that are based on sites of environmental and cultural significance to the Rūnanga.

The current programme of work seeks to increase the use of effective thinking strategies by enabling students to use their own cultural knowledge as a framework to critically analyse information. This is intended to raise Māori student achievement by developing the effective use of critical thinking strategies, in addition to increasing academic self-efficacy by demonstrating to students the value of their cultural knowledge and viewpoint.

While more schools and sites will be included in the second year of the programme, Tūtaepatu Lagoon, Tūhaitara Coastal Park, Kaiapoi Pā and Tuahiwi Marae will be a focus for study during the first year. The lagoon and coastal park are traditional sources of mahinga kai, and significant work is underway toward the preservation and restoration of the lagoon and the surrounding area. Year 9 and 10 science teachers from a small sample of schools will learn about the lagoon and coastal park and traditional Māori environmental concepts, and will develop an enquiry unit to deliver to students in Term 2. They will develop an initial approach for measuring and evaluating the use of critical thinking strategies and the impact of these strategies on student achievement prior to the unit's delivery. They will then be supported to develop and implement an action research model that evaluates whether the cultural narratives of Māori students enabled them to use the unit's framework to apply critical thinking strategies more effectively.

Interweaving mātāuranga and science through locally focused online tools

Currently New Zealand has a significant community investment in locally focused environmental management groups, including management of fisheries via Customary Protection Areas (CPAs). Collectively the communities responsible for these areas possess a wealth of knowledge and experience that allows them to detect subtle, but important, changes in the status of their environment: an approach that remains beyond the reach of large-scale nationally focused management initiatives. To gain support for local management decisions based on mātāuranga (traditional ecological knowledge), local and customary management groups need support from scientists. Although the New Zealand CPA network covers an area larger than the mainland New Zealand Marine Protected Area network, very few research programmes are specifically designed to support them. Further, what information that is available is difficult to access and hard to interpret for non-scientists.

To address these problems, the proposed work programme will build research capability within individual CPA management teams and the communities they support, to empower 'citizen science' approaches to local monitoring and research. The work programme will develop a unique online tool and location-based interface to summarise multiple strands of knowledge. The work programme will establish a wānanga programme to provide training to CPA managers and local people and draw on extensive databases of existing information to ensure that the technology presents the most relevant and important information to support their management decisions. Through the collation of existing knowledge and provision citizen science tools, this work programme will empower communities to retake their position as guardians of New Zealand's natural environment.

Kura ki Uta, Kura ki Tai

Currently the Whakatohea Maori Trust Board (<http://www.whakatohea.co.nz/>) have kaitiaki over significant marine resources in the Bay of Plenty that are largely dormant. Their aspirations for long term sustainable development, incorporating the principles of Kaitiakitanga, remain unfulfilled. At the same time Cawthron has significant technical and R&D skills and knowledge about aquaculture. There is therefore a fantastic opportunity to put these together and thereby:

- increase matauranga Maori in aquaculture research R&D
- improve research understanding and utilisation by Maori.

Building on the VM policy themes, this project will increase Whakatohea's capacity to engage in VM related R&D for the social, environmental, and economic wellbeing of the community. The reciprocal introduction of Matauranga Maori to the scientists, and the wider Cawthron Institute, will bring new awareness to Cawthron's approach to science and indigenous innovation.

Understanding and using appropriate VM research the project will unlock the potential of Whakatohea resources, and realise several outcomes:

- The generation of a collaborative five year VM based research strategy and two year action plan will increase Whakatohea's research capacity and focus the board toward targeted development of existing and new species;
- aquaculture species not currently used on the farm will be reviewed and their potential identified;
- the Whakatohea training curriculum will be adapted to respond to the identified needs for the future developments;
- the scientist and the Cawthron Institute will get an in depth perspective of matauranga Maori. This perspective will increase their capacity to undertake VM related R&D, improve ways of effectively transferring knowledge to Maori and fostering collaboration with Maori.

Living Archive Rangitane o Wairau Pilot

The cultural and spiritual well-being of an iwi is intimately linked to matauranga and to whenua: knowledge of people and history, and an understanding of the relationship to the land through ancestry. The Living Archive project (LA) is a partnership between Rangitane o Wairau and the University of Otago which is built upon the foundation of these principles.

The LA will draw together knowledge from many fields in a single place. The core of the system will be GIS based – a spatial information system that allows multiple types of data to be readily accessed through a graphical interface based on maps. This knowledge base will cover oral history, environmental history, wahi tapu, whakapapa, taonga, archaeology, scientific knowledge associated with rohe, and an inventory of historical records.

There will be two placements which together will bring this project to fruition:

A Rangitane researcher will work with the University of Otago research team at SPAR (Southern Pacific Archaeological Research) developing the systems and protocols for the GIS system. He will work with SPAR on projects that provide skills and experience relating to individual modules of the LA such as standards for recording artefacts and creating annotated bibliographies. A SPAR principal will be assigned a mentoring role.

The SPAR researcher will work with Rangitane in Blenheim to set up the LA and to identify and develop outputs from University of Otago environmental and historical research that are relevant to Rangitane initiatives in sustainable management and cultural development.

The outcomes will see Rangitane o Wairau having greater capacity to manage its information and research capability; and as a pilot this project will provide a innovative model which can be rolled out to other iwi nationwide.

For further information please contact Professor Richard Walter, University of Otago (richard.walter@otago.ac.nz); or Jim Ward, Rangitane o Wairau (jim@rangitane.org.nz).

Manaaki moana, Manaaki awa, Manaaki tangata

Ngāti Kahungunu have the second largest rohe moana of any iwi in Aotearoa, with significant customary and commercial fishing interests. Using the Āwhina whānau model, we will develop a plan with NKII/hapū to grow marine/freshwater science research capability responsive to iwi/hapū needs. We will 1. identify areas of marine/freshwater science research need, 2. develop a long-term marine/freshwater research plan, and 3. develop a plan with NKII/hapū to build their own capability, supported by AVI and SEAD, to carry out their long-term marine/freshwater research plan.

Activities proposed will include, but are not limited to, a series of wānanga with NKII/hapū to:

1. Determine hapū marine/freshwater science capability and interests
2. Identify hapū tikanga and mātauranga for marine/freshwater species, and review the state of scientific knowledge relevant to these species
3. Develop a long-term marine/freshwater research plan with NKII and hapū
4. Develop a plan to build the capability required to carry out the long-term marine/freshwater research plan, and identify possible pathways for implementation
5. Deliver the long-term marine/freshwater research plan, and capability building plan, with pathways for implementation, to iwi/hapū for feedback

This project has been developed in partnership with NKII with the capability building plan and identification of pathways for implementation representing a significant shift in the nature of the relationship between university researchers and iwi/hapū. This shift in focus from a service delivery model of research, to one that builds research capability within iwi and hapū, will increase research relevant to VM theme 2. Taiao/Environment with further research opportunities identified over the course of the project. The project will serve as a model for other researchers to work with iwi and hapū to build their own science capability for realising tino rangatiratanga, which will in turn benefit all New Zealanders.

Maori and Forestry Management

Māori own the land but not the forests; consequently financial returns and participation within the forestry sector are limited. To effect transformational change that will realise benefits for Māori and New Zealand, the complex issues that hinder transition from leaseholder to forest owner need to be addressed and solutions found.

A sustainable commercial forest requires a minimum of 10,000 – 15,000 hectares; this is a significant challenge for Māori with land blocks that are often small and fragmented

The Rotoehu Tarawera Forest collective comprising five Māori organisations with 45,000ha of collective forested land is looking to operate in collaboration for recognised benefits and long term sustainability.

This programme will develop a model for the collective to compare various options from absentee landlord to forestry owner and management, against three scenarios. Methodology and outputs will incorporate Māori principles of whakapapa, kaitiakitanga, mauri, nga taonga tuku iho. Indigenous and exotic species as well as multiple use forestry such as under-cropping and eco-tourism will be investigated. Scion research staff will work within the iwi organisations, providing expertise in assessment and assimilation of the current owner's land and stumpage resources; with quantitative modelling to demonstrate the impact of scale on return of investment.

The iwi collective will be able to articulate and evolve a plan for the sustainable future of their forestry interests. The model developed will be of significant use to the wider Māori land owner community and supporting organisations as an exemplar for Maori forestry. It will provide Scion insight and understanding, connecting and adapting its science through the incorporation of Mātauranga Māori principles. To become key stakeholders in the future of forestry, Māori require the support, resources and tools to create the vision, commitment and capacity to effect transformational change.

Matauranga Maori for the 21st Century.

Difference exists between traditional knowledge and western scientific processes; western based scientific methods dominate when informing Iwi about their environments and aspirations towards realising kaitiakitanga. We need to ask not what has resulted in this inequality, but rather why has mātauranga Māori/Iwi not developed or not adapted to using new technologies to understand, monitor and inform Māori/Iwi of their environments and associated values.

This project will explore mātauranga Māori from two Iwi, Rangitaane O Manawatu and Ngati Rangi, to see if 21st century technologies from environmental sensors and Geographic Information Systems can be adapted and applied within this indigenous knowledge framework to build capability and create a more equitable resource management process.

People and pingao

The aim of this project is to build an ongoing, collaborative, knowledge-sharing network of iwi, weavers, scientists, social scientists and conservationists interested in the biology, ecology, conservation, restoration and traditional use of New Zealand taonga plant species. We will bring together scientific and Māori perspectives to develop a research plan to advance our ecological and cultural understanding of one of New Zealand's most iconic threatened plant species, pīngao/pīkao/golden sand sedge (*Ficinia spiralis* Cyperaceae). This once widespread plant previously occurred on sand dune habitats throughout New Zealand (including Stewart Island and the Chatham Islands), but is now limited to small remnants and a number of human-planted restoration populations. Pīngao is of great cultural and ecological value and significance for Aotearoa New Zealand, but exhibits pronounced biological variation, the significance of which is poorly understood, both ecologically and culturally at a nationwide scale. This network will unlock mātauranga Māori relating to tikanga for both planting and weaving the different varieties of pīngao found in specific locations. We will build on the strong foundations of existing Māori and scientific knowledge of pīngao, including how Māori have used and engaged with it in different places.

This work programme is a collaboration between two Māori organisations (Te Taumutu Rūnanga and Ngāti Hinewaka) and two universities (Lincoln University, Victoria University of Wellington). We will run a series of development meetings and three larger workshops that will result in the development of a common dialog, including potential questions, hypotheses and methodologies. We believe that this network will fuel many ideas of value for New Zealanders interested in plant conservation and ecology, sustainability and resource management.

Rangitaane Freshwater Fisheries

The purpose of the proposal to increase our understanding of Rangitaane o Manawatu's connection to their freshwater fisheries resources, and to increase the public understanding of the significance of fisheries to mana whenua. It will raise awareness about the importance, state and future opportunities pertaining to the fisheries within the Rangitaane o Manawatu rohe [boundary, area] and the role we all have to play to ensure the sustainability of our taonga for the benefit of future generations.

In order for Rangitaane o Manawatu, through Tanenuiarangi Manawatu Incorporated, to be able to realise their goals and aspirations, they require tiaki tangata who have the skills, expertise and networks to deliver the required work programmes, decision support frameworks, stakeholder networks, plans and policies required. Tanenuiarangi Manawatu Incorporated will partner with the National Institute of Water & Atmospheric Research (NIWA) to train and work alongside tangata tiaki in native fisheries population assessments, fisheries monitoring techniques, reporting and communication, and securing on-going funding.

The proposal will enhance collaborations and foster mutually beneficial relationships between mana whenua, territorial local authorities and other government agencies who have roles in the protection, restoration and management of our taonga species.

The proposal will help those agencies understand the worldview of Rangitaane o Manawatu when it comes to our fisheries taonga so that those goals and aspirations can be incorporated into their organisational planning and monitoring operations. Thus, the proposal shall contribute to increasing the knowledge base and understanding of all parties, i.e., Rangitaane o Manawatu, government and non-government agencies, and the wider community.

For more information please contact: Paul Horton (paul@rangitaane.iwi.nz).

Te Hono Putaiao O Waipareira

Rising costs in social services, healthcare and education are driving the New Zealand government to seek ways of improving delivery to the community while optimising the outcomes for the individual/whanau. Maori, and particularly Urban Maori, are over-represented in the New Zealand Government's total spend on Social Welfare, Justice, Education and Health.

Callaghan Innovation and Whanau Tahi, a subsidiary of Waipareira, aim to address the social care issues above by unlocking the potential of tikanga and thought leadership in social health delivery in Whanau Tahi's community. This will be achieved by translating Whanau Tahi's knowledge into high tech-software products that can be adopted by other Maori health and social service providers, and those in the mainstream.

Waipareira is a leader in the delivery of services for Maori by Maori. They have translated Whanau Ora practice and Waipareira's unique community focused delivery culture and processes into a high value software product. This tool facilitates better support of clients in Waipareira's community, optimises access to services required and empowers Whanau self-development. It has been implemented into other Maori groups and overseas communities.

The programme builds on Waipareira's success and fully supports their goals of flourishing Whanau and leading successful change towards a better educated, higher socio-economic community. A long term alliance between Callaghan Innovation and Whanau Tahi will underpin technology development based on Waipareira's and other Maori community requirements, and support Waipareira uptake of new innovations in community focused care. This work will improve Callaghan Innovation's understanding of matauranga, urban Maori innovation potential and methods to improve knowledge transfer between Maori and researchers to deliver on Vision Matauranga outcomes.

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The Gathering of Light - creating a Maturanga Maori Research Collective

Nga Uri o te Ngahere Trust has conducted a needs assessment over the past 5 years within the Bay of Plenty and East Cape regions which has identified the need for the development of alternative land and marine space utilisation strategies. At present many of the farming and land use practices are invasive or extractive which lack diversity. Many of the land and marine use practices are impacting on biodiversity and are undermining cultural values and ecological values.

The Trust is researching alternative land and marine space utilisation strategies which will diversify income from the development of native flora and marine organisms, using Maturanga Maori and traditional use practices. The research required must incorporate western scientific methodologies and processes, without an erosion of Maturanga Maori, tikanga and kawa, as many of the gifted scientists we need are not trained in, or have not been exposed to traditional practice and struggle to understand how Maturanga Maori relates to western scientific research.

The creation of new understandings, resource development plans and commercial utilisation strategies which can be drawn from an amalgam of Maturanga Maori and westerns sciences will significantly improve outcomes for the Trust and for Maori in our region within complementary development planning.

This will require the development of a mentoring programme to build skills and understanding within the Science community, across a targeted range of SR&T organisations, which bring the skill sets needed within the development programme, into the local community. The enclosed Connect programme will facilitate the development of this research cohort and the transfer of Maturanga Maori and western science between the Trust and the science providers in a planned and cohesive process which fits within a 3 year Strategic Planning framework.

This will significantly build capacity within the Trust and science community alike.

Tiro whenua and the disciplines of pedology and geomorphology in New Zealand.

Ngati Hikairo is a hapu whose rohe encompasses land around Tongariro, including farmland, forestry and DoC managed land near Taumarunui, National Park and Rangipo. This includes Tongariro National Park and the 42nd Traverse. Ngati Hikairo ki Tongariro is very aware of the high value of parts of their rohe to New Zealand, as both an internationally recognised ecological entity and a very popular tourist destination.

Ngati Hikairo ki Tongariro will host a pedologist from Landcare Research. They seek to empower their people through the integration of concepts about spatial soil patterns and soil properties from Matauranga Maori (Tiro Whenua) and mainstream science. For example, there are local Maori concepts about the how the geology and landscape have formed, the names of the parent materials and soils in the area, and long-held understanding of the strengths and weaknesses of land types. By correlating the concepts from the two perspectives, a greater cross-section of the hapu will be able to access knowledge from mainstream science, and Matauranga Maori will become more relevant to younger members of the hapu.

This project represents an opportunity to investigate a part of Maori culture and for the first time gain insight into the links between Maori cultural knowledge, linguistics, and soil science.

The process is expected to create a renewed sense of mana within the hapu, and together with Landcare Research, lead to enhanced kawanatanga and kaitiakitanga within the rohe. Through enhanced management of land-based environmental issues such as erosion from tourist foot traffic on the Tongariro Crossing, and nutrient management related to farms in the rohe, there will be a flow on effect on water quality, tourism, and the regional and national economy.

The project is an opportunity to encourage Maori into careers in soil science, where there is currently a critical skills shortage and substantial demand for the capability predicted within the short term.