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WHAKAORA NGA WHENUA WHĀMA: UTILISING MĀTAURANGA MĀORI AND WESTERN SCIENCE TO PROTECT AND RESTORE THE SOIL ON RURAL FARMS IN TE TAI TOKERAU

Mere Kepa, Benjamin Pittman, Marcus Williams, and Peter Bruce-Iri

DISCUSSION

Mātauranga Māori [Māori knowledge]

Before the arrival of the European settlers, Māori society was governed by a system of principles, laws, and customs known as tikanga Māori. The terminology, tikanga, is derived from the word tika that means to be righteous, honest, and just. At the heart of mātauranga Māori is tikanga and both principles conceptualise whakawhanaungatanga (making good kin relationships) and whakapapa (shared ancestry).[1] Through whanaungatanga (kin relations), a Māori world, both visible and invisible, is conceptualised and apprehended as palpable.[2] Conceptually, whakapapa can be understood as the interminable connections from the Atua (Māori gods) to earth to the people. Whakapapa binds Māori people together in a sacred relationship and responsibility to care for each other, the soil, air, and water.[3] Prior to colonisation, mātauranga Māori that included the principles of tika, tikanga Māori, whakawhanaungatanga, whanaungatanga, and whakapapa enabled Māori to live a tika (good, just, decent) life.

Since the beginning of colonisation of Aotearoa New Zealand, by the British, kāinga have been damaged by the scientific, calculative, logical discourse. Through the dominant English language and culture, the Māori people have been pressured to obey linguistic conventions which are distinctly Western. In the *Whenua Whāma* project, the research team has begun to talk deeply of a cultural interface that draws attention to Māori beliefs, interaction, and self-development in the areas of organic and regenerative agriculture across Te Tai Tokerau, Aotearoa.[4]

In the twenty-first century, the philosophies, mentioned above, can help both Māori and Pākehā to make sense of the world, our shared place on earth, and how we should relate to one another in cultivating food, mitigating man-made climate action, and changing or adapting our ways of living to nature's changes.[5] Māori language terms reveal a sense and process of interaction and self-development; there is a sense that the Māori language highlights the mysterious spirit of a Māori world. Māori people's attention is drawn to think of the Atua and the ancestors as part of everyday living and knowing; therefore, the people's beliefs in the presence of the supernatural distinguish the Māori world from a scientific discourse which treats the appearance of a thing, including the individual, as a solid, calculable object.

During the *Whenua Whāma* study, the kaumātua recounted their experience of food being cultivated by their grandparents in their respective kāinga at Waiotu and Takahiwai. In the kāinga are their shared descent from the first upwelling of energy in the cosmos to thinking, knowing, and desiring; the earth and the sky, the sun, moon and stars,

the sea and the winds, forests, crops, and people, flora and fauna linked together in an immense extended family. They recalled healthier parents, grandparents, and siblings working the soil together to produce food to feed the kin living in their respective kāinga, as well as the relations who were domiciled in the nearby urban centre of Whangārei.

Waiotu and Takahiwai used to be the place of a favourite tree, waterfall, or stream that was once full of mauri (life force, energy). The sacredness of the kāinga was strong. Then topdressing planes arrived, the wetlands were drained, the forests were hewn, the waterways were polluted and life in the kāinga was overtaken by industrial farming. The whānau [extended family] and hapū [groups of extended families] were moved to towns and cities across Te Tai Tokerau, Aotearoa, and the world. All of the changes required the promotion of mātauranga Māori as a significant support for rethinking, reimagining, and regenerating agriculture in education curricula, policy discussions, and commercial practices rather than using the remnants of Māori tribal society merely for ceremonial purposes.

One of the great ironies of the contemporary acknowledgement of mātauranga Māori in the context of sustainable and chemical-free agriculture is that it has been consistently there but without due recognition. Okeroa Pitman, the grandfather of one of the kaumātua-researchers, and many others never talked about Māori knowledge at all; they simply practised it. Their practices in food cultivation included:

- grubbing out weeds – rushes, thistles, ink weed, deadly nightshade, and blackberry; slashing and burning-off dry fern which provided essential soil nutrients that, in turn, encouraged colonisation by valued plants such as mānuka (*Leptospermum scoparium*) and tōtara (*Podocarpus totara*)[6] and, in the short-term, dry land watercress and pūhā (perennial sow thistle);
- using tethered goats on rare instances of gorse invasion, gorse being mainly a problem outside the farm boundaries as within it was strictly controlled;
- using rongoā Māori (plant-based Māori medicinal knowledge and treatments) for the animal's internal and external health, the bush and the margins being the source of all;
- regarding animal health as part of synergistic human health;
- regarding nothing as unproductive wasteland; so-called wasteland was prime eco-habitat for invaluable plants like mānuka, tūpākihi, (also known as tutu, *Coriaria arborea*) and pennyroyal;
- using karakia (incantations) for every beginning, ending and identified problem;
- respecting and preserving the sanctity of wai Māori (fresh water) with strict separation of animals from puna (springs);
- using crop rotation and natural fertilisers;
- respecting the mauri (life force, life principle) of the land and everything within and upon the whenua;
- respecting and valuing water as the source of life for all living things; and
- never allowing the use of chemicals or artificial fertilisers on the land.

In 2016, all of these practices on the whenua Māori (Māori-owned land resources) began to come together through a programme to develop bovine nutraceuticals. Aotearoa became home to the programme and, yet another irony, the chemical-free whenua Māori became the most valuable place of all for the programme. Nutraceuticals that were extracted from bovine herds had the added benefit of providing high quality, organic meat as a value-adding by-product; that is, in addition to the projected $10,000 per animal in nutraceuticals extraction. A notable product, in focus, is bovine colostrum. The therapeutic benefits of bovine colostrum include maintaining well-being and treating medical conditions in both human and animal populations.

While previously, Māori farmers in their adhesion to mātauranga Māori and sustainable farming practices, even without terms to describe the knowledge and approaches, might not have been aware of such specific developments; they were in fact farming both for their 'present' at the same time as laying the groundwork for a collectively beneficial future for all. The notion of 'doing good things for mokopuna' [grandchildren] is deeply embedded in Te Ao Māori (Māori world). So, the good spirit of mātauranga Māori is the continuum of a Māori history.

European settlement brought novel knowledge and previously unknown animals that became part of mātauranga Māori. This was merely a continuation of mātauranga Māori of migration, discovery, and transformation over thousands of years. Māori valued horses, pigs and cattle especially. Horses as transportation became 'superior' property under the Māori classification system of 'superior' and inferior property. Grandfather Okeroa also followed his maramataka (lunar calendar) that commenced each month with the rising of the new moon as the guide for all activities related to planting, harvesting, and fishing. A document in our whānau archives, dating from from the 1890s was a guide, designating rongoā hōiho (horse medicines) that were based on native plants with the interesting addition of tupeka (tobacco).

The details illustrate the flexibility of mātauranga Māori with the capacity to embrace the new: knowing is never static; rather, knowing is vital and aware. The other cultural principle in play is the Māori notion of whakapapa that links all things, animate and otherwise, as part of a universal genealogy; a sophisticated system of kinship, relationships and inter-dependence. So sustainable agriculture, in Te Ao Māori existed even without a name, as a manifestation of a dynamic, interlinked through whakapapa. As well as people as agents of action, key contextual elements were whenua and wai (earth and water), water being the blood of life; "Mā te wai e ora ai ngā mea katoa" ("Through water, all things are sustained"). This reinforces the notion of interconnectedness of all things animate and inanimate. Completing the picture and binding *all* together is the taha wairua [spiritual dimension], manifested by ritenga (customary practices) and karakia.

While recognising that mātauranga Māori shares aspects of knowledge with Western science, as a system operating within Māori contexts and rules, mātauranga continues being deep and core to Māori existence; and is fully able to stand alone. It is through research projects, such as *Whenua Whāma*, that what might previously have been regarded as barriers to development by Māori, are more likely to be helpful, conceptual and perceptual illustrations of growing food.

REGENERATIVE AGRICULTURE

In the 1960s, research highlighted the negative environmental impacts of industrial farming; that is, a counterculture to earlier pioneers emerged in the form of organic and bio-dynamic farming.[7] Such farmers remained in the minority, and progressively neo-liberal economics created a drive for production that spawned intensification and the aggregation of smaller farms into much larger farms. Rises in fertiliser use and decline in water quality evidenced the changes. Biodynamic and organic certification processes have specified on-farm standards. Some that aspire to more natural ways of farming find the standards impose undesirable constraints and have adapted biodynamic and organic methods without fully complying with the measures. Some farmers have described their methods as being biological or indigenous. In this project, we have used the term regenerative to encompass the methods. Regenerative infers environments can go beyond sustainability to heal ecosystems and to intensify life and biodiversity. Climate justice concerns add to the urgency to create farming practices that improve soil, plant, air, animal, and human health and resilience. A motivation for the study was to identify how farm pastures can grow and sequester soil carbon to help mitigate climate change. Also, we wanted to identify ways of reliably quantifying carbon levels using methods easily implemented by farmers. A range of methods were investigated until the team settled on using the Visual Soil Analysis (VSA) developed by Graham Shepherd[8] and outlined in a manual developed, and then adopted by the FAO for international use.

In the *Whenua Whāma* project, one of the farms has USDA Organic Certification while the other is farmed conventionally. Graham Shepherd used the VSA to assess the soils, to demonstrate the methods used, and to gather the soil samples for laboratory analysis. The comparative study of the two farms was not designed to validate an assumption that the soil on the organic farm would be superior, rather the idea was to explore the methods that might be used by farmers easily.

One of the results from the soil and pasture sap analysis highlighted a significant difference in practices based in mātauranga Māori and industrial agriculture, prompting a further investigation of relevant literature. Results from the soil tests on the organic farm revealed Olsen P levels of phosphorus of 23 on the low end of the medium range. This would normally prompt recommendations for the addition of phosphates. But herbage tests revealed high levels of phosphorus (0.49%); this indicated an active microbiome on the organic farm that effectively mines phosphate from soil minerals and makes it available to plants.

The authors of a 1923 article from the *Journal of Polynesian Society* were clearly impressed by the soil quality of Waimea plains soils cultivated by Māori. Notably, the soils were still of superior quality when the soil scientists tested them several decades after Māori soil amendments. The gravel and sand applied improved the soil texture; Bruce and Rigg attributed the very high levels of phosphate to the burning of scrub:

> The source of the enrichment was apparently wood ashes, since the soil is black, owing to the presence of much charcoal. Wood, scrub, or other vegetable matter must have been brought on to the land and there burnt. Tea-tree (mānuka) is suggested as the form of vegetable matter which was employed for this purpose. The ash of tea-tree is rich in phosphates, potash and lime.[9]

Meanwhile, on Pākehā farms, the use of superphosphate happened soon after the establishment of Canterbury Agricultural College in 1878.[10] A former 28th Māori Battalion soldier recalled from the era (1910 to 1930) that his father had observed that their Pākehā neighbours were stealing the mauri (life force) from the soil.

Superphosphate is derived from phosphate rock. Nauru Island as a source has been left with large areas of degraded landscapes and currently New Zealand sources the rock from West Sahara, a country colonised by neighbouring Morocco. The Saharans protest that they receive no benefit from what they call "blood phosphate."[11] Thus, to source our phosphate we are, in the words of Hua Parakore (Māori organic gardening) authority "eating other people's landscapes"[12] as well as degrading their quality of life. As well as perpetuating injustices in the countries of origin, phosphate fertilisers do harm here too. They contain cadmium and fluoride. The Ministry of Primary Industries claims that cadmium is within World Health Organisation guidelines. Cadmium is a heavy metal that can harm human and ecosystem health.[13] Phosphate fixes strongly to the clay fraction of soil. In New Zealand "over two hundred million tonnes of sediment are lost … into the ocean every year."[14] This is the main pathway for phosphates to pollute waterways. In his interview for the project, Dr Benjamin Pittman related how his grandfather, Okeroa, refused to have artificial fertilisers on his farm. If the value proposition for phosphate use is confined to the farm, it might be justified, but the wider social, environmental and economic impacts appear to remain unexamined.

These gleanings of farmers' application of phosphate illustrate the gulf between industrial agriculture and mātauranga Māori. By contrast, the interface between regenerative agriculture practices and mātauranga Māori approaches to agriculture are more apparent. The practices and approaches share in common a reverence for the natural world, and a sense of obligation to nurture the environment. Australia's Terry McCosker describes the transition that farmers make as they move towards a more regenerative mindset as follows:

> …over the time that I've been working with graziers, a lot of people think that they were graziers or livestock managers. Well, the time they do the first round with us, they realize that they're grass managers. But by the time they learn a little bit more about ecology and soils, et cetera, they realize that they're soil managers, and it is management of that soil, that creates all the wealth, that happens from then on.[15]

Some of the tools grounded in Western science, such as the VSA, are very helpful in this transition. Mātauranga Māori offers an antidote and contrasting world view to curb the excesses of industrial agriculture and is an ideal lodestone for guiding regenerative practice.

"KO AU TE WHENUA, KO TE WHENUA KO AU" (I AM THE LAND, AND THE LAND IS ME)

The *Whenua Whāma* project occurred with support from the New Zealand National Commission for UNESCO, a UNESCO Member State. The Commission has five strategic priorities, one of which is nurturing and connecting diverse forms of knowledge based on scientific evidence, traditional knowledge, and intercultural dialogue to enhance decision making and foster mutual understanding. In Aotearoa, traditional knowledge is often referred to as mātauranga Māori; Dan Hikuroa has asserted that "there are significant similarities between mātauranga Māori and science."[16] Yet this idea of intercultural dialogue is harder to enact than it is to state because the people involved in these different knowledge systems frequently talk past one another, particularly in areas of agriculture and food production, which are at the very heart of the colonial history of Aotearoa. As discussed in this paper, in Aotearoa and internationally, the methods associated with gathering scientific evidence and traditional knowledge are fundamentally different. The dialogue, attitudes, and methodologies come from different world views, and operate within different paradigms. In the context of contemporary research, Western science is hegemonic, has historically received most of the resources and is generally dismissive of traditional knowledge. On the matter of the funding and prioritisation of environmental research in New Zealand, the Parliamentary Commissioner for the Environment states, it is not "…inclusive of mātauranga Māori and the centuries of knowledge attained from living on, and with respect for, the whenua."[17]

Relevant to contemporary debates around Te Tiriti o Waitangi, the established power imbalance between the paradigms of mātauranga Māori and Western science are slowly being acknowledged within research institutions, the New Zealand government, and across society. A manifestation of this is the development of Vision Mātauranga (VM) by Charles Royal[18] in 2005 and its implementation in the Ministry of Business, Innovation and Employment in 2010. Vision Mātauranga seeks to recognise the innovative potential of mātauranga Māori to Aotearoa society and requires applications for research funding to address four main areas of relevance: Indigenous Innovation, Taiao (Environment), Hauora (Health) and Mātauranga (indigenous knowledge and science).

Arguably, VM is an example of an effort being made across different sectors of Aotearoa to create intercultural dialogue and to address the power imbalance between the knowledge systems.[19] In relation to the *Whenua Whāma* project, VM addresses the loss of potential benefit to society and the environment by the marginalisation of the Māori worldview; the thinking, knowledge, and practices of Te Ao Māori. In her reflections on VM, Lanning also acknowledges the possibility for academic disciplines to use the framework to contribute to intercultural dialogue: "Vision Mātauranga, done properly, forces scholars to come together for long periods of planning where we listen to one another, participate in debates, and figure things out."[20] An understanding of the *Whenua Whāma* research team, which is comprised of Māori and Pākehā, is that in the context of food production, a failure to address the power imbalance between Western science and mātauranga Māori has the potential for catastrophic outcomes.

Photography formed an important component of the project. Sometimes described as a universal language, photography was incorporated into the project as a way of addressing the phenomenon of talking past one another in an intercultural dialogue. There were three hui (meeting) held at NorthTec in Whangārei:

- To engage with the community;
- To share findings; and
- To exhibit the photographic documentation at NorthTec's Marae, Te Puna o Te Mātauranga.

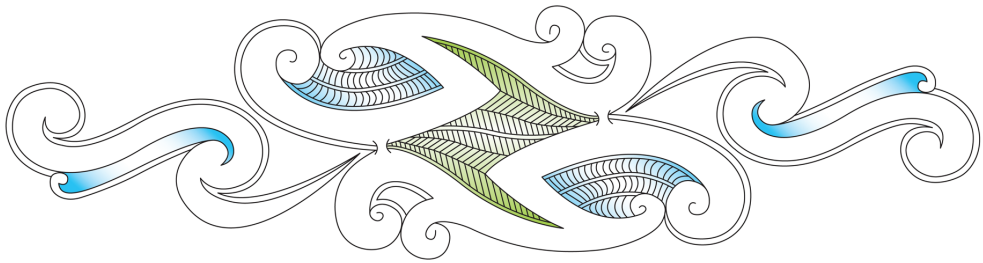
Photography is a powerful communication tool, but like all forms of representation, the method can be deeply problematic in a research context. The research team decided to engage two local taitamariki (young) Māori, the daughters of the two Māori farmers. Both were recent school leavers; they were guided in photographic techniques and equipment and encouraged to engage in the significant events of the project. The research approach emerges from Participatory Action Research (PAR) which, according to Vollman fosters capacity, community development, empowerment, access, social justice, and participation.[21]

Photography as PAR emerged from a critique of the use of photographs and film in ethnographic research. By the 1970s, the use of photography as a tool for recording cultures was recognised as objectifying the subject and perpetuating the colonising tendencies of the dominant culture. Linda Tuhiwai-Smith speaks of research through imperial eyes in her book, *Decolonising Methodologies; Research and Indigenous Peoples*, asserting that the words and images of researchers often marginalise the experience and stories of the Other.[22] Participatory Action Research emerged from what John Heron, in 1971, described as Cooperative Inquiry; the major idea being to research "with" rather than "on" people.[23] This approach pervaded all of the *Whenua Whāma* project, where the divide between the researcher and researched was deliberately blurred. Participatory Action Research was chosen as the photographic research approach because the method claims to give voice to the Subject, which creates the potential for transformation through communication, heightened awareness and activism. Maguire emphasized that the action activity of PAR was "a way for researchers and oppressed people to join in solidarity to take collective action, both in short and long term, for radical social change."[24]

The assertion was born out. The resulting photographic exhibition represented the project and farm life from the point of view of taitamariki Māori from the area and provoked conversation among the various communities involved, in ways that had not occurred in the Final Hui at which the Final Report to UNESCO was presented. On that occasion, the audience walked to the exhibition nearby, after a morning of presentations. Only then did a sustained, inclusive, intercultural dialogue about the potential confluence of Western science and mātauranga Māori occur among the large group of people viewing the photographs.

CLOSING REMARKS

In the feasibility study, *Whenua Whāma*, the language and culturally diverse interface among the Māori and Pākehā researchers, the kaumātua, the farmers and their daughters has been successful in drawing out ideas, knowledges, and techniques on healing the earth. The research team has affirmed better food cultivation is achieved when the partnership of Māori and Pākehā honours, concomitantly, mātauranga Māori, Te Tiriti o Waitangi, regenerative and organic agriculture, and climate justice. Finally, the findings have been set out, in detail, in the Final Report to the New Zealand National Commission for UNESCO.[25]



Dr. Mere Kepa (https://orcid.org/0000-0003-4768-5871) is Tangata Whenua of Te Parawhau, Patuharakeke, Ngāti Raka, and Ngāti Ira. Dr. Kepa is a writer, editor, and a peer reviewer of proven merit, and writes poetry about the degradation and destruction of Nature. Dr. Kepa has a lengthy tradition of fostering International Indigenous relations in scholarly writing, editorship, peer review, teaching and research, and critically thinking about education where language and cultural diversity, and innovation are keenly valued. In the Kāinga of Takahiwai, Te Tai Tokerau, Dr. Kepa plays a role in environmental, health, and education research and activities.

Dr. Benjamin Pittman (https://orcid.org/0000-0003-1355-3280) I whakapapa to Te Parawhau, Ngāti Hao - Te Popoto (Hokianga) and Ngāti Hau (Akerama) and chair Te Pouwhenua o Tiakiriri Kūkupa Trust - Te Parawhau ki Tai. Dr. Pittman has spent his entire adult life within education in both Aotearoa and Australia and has been fully immersed in environmental issues related to the whenua since 2013, when he returned to Aotearoa. His focus has been on water quality, land, waterways, harbour and ocean degradation and use and on keeping genetically modified organisms out of Te Tai Tokerau.

Peter Bruce-Iri (https://orcid.org/0000-0003-3956-7111) was born and raised at Te Kōpuru and has had a passion for organic production and the environment for all his adult life. His current research is about regenerative food systems and climate change. He was a founding director of Local Food Northland in 2016 and a founding trustee of the Climate Change Tai Tokerau Northland Trust. A veteran educator, he has led programme development and accreditation initiatives, including the recent Māori Enterprise Major for NorthTec's business degree. Peter is an associate member of the Ngāti Pū hapū, through marriage to Huria Bruce-Iri.

Marcus Williams (https://orcid.org/0000-0002-3313-211X) is an Associate Professor Creative Industries and Director Research and Enterprise, Unitec Institute of Technology. Since 2014, he has led Unitec to a position of strength in Applied Research over the last five years. As an example, he advocated and facilitated key appointments which led to the creation of Ngā Wai a te Tūī, the Unitec Kaupapa Māori Research Centre which was opened in 2019. He holds a Masters of Fine Arts from RMIT University and a Bachelor of Photography from the University of Auckland. His research interests are in creative practice as an agent of social change. He has led several highly collaborative, transdisciplinary projects with multiple complex outputs. As a climate change champion, he has facilitated the establishment of Regenerative Agriculture projects.

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