Manaaki Whenua
Landcare Research

The Mana of Soil: A Māori Cultural Perspective of Soil Health in Aotearoa-NZ

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Kaupapa Māori Research Objectives

- Define Soil Health concepts and knowledge from a Māori perspective
- Local, Regional and National level Māori coordination and research (values, interests and rights in soils)
- Development of a Māori soil health framework and indicators
- Integration of key concepts and knowledge into a national assessment framework

- *Present measures and indicators of soil health in Aotearoa-New Zealand do not recognise cultural perspectives or incorporate other knowledge systems, such as mātauranga Māori*

Ancient, traditional, historic, local, mātauranga Māori through to contemporary knowledge

Māori Beliefs

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In Māori tradition, the link between Māori and the soil was strong and reciprocal, stretching back to the time of creation.

Papa-tū-ā-nuku and Ranginui, whakapapa, whenua, ecosystems, habitats, taonga, soil.

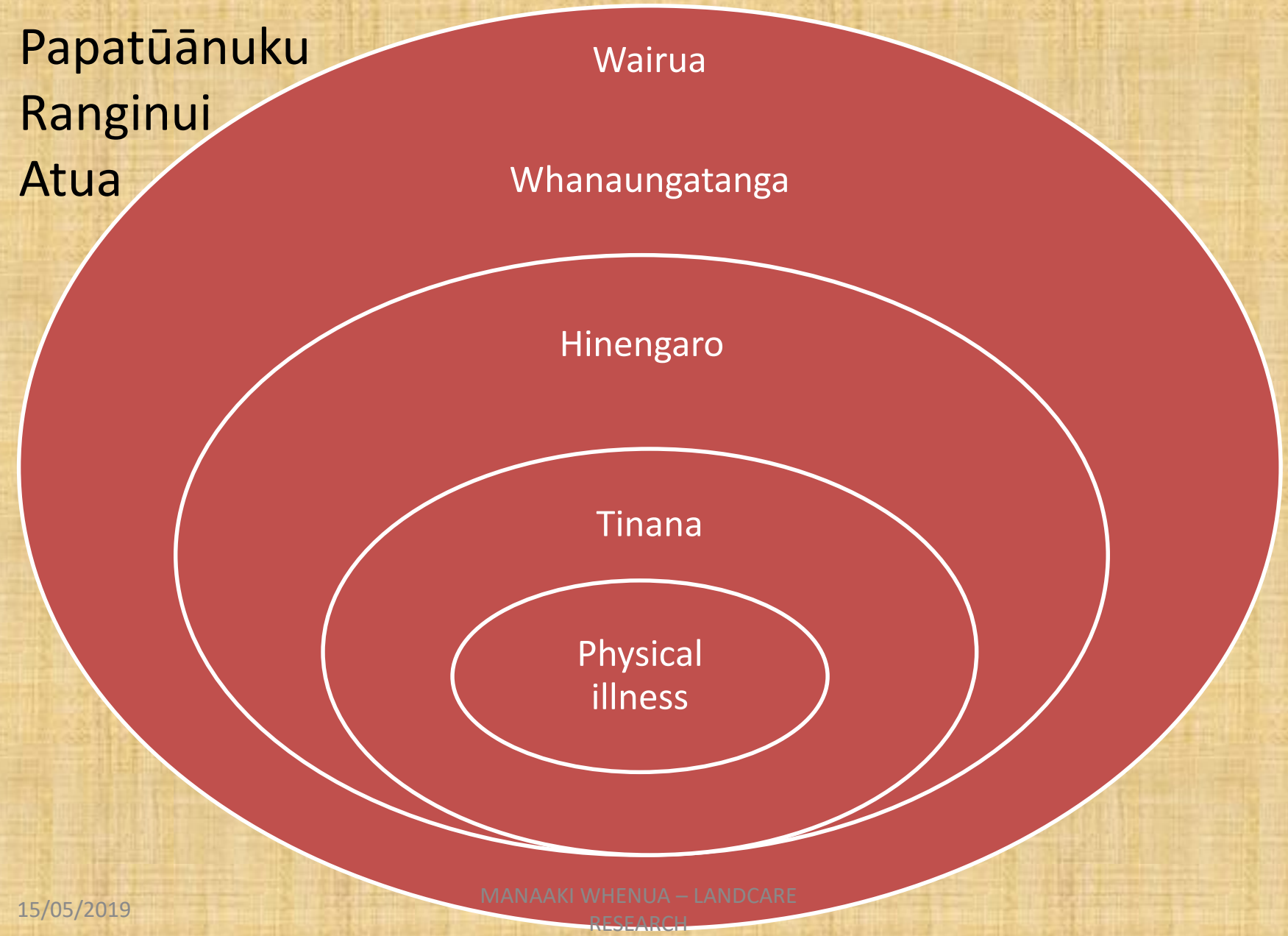
In terms of narratives, the complete life cycle starting, with birth and ending in death, was frequently acknowledged:

- Hine-ahu-one, also known as Hine-hau-one, she was the first woman created by Tāne-nui-a-Rangi and Io from the red clay at Kurawaka
- Hine-nui-te-pō, goddess of the underworld *Me matemate-a-one'* (let man die and become like soil).

Whakatauki

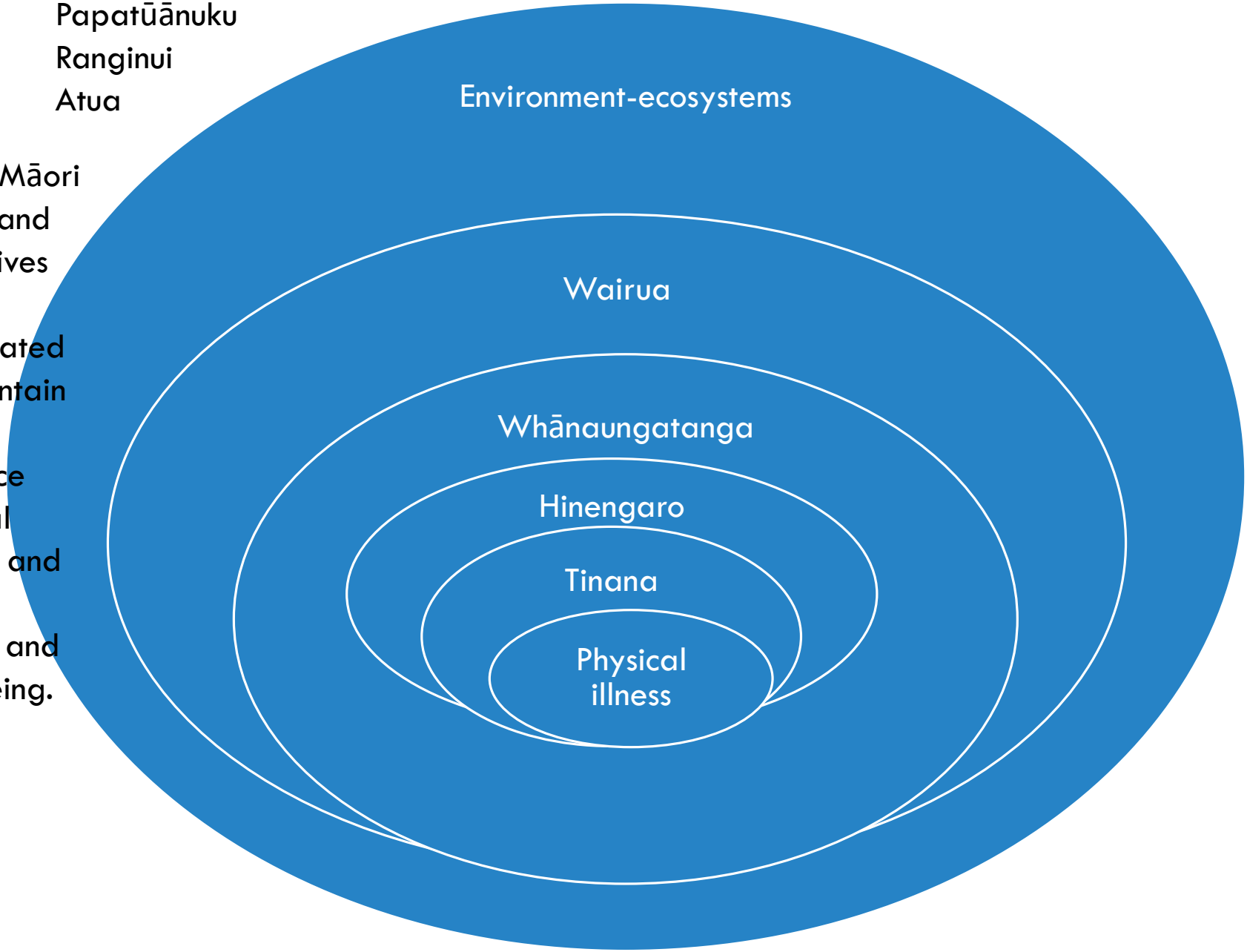
- “Te toto o te tangata he kai, te oranga o te tangata, he whenua, he oneone – While food provides the blood in our veins, our health is drawn from the land and soils”

Papatūānuku
Ranginui
Atua



Papatūānuku
Ranginui
Atua

Many Māori goals and objectives are formulated to maintain and enhance cultural values and human health and wellbeing.



Tribal stories (pūrākau)

TE TAENGA MAI O TAKITIMU KI AOTEA-ROA NEI.

- “Pewhea ake te tua-whenua?” Ka mea atu a Nga-Toro', “He pai; he one tai etahi wahi, he one matua etahi wahi, he one tuatara, he paraumu, he one-rere, he one-punga, he one-haruru, he one-puia, he one-kirikiri, he one-powhatu, he one-takataka, etahi wahi.”

  “What kind of land is this?” Ngātoroirangi replied: “It is good. Some parts are limestone, some are sandy soil, others rich soil, others friable soil, black soil, sand, pumiceous soil, and light sandy soil, red volcanic soil, some parts are gravelly, stony, and some are very loose soils” (JPS 1915).

Māori gardeners had at least 60 names for types of soil

Maori names for soils	Maori names for soils
One-pū – sand One nui – rich soil, consisting of clay, sand and decayed organic material One-matua – typically loam One mata – dark fertile soil Tuatara wawata – brown friable fertile soil suitable for kūmara One-pārakiwai – silt One paraumu – very dark fertile soil, friable One hanahana – Dark soil mixed with gravel or small stones One haruru – Light but good soil; sand and loam	One hunga – sea sand, sandy beach, sometimes mixed with mud One kopuru – soil found in wet situations One kōkopu – gravel, or very gravelly soil One kura – reddish, poor soil One pākirikiri – soil containing gravel One parahuhu – alluvium (also parahua) One punga – light spongy soil One tai – sandy soil, near tidal flats, near beach One tea – white soil, sandy volcanic material One takataka – friable soil One tuatara – stiff brown soil, needing sand or gravel worked in

Maori names for soils	Maori names for soils
Kere was used as a prefix for some types of clay, including: keretū, kerematua and kerewhenua: Keretū - clay Kerematua – stiff clay Kerewhenua – yellow clay Kereone – sandy earth, e.g., near Morrinsville One wawata – lumpy soil Kirikiri tuatara – fertile brown soil	Kōtae – alluvial soil One tea – light sandy soil, near Dargaville. Kenepuru – sandy silt Kōtore – white clay Taioma – pipe clay Uku - unctous clay, white or bluish Uku whenua – plastic clay (old traditional name – **KUPE AND NGAKE START FOR NEW ZEALAND JPS 1913.** Matapaia – a clay when baked hard was used as a stone for cooking

National Maori Organic Authority
Guardians of Hua Parakore

Hua Parakore – An Indigenous verification and validation system for food and product.

Interviews/wānanga Concepts

- What is missing around the kaitiaki of our soils is the deep understanding of the whakapapa of our soils" (Hema Wihongi interview by Kiri Reihana, 2017).
- "Following is karakia, be thankful and pay respect to the mahi you are doing in this case the whenua, oneone, having scared regards for it sustaining your life and your reciprocating by giving life back to the whenua (land). Therefore the land is what sustains us "ka ū ki te ūkaipo" (Hema Wihongi interview by Kiri Reihana, 2017).

"Kaitiakitanga is about caring for the land. We inherit the whenua, the waterways, the moana, we don't own it but our responsibility, our role to our people and to our whenua, is to care for it and to ensure its sustainability for future generations" (Wharekura o Maniapoto, Hōhepa Hei interview by Yvonne Taura, 2017).

When asked, "how important are soils to you?", tauira (School students) responded with these enlightening responses (Wharekura o Maniapoto, Hōhepa Hei interview by Yvonne Taura, 2017):

- Maniapoto Kura
  - Tangata Whenua
    0% (kore) – 100% (hundy)
    For the people to stand on
    Soils clean the water, soils feed the plants
    Healthy soil = FOOD, Unhealthy soil = NO FOOD!
    We live off it, on it – We fought for it, live for it, with it – We would be dead without it!

Understanding concepts (definitions)

- It is particularly important to enhance the mauri of the soil by enhancing its fertility, structure and biological activity" (Hua Parakore, Te Waka Kai Ora 2011b, p22).
- "…The capacity of a soil as a living ecosystem to sustain and support all forms of life (to sustain microbes, plants, animals, humans and complex interconnections), through the maintenance of te mauri, to strengthen and enhance whakapapa, taonga tuku iho, mana, oranga, wairua, and whai rawa" (*provisional* Māori definition – June 2018 – developed from the MBIE soil health programme C09X1613).
- "Capable of supporting, maintaining, and enhancing life and wellbeing" (from this soil health programme C09X1613).
- "Soil health: "the optimal state and condition of soils to support an intended land use and sustained productivity level, and to ensure the optimal soil resource is in place for future generations" (Blair Waipara, land development manager, Tumu Paeroa)
- "Papa Oranga ki a mātou so soils are important to me because they exemplify my health, my well-being, who I am - ko wai ahau, nō hea ahau, tōku whakapapa me ngā tikanga e pā ana ki tōku mana arā ka puta ko te kōrero mana whenua" (Maanu Paul interview by Kiri Reihana, 2017).
- "For soil health you should use 'papa oranga he aha ai? kia whakatōhia te mana o Papatūānuku ki roto i te whenua', so I respect soil, it has mana more than that it has a mauri (Maanu Paul interview by Kiri Reihana, 2017).
- "Whakapapa defines what a healthy soil is, it comes from our whakapapa, we define ourselves from our pepeha, our land. So whatever happens to the soil happens to me, when we are disenfranchised from our soil, our land, it also effects our physical and mental health".... "The indicators and measures of soil health can be seen in the place names, the geographical whakapapa" (Hema Wihongi interview by Kiri Reihana, 2017).
- "In all cases, healthy soils sustain healthy people" (MBIE programme wānanga 2018)
- When asked, "what tohu would you use to measure soil health?", the tauira (School students) responded with key concepts, such as (Wharekura o Maniapoto, Hōhepa Hei interview by Yvonne Taura, 2017):
  - *Nutrients*
    Smells like soil
    Birds, insects and worms
    Dark soils = Healthy soils
    Trees growing in the ground
    Worms are good, snails are bad

KEY MĀORI PRINCIPLES

The following values and principles have emerged as integral to the understanding of soil health from a Māori perspective:

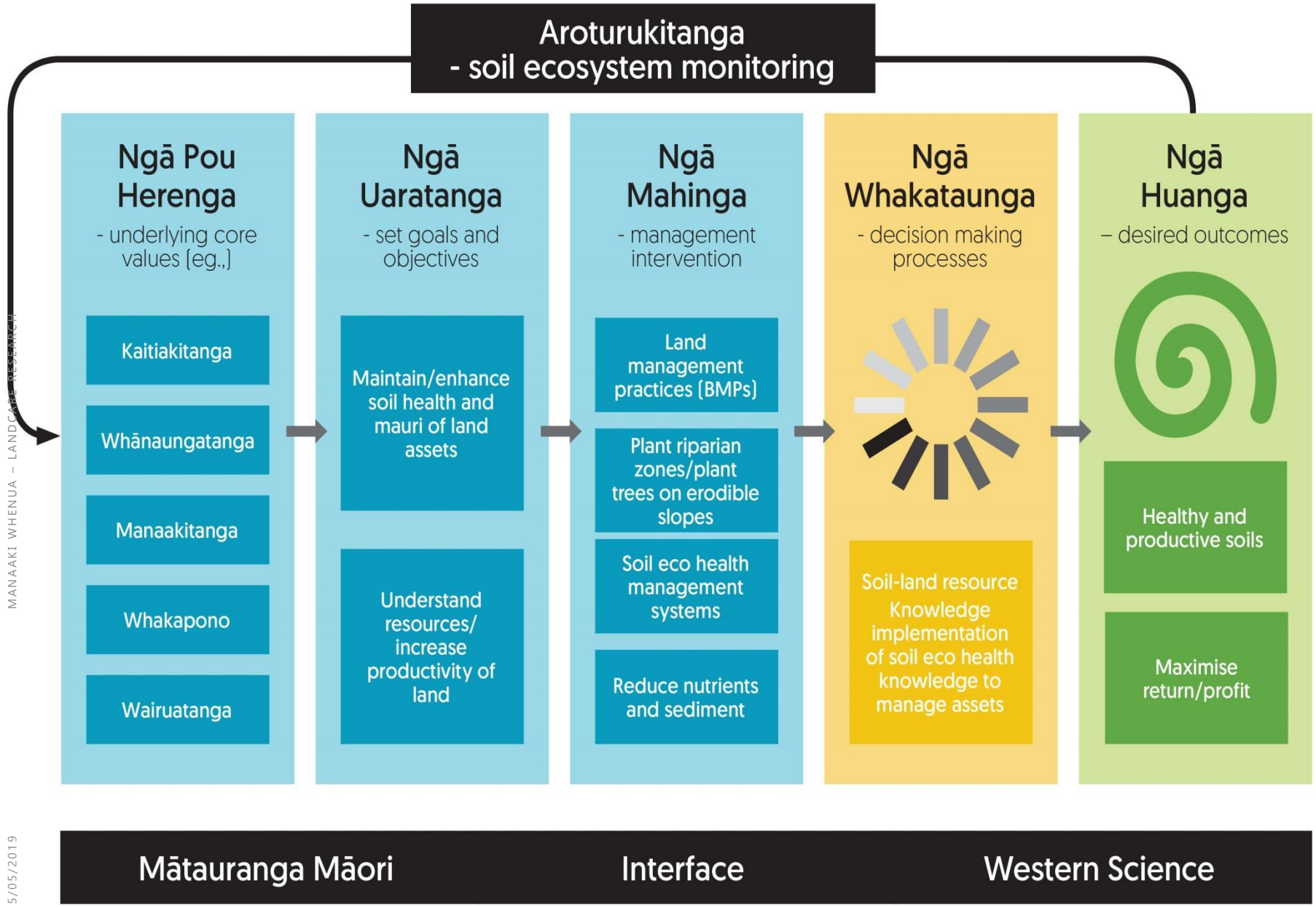
- Mana, mana whakahaere/rangatiratanga/ mana motuhake
- Mauri
- Mahinga kai/Maara kai
- Oranga ora, whenua ora, oneone ora
- Whakapapa
- Wairua
- Taonga Tuku Iho

Māori values and key principles

Core values/principles	Values/Principles – Description
Mana, mana whakahaere, rangatiratanga, mana motuhake	Authority and rights to manage land, soil, and resources, to exercise mana and kaitiakitanga over resources. Recognition of the Treaty of Waitangi, Māori land versus tribal interests (Māori land owners – iwi/hapū/whānau) to express from local through to national rights and interests (e.g. over resources, management, authority for decision-making).
Mauri	Life force or energy, vitality and continued capacity of the soil to sustain/support life and wellbeing. e.g. well-functioning vital living soil ecosystems, full of soil biota, that maintain inter-connections between physical, chemical, biological components and people.
Mahinga kai/Maara kai	Ability of soil to produce and sustain food for harvest and collection to support people, ecosystems
Oranga ora, whenua ora, oneone ora	Ability of soil to provide and ensure health and wellbeing of people (ko au te whenua, ko au te oneone, ko te whenua/oneone ko au, ngā tangata), in accordance with tikanga and kawa, (e.g. no human waste) and supply healthy food. e.g., with no harmful contaminants, pathogens, pesticides, and free of toxicity. A well-functioning soil free of contaminants and waste in accordance with cultural values.
Whakapapa	Respect for ancestral links or lineage of the soil, relationships, connections back to ancestors, origins of Papatūānuku and Ranginui, Whenua, Ātua domains, also denotes family connections to place and between whānau/hapū/iwi.
Wairua	The spiritual domain or dimension. Conveys elements of whenua/soils to spiritual connections which bind the living to the non-living, the heavens to the earth, to give mauri and spiritual health which transcends through to people, food and resources.
Taonga Tuku Iho	Ability to sustain the soil resource for future generations, through practices and concepts of kaitiakitanga and Te Ao Turoa. Intergenerational equity of the soil resource and its ability to provide for future generations. The soil resource is sustained, enhanced, in as good or if not better condition for future generations.

Maori soil health datasets/evidence/indicators

Core values/principles	Types of data /evidence/indicators
Mana, mana whakahaere, rangatiratanga/mana motuhake	Data/evidence that Māori are making decisions over their whenua, over their ngā oneone; This could be over tribal rohe (e.g. iwi /hapū management plans) or could be on specific land blocks/whenua where they have whakapapa and mana (e.g. kaitiaki, owners, beneficiaries). Decisions for enhanced soil health, using soil management guidelines, plans, and implementation of best practice on Māori land.
Mauri	Data/indicators which demonstrate the soil and people are in a healthy state and connected, the system is in balance, indicators which show the vitality and energy of the soil resource, or the diminished state of the soil.
Mahinga kai/Maara kai	Data/attributes/indicators of mahinga kai, and that the mahinga kai is healthy and comes from healthy soils.
Oranga ora, whenua ora, oneone ora	Data/indicators of a healthy soil is providing healthy food, and healthy people. That practices for growing food from soil is following tikanga and guidelines for food sovereignty, food safety and food security. e.g., no harmful contaminants, pathogens, pesticides, free of toxicity. A well-functioning soil free of contaminants and waste in accordance with cultural values.
Whakapapa	Data/indicators which show the ancestral links (connections, interdependencies) between people and place, people and soils, and confers responsibility to those to manage soils for enhanced soil health and human survival and wellbeing
Wairua	Data/evidence that the wairua is intact, the spiritual health of the people is intact, and provides a connection between the spiritual and the physical, in order to sustain the soil in a healthy state. Provides the glue between the physical and spiritual worlds, maintaining balance between mauri and mana.
Taonga Tuku Iho	Inter-generational equity. Data/indicating a resilient healthy soil- i.e., the soil resource is sustained, enhanced, in as good or if not better condition for future generations. The soil is 'fit for purpose' in line with cultural values and Māori aspirations.



Maori soil health indicators (examples)

Core values/principles	Soil health indicators
Mana, mana whakahaere, rangatiratanga	No. Iwi management /kaitiaki plans that refer to soils, soil health Land/soil management practices, to improve soils, implemented on Māori land Areal extent of healthy soils on Māori land % areal extent of land-uses/contaminated areas that reduce soil health on Māori land
Mauri	Mauri whenua ora/mauri being enhanced Soil ecosystems/soil biota that indicate well functioning soils (e.g. earthworms, porosity, OM) per (land area) High life supporting capacity, soil capacity/integrity high (land area) % area/tribal area: Strong connection between soils and people (e.g. area of soils used for gardening, cropping, mahinga kai, etc)
Mahinga kai/Maara kai	Mahinga kai areas assessed as healthy with mauri intact, good-high People/whānau are healthy – tangata ora
Oranga ora, whenua ora, oneone ora	Soil health is being maintained across cultural areas, within range usingl key indicators. % proportion of food that is healthy and free of contaminants/pathogens/pesticides. Human health/wellbeing is good to excellent
Whakapapa	Whakapapa is recorded/transferred and known between people and whenua/soils, Traditional mapping of soils, cultivation sites, maara kai, pasta and present. Ancestral links between people and place, kaitiakitanga is practiced over natural resources/whenua. No. of wānanga/field studies on whenua/soils.
Wairua	The spiritual dimension/domain is important to local people Wairua is seen as part of maintaining/strengthening mana and mauri Wairua provides balance in the system, a well-balanced functioning soil ecosystem is achieved (e.g. kaitiakitanga and karakia practiced)
Taonga Tuku Iho	Soil health is maintained in areas for future generations Wise land use options are undertaken to maintain/enhance soil.

Indicators

- Mauri (internal essence, life force, assessment, local knowledge) e.g. a healthy functioning soil fit for purpose and sustaining life, health, and prosperity, capacity of a soil to function as a living system to sustain mauri
- Mana (authority to manage and make decisions) also can imply the mana of a soil (as a living entity) – food sovereignty e.g. ability to make decisions over someones land, soil management guidelines and best practice
- Mahinga kai and Maara kai (the ability of the soil to provide sustenance, food sovereignty, and prosperity) e.g. area of soils that sustain gardening/organics
- Oranga, ora (measure of food safety and food health from soil) e.g. a soil free from pesticides and contaminants, meets food safety standards

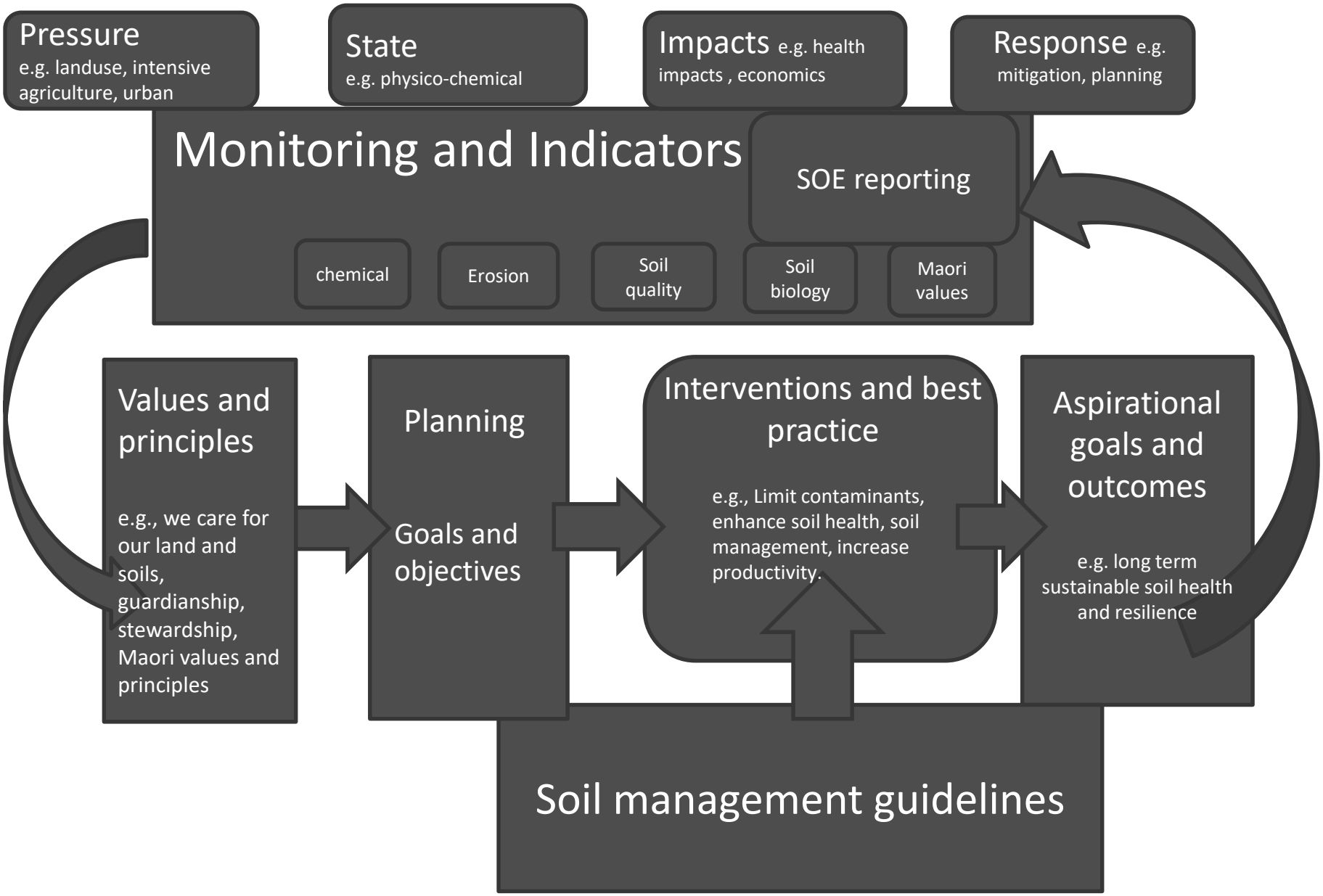
NZ SOIL HEALTH MEASURES TO DETERMINE SOIL HEALTH INDICATORS

Soil health indicators	Soil measures	Why is this measure important?
Organic reserves	Total carbon	Organic matter helps soil retain moisture and nutrients, and supports good soil structure
	Total nitrogen	Reserves of nitrogen are stored within organic matter in the soil
	Mineralisable nitrogen	Mineralisable nitrogen is a form of nitrogen that plants can use for growth and is an indication of soil organism activity and health
Fertility	Olsen phosphorus	Plants get phosphorus from phosphates in the soil, but many New Zealand soils have naturally low available levels
Acidity	pH	Soil pH controls the activity of nutrients and metals in soil. Most plants have an optimal pH range for growth
Physical status	Bulk density	Soils with high bulk density drain poorly and restrict plant root growth, while soils with low bulk density are vulnerable to erosion
	Macroporosity	Large pores allow air and water to penetrate into soil for root growth and soil biological activity, but these are easily compacted

Table 1: Complementary soil assessment/monitoring approaches

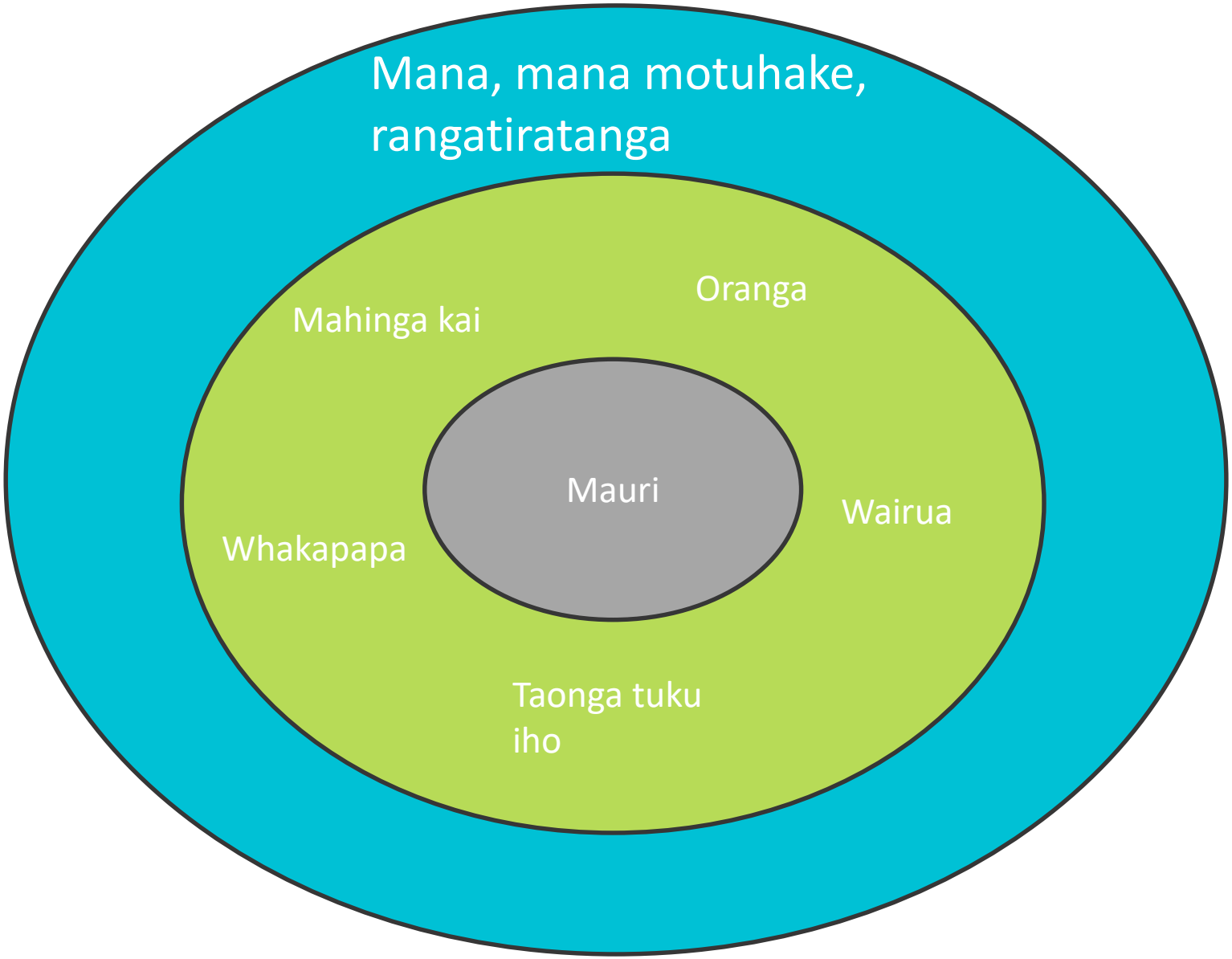
Kaupapa Māori soil assessments/indicators	**Farm, community–technical & non-technical assessments**	**Science based – including professional scientific, technical assessments, and science based (statistical) sampling strategies**
Kaupapa Māori based **Mātauranga Māori knowledge based** **Based on Māori concepts and values** **<u>Examples:</u>** **Hua parakore (Maori organics)** **Kaitiaki assessments (pastoral, cropping, gardening, etc)** **Farm KPIs** **Customary environmental indicators e.g. mahinga kai** **Cultural impact assessments** **Iwi/hapū/marae monitoring of contaminated sites** **Require in-depth Māori knowledge and understanding of particular environments and issues. Understanding of Māori values, goals, and aspirations.** **Kaupapa Māori approaches can include science and technical assessments.** **Examples:** • **Māori concepts, principles, and values** • **Kaupapa or mātauranga Māori based assessments and indicators** • **Traditional stories, narratives, gardening, maara kai, mahinga kai** • **Soil management guidelines, best practice** • **Land management, whenua,**	<u>Examples:</u> • Can be subjective • Visual soil assessment (VSA) • Farm assessment • Farm indicators • Community based indicators (e.g. collectives) Can be subjective and practically based. Cost effective, relatively simple and short duration assessments linked to land management, soil management, farm operations, cropping, orchards, market gardens, hill country, etc. • Farmer, grower, orchardist, industry • Community values • Technical and non-technical assessments • School assessment programmes (soils and gardens) VSA pastoral, soil management, hill country, <u>Indicators:</u> • Soil structure and consistence • Soil porosity • Soil colour • Earthworm counts • Compaction–tillage pan, clod development • Soil erosion • Organic matter • Plant indicators	Scientific soil quality and soil health indicators: e.g., objective, measure 'soil quality' or 'soil health target range' <u>Example indicators measured</u> Organic reserves • Total carbon • Total nitrogen • Mineralisable nitrogen Fertility • Olsen phosphorus Acidity • pH Physical status • Bulk density • Macroporosity Trace elements Contaminated soils Use science based sampling strategy Laboratory analysis Require higher levels of technical input and skill, robust sampling strategies, analysis and interpretation, can be expensive and time-consuming.

An integrated soil health framework



Findings to date (kaupapa Māori)

- Soil health is understood holistically from a cultural and science perspective (beliefs, whole ecosystem and interconnections – microbes to people)
- Understanding is based on Māori beliefs, philosophy, knowledge, values and perspectives
- Inter-generational connections (whakapapa) between people, land and soils are integral
- The mana gives authority for caring and looking after the land and the soil. "…Te Mana o te Whenua, te mana o te oneone, te mauri o te oneone" "The mana of the land, the mana of the soil, enhances the mauri of the soil".
- A spiritual dimension, or wairua, is a key dimension from a cultural perspective
- The mauri or life force and energy of the land and soil is a key concept. There must be a focus and responsibility on maintaining the mauri or life force/energy/vitality of the soil ecosystem, to ensure human wellbeing.
- There is a long-term view of soil resilience (generational, "resilient soils, resilient people") in line with understandings of Te Ao Tūroa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