

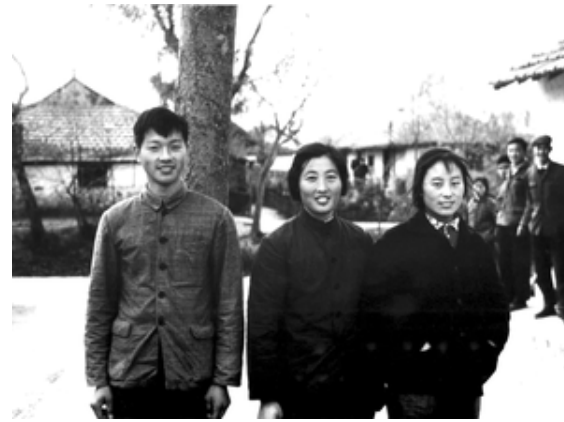
The Barefoot Scientist

Local engagement in the management of freshwater: Te Tairāwhiti, a vision for the future



Presentation structure

- Examples of current and recent projects
- A successful model: the 'barefoot doctors' - community management of public health in China, originating in the 1950s
- Where to from here: needs assessment for successful environmental monitoring and management communities in Te Tairāwhiti



Some current examples of community engagement in environmental management Te Tairāwhiti

- Regional stakeholder advisory groups with influence on decision making (Freshwater advisory group, Wastewater technical advisory group, Wastewater management committee and Options Review Group)
- Individual catchment management projects (Te Rangiwaho Marae and Tarakihinui Stream 2004, Ngati Porou and Waipua River 1998+, Mata River and Hikurangi Takiwa collective 2010+)
- Restoration initiatives (Longbush Ecosanctuary, Waihirere Domain, Whinray Reserve, Te Wherowhero Lagoon, Te Kuri a Paoa, Whakaki Lake, Waikanae Stream and Taruheru River, fish passage and inanga spawning)
- Focus: Community based environmental monitoring programs

What is the current context around freshwater management nationally?

- Deep community desire for protection and improvement of freshwater environments
- Availability of statutory tools (RMA1991, NPSFM2014)
- Increasingly sophisticated methods for measuring environmental status and change (e.g. drone and laser mapping - sediment, molecular source tracking – faecal coliforms)
- Nevertheless: ‘Managing land and water better is, as recent environmental reporting shows, a matter of urgency’ (Land and Water Forum, 2015. *The Fourth Report of the Land and Water Forum*)

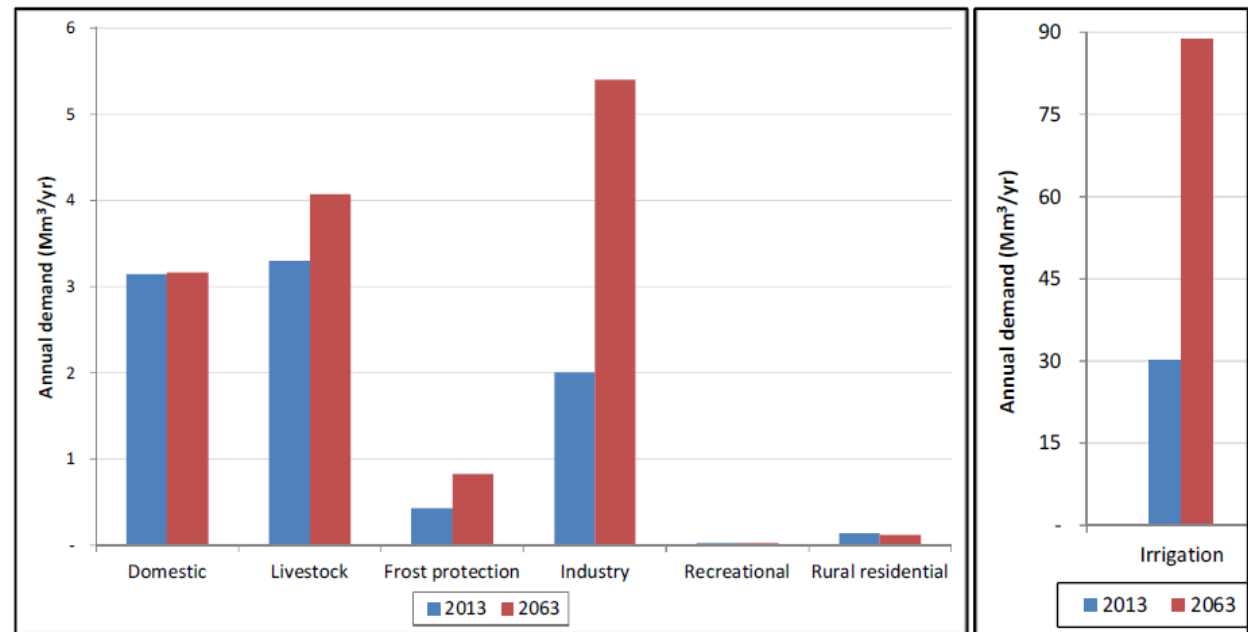
Challenges to freshwater quality: Tairāwhiti context

- Plantation forest harvest: impacts on infrastructure and communities, large bi- or tri-generational pulses of sedimentation, excess slash, huge demand for river metal from limited sites
- Continuing soil erosion and mass movement (Waiapu and Waipaoa catchments)
- Stream bank erosion
- Ongoing discharges of untreated sewage to urban waterways and the coastal environment

‘Our children train on the river daily, as waka ama is part of their lives. Just like rugby has a field to play on, our club members have the river and sea. If we poured raw sewage on to a rugby field, no one would take that and the council would do something in a flash.’ Orohena Brightwell, April 10, 2017.

Challenges cont.

- Intensification of cropping: impacts on soil structure, sedimentation, pesticide and nutrient inputs to water
- Demand for irrigation water in particular is far outstripping supply. Water that is available is either allocated or over-allocated



Despite increasing sophistication and commitment, why are these challenges remaining?

- Disconnect between science, policy and 'best practice' uptake and implementation by land managers and local authorities
- Chaotic markets or marginally economic industries reducing focus on environmental sustainability e.g. dairy markets changing and putting environmentally friendly practices aside
- Many environmental effects occur in remote areas and may only be seen by locals (e.g. forest debris and sediment through estuaries and coastal reefs, large scale river quarrying, localised waterway degradation)

Challenges cont.

- Others only picked up by regular monitoring (e.g. collapse of sensitive aquatic invertebrate populations, rapid gully development)
- Resourcing issues for local authorities
 - insufficient database information creating a 'drag' on appropriate policy development or implementation, or the ability to turn focus rapidly to critical events or processes



CASE STUDY

Mass movement, Kopuaroa Bridge no.3

- 2008: Flood takes out temporary replacement bridge while existing is replaced
- 2010: Minor gullying appears and recommendations made by local people to landowners and GDC to conduct remedial works
- 2016: Major earth movement threatening to block stream and inundate settlement during high rainfall event



The Gluckman Report 2017

Most recent report confirming the need for freshwater management:

‘Water monitoring in New Zealand is imperfect, with sampling site distribution not fully representative of the environmental variation that occurs, sub-optimal site density in places, and variable quality of sampling and analysis protocols. Despite these challenges, the data very clearly shows that water quality and quantity is being adversely affected primarily by changes in land use and the diffuse contamination arising from pastoral farming and urbanisation’ (Sir Peter Gluckman 2017).

What is the case for local community monitoring and reporting?

- Local communities are the place where ecology and economics cohabitate: *kanohi ki te kanohi (face to face)*
- Potential to greatly increase environmental data gathered (400%?) and record activities, processes, local characteristics that authorities never normally do (including local cultural indicators)
- Locals have a vested interest in improved environmental management (enhanced fisheries, recreational and landscape values, visitor industries, te mana o te wai)
- Community development through participation in resource management, including relationships with external agencies (CRI's, universities, local and central govt)
- Improves educational opportunities in science and resource management careers: a seamless process shaped within ancestral landscapes
- Implements *kaitiakitanga* and *mana*, restores *mauri* - fundamental values

Why 'barefoot scientist'?

- 'Barefoot doctors' providing: primary health care, diagnosis and treatment, some minor surgery, referral
- Barefoot doctors also peasants, an integral part of their local communities, answerable to their peers as well as their medical educators
- Their practice was subject to continued in-service training from mobile medical teams and doctors stationed in rural areas and correspondence classes available for those wishing to upgrade their skills and qualifications
- Doctoral student: "Today both researchers and policy makers have widely acknowledged it is hard to bring people to work in rural areas. So, training local people seems to be the optimal solution in building sustainability in rural health care services"

Human and environmental health: Te Tairāwhiti and rural China?

Barefoot doctor (China 1972)	Barefoot scientist (Tairāwhiti 2016)
Reasons for establishment: poor professional health coverage of rural community; loss of traditional health practices; desire for more autonomy and self-sufficiency for rural worker collectives	Reason for establishment: inadequate coverage of environmental monitoring to meet community needs and aspirations; inclusion of mātāuranga and tikanga Māori in practical science practice; greater exercise of self-governance by hapu groups
Funding: mix of central government and direct taxation	Funding: mix of central government, local authority, and charitable funds
Waged: at level of agricultural workers i.e. 50% of doctors salary	Waged: training allowance (6 month) followed by internship (3 month) and then full technical practitioner wage

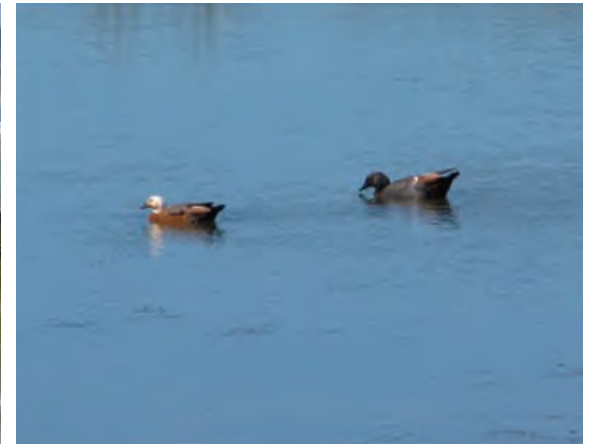
Useful guidelines?

Barefoot doctor (China 1972)	Barefoot scientist (Tairawhiti 2016)
Base education: several years at secondary school level	Base education: preferable secondary school science background, but probably not essential
Training: by qualified doctors for a few months to a year and a half	Training: by science professionals for 6 to 9 months (interim recommendation)
Certification: by medical body	Certification: by environmental science professionals
Ongoing professional development	Ongoing professional development
Uses contemporary (western) and traditional Chinese methods (herbal, massage, acupuncture, moxa, differential diagnosis)	Uses contemporary science and traditional matauranga and tohu taiao (environmental indicators)
Strong focus on health advocacy and disease prevention	Strong focus on environmental advocacy and best practice land use
Governance and review: local collectives with professional government body input	Governance and review: local collectives including professional science membership and regional/national oversight

CASE STUDY 1

Royal Society Teacher Fellow 2008 Jason Love and Nga Tohu Taiao no Whangara Mai Tawhiti

Jason chose to base his Teacher Fellowship research on the investigation and documentation of traditional Māori weather forecasting and the use of biological indicators of climate variation. His research also looked at the use of these indicators in the context of longer term climate change and an improved understanding of species behavioural responses.



CASE STUDY 2

Motu School and community

- Health of the Motu River and fishery (tuna and trout)
- Threats experienced from land use intensification (dairying and intensive beef)



- Intergenerational connection of science, ecology and community (science fair award)

CASE STUDY 3

Hikurangi Takiwa Collective



and Nga Kura o
Makarika,
Hiruharama, Ngata



- Effects of infrastructure development on the Kopuaroa Stream (2008)
- Marae-based learning utilising water chemistry and stream biology to identify stream health, other curriculum activities e.g. bridge engineering (2009 on)
- Informing Mata River and landscape database
- CRI, universities participation and development of cultural indicators program

Hikurangi Takiwa Trust ongoing

- Surveying Hikuku wetland complex for protection and restoration
- Significant cultural, geophysical and ecological landscape
- Beginning of a series of workshops around freshwater management with the goal of accreditation in freshwater monitoring
- Cawthron Institute now a major long term partner



Update to May 2017

2016:

27 schools in Te Tairāwhiti participated in He Awa Ora (WBC) freshwater science programs and He Tai Ora (EMR) programs including 2254 students plus community members.

2017:

- Term 1, 16 schools and 906 students.
- Four adult workshops across the region to train freshwater monitors and managers
- Continuing catchment monitoring for the Taruheru, Mata, and Motu rivers, and new programs to be established for the Poroporo and Waiomoko rivers



Communities as science and research centres: resources required

- Realistic income for work – multiple funding sources including local authority
- Establishment of small workshop and storage space, mini-lab, research and education hub (within a school or marae environment?)
- Collaborative opportunities (e.g. uni's, CRI's, polytechnics, land management bodies)
- Ongoing education – skills for monitoring staff and governance forum, certification, continuous professional development

A supportive community governance forum

- Umbrella organisation - a range of options? (Marae, land trusts, hapu collectives, community groups?)
- Part of their role to ensure work is understood by wider community and is kept 'heading in the right direction' (objectives and principles of the programs)
- Support individual staff commitment to: achieving skills, reliability, work reviews
- Ensure healthy work environment, physically and socio-culturally
- Foster opportunities for participation by schools, tertiary groups, facilitate career pathways, facilitate and co-manage research
- Forum needs to be funded, and acknowledged and supported by the wider social grouping

The barefoot scientists: skill description

- Individuals at home (*ahi kaa*) with passion for, or at least a healthy interest in the work, commitment and time
- Some background skills – IT, science, logical thought, enquiring thought, conservation or *kaitiakitanga*, *tikanga* or cultural awareness
- Comfortable working in a community environment
- Natural communicators and educators
- Beware: ‘A little knowledge is a dangerous thing’ – need for recognition that the development of science skill and knowledge is an ongoing process that requires constant review and evaluation

Expert partners

- Provide training, professional development and ongoing review for the project
- In for the long haul – local communities need stable and responsive partners, not here today and gone tomorrow - commitment remains even if the well runs dry
- Respect for, and incorporation of, important cultural tenets – *tikanga, kawa, matauranga, manaakitanga* - recognition that knowledge is developed in a social and cultural context, and may be expressed in cultural forms
- Beware: Unhelpful distinctions between ‘subjective preferences of stakeholders’ and ‘objective (science based) expert predictions’

Expert Partner Example:

Hikurangi Takiwa Trust,
Cawthron Institute
and the Mata River catchment



Senior freshwater scientist Dr Joanne Clappcott of Cawthron Institute addresses a river workshop, above Makatote Stream Te Penu Marae June 2015, and below, the Mata River February 2017.

Te Tairāwhiti freshwater takeaways

- Some urban waterways are highly degraded from unwise decisions of previous city fathers
- Motu: decline is well under way - poor land use and illegal practices evident e.g. trout
- Taruheru: restoration is possible, but will require significant effort – horticultural interests mid-catchment, urban restoration estuarine reaches – Waihirere excellent
- Mata tributaries good to excellent water quality (e.g. *Sternoperla*) due to specific characteristics of land use: extensive pastoral, some riparian wetlands remaining, some fencing of waterways (to stop stock roaming..) - remember these are lowland sites that may come under pressure if land use intensifies – need to identify and implement best practice models



Te Tairāwhiti freshwater takeaways Cont.



- Water allocation is the elephant in the room - two ways to kill a river, lake or wetland - put bad stuff in, or take too much water out
- Good freshwater environments need to be actively protected: no purposeful decline should be acceptable – may be hard or impossible to restore (Gluckman 2017)
- Barefoot doctor: “There are great benefits to having a barefoot doctor in the village. The patients are all my neighbours. I know each family’s situation, lifestyle and habits.”



Thanks for listening!

