National SCIENCE Challenges

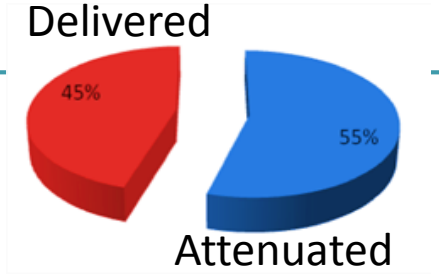
OUR LAND AND WATER

Toitū te Whenua, Toiora te Wai

Sources and Flows

Managing contaminant pathways & attenuation to create headroom for productive land use

Why we need this work



55% of nutrients lost are attenuated between source and sea

- Not all land is created equal
- Proportion attenuated varies greatly for different soils, landscapes & flow pathways

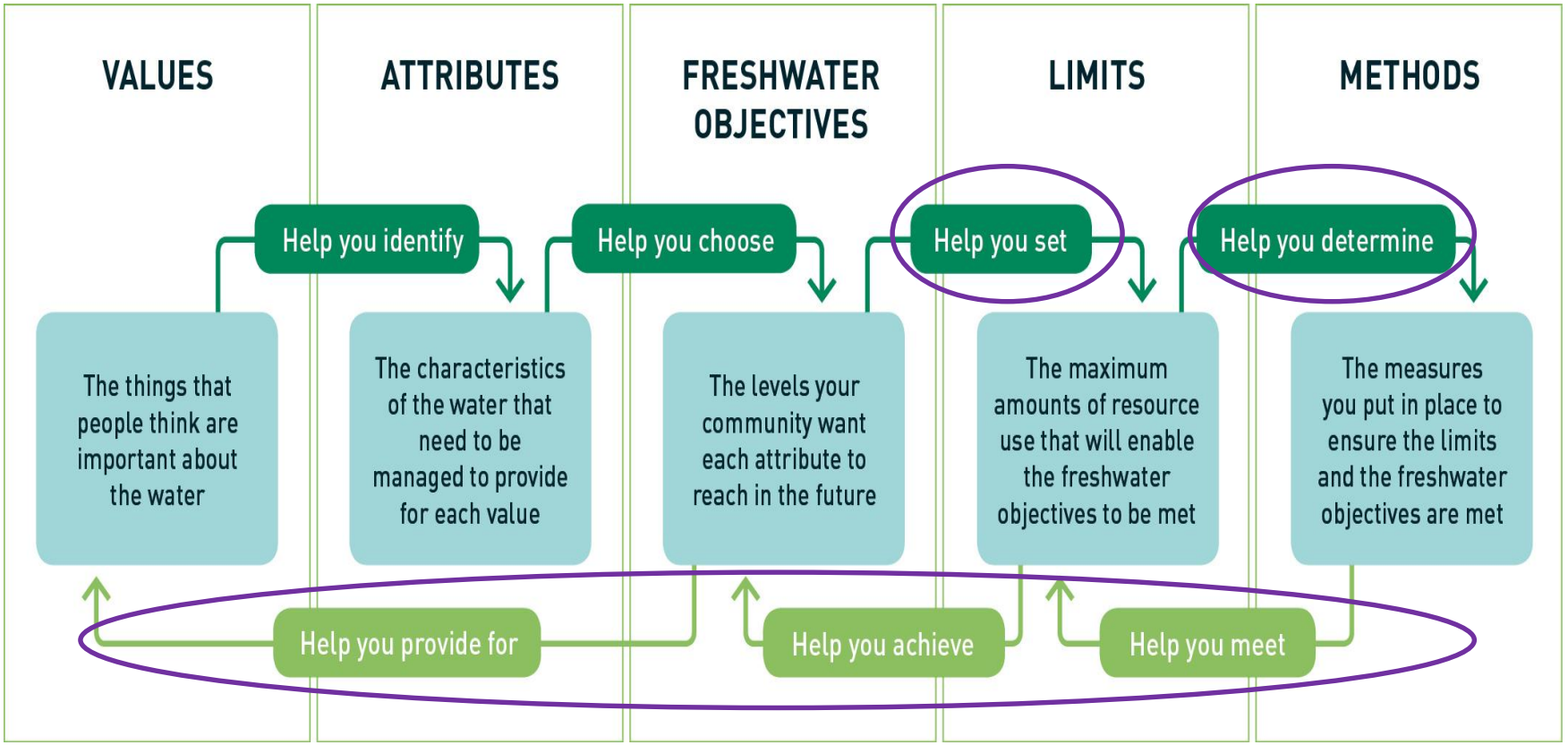
Ability to adapt and tailor land-use & management to suitability

- Risk of contaminant loss and attenuation capacity
- Link to receiving water assimilation capacity to define “suitability”
- “The right enterprise to be in the right place at the right time, doing the right thing”

Potential to better exploit natural attenuation capacity, or engineer in more

- Target dominant contaminant pathways
  - Riparian buffers, detainment structures, restored & constructed wetlands, reactive filters

NPS-FM: accounting for attenuation



What we will do

National catchment-scale assessment of source, delivery and attenuation

- identify broad-scale patterns of headroom and over-allocation
- Identify regional anomalies and outliers
  - Groundwater lags, anoxic ground waters, rapid transport via tile-drains

Develop Framework

- Integrated understanding of sources, pathways and attenuation
  - Across different climates, soils, landscapes, farming systems and flow pathways
  - Tested in case study catchments
- Guide future development of inter-operable catchment modelling tools

Assess potential to use indirect methods to define sources, pathways & attenuation

- flow and contaminant signatures

Impact the work will have

Key tool for move from focus on land-use "Capability" to "Suitability"

- Link landscape characteristics to receiving water resilience to determine Suitability
- Better long-term investment decisions

Allow resource use limits to reflect likely risk of impact

- More cost-effective targeting of mitigations
- More cost-effective achievement of agreed environmental, social and cultural values

Ability to identify

- Scope for intensification within limits
- Potential to exploit natural attenuation capacity or engineer in more
- Constraints where new technologies or production systems are required
- Guide development of "fitter for purpose" catchment modelling tools

Key ingredient for alignment of environmental performance indicators with product value chains

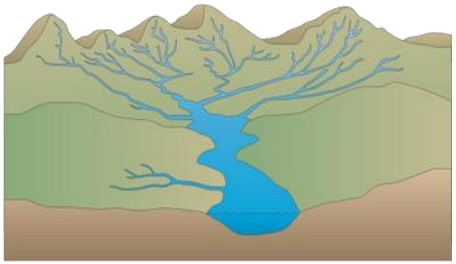
- Capacity to generate greater wealth for New Zealand

Research questions and stretch

"blue sky to blue ocean"

- Integrated understanding of sources, pathways and attenuation within catchments
  - Interdisciplinary/ multiple contaminants/ spatial and temporally variable
  - Not attempted before
- Can flow pathways & contaminant fluxes be identified & mapped to inform "suitability"

Can suitability approach:



- Increase productivity/profit per unit of contaminant loss?
- Identify areas with headroom and others with constraints?
- improve mitigation strategies- sources, pathways, attenuation?

Incorporation of Maori cultural values and matauranga

- Inclusion of biophysical and cultural inputs to inform Maori producers "Pa to plate"

Where & with whom will we work

Focus on developing integrated framework based on existing biophysical knowledge

- applicable across the country

Case studies

- Northland–Mauri whenua ora programme and associated iwi.
- Southland–Suitability programme, Environment Southland & assoc iwi
- Waikato–Landcorp farms in the upper Waikato catchment

Other Research Programmes

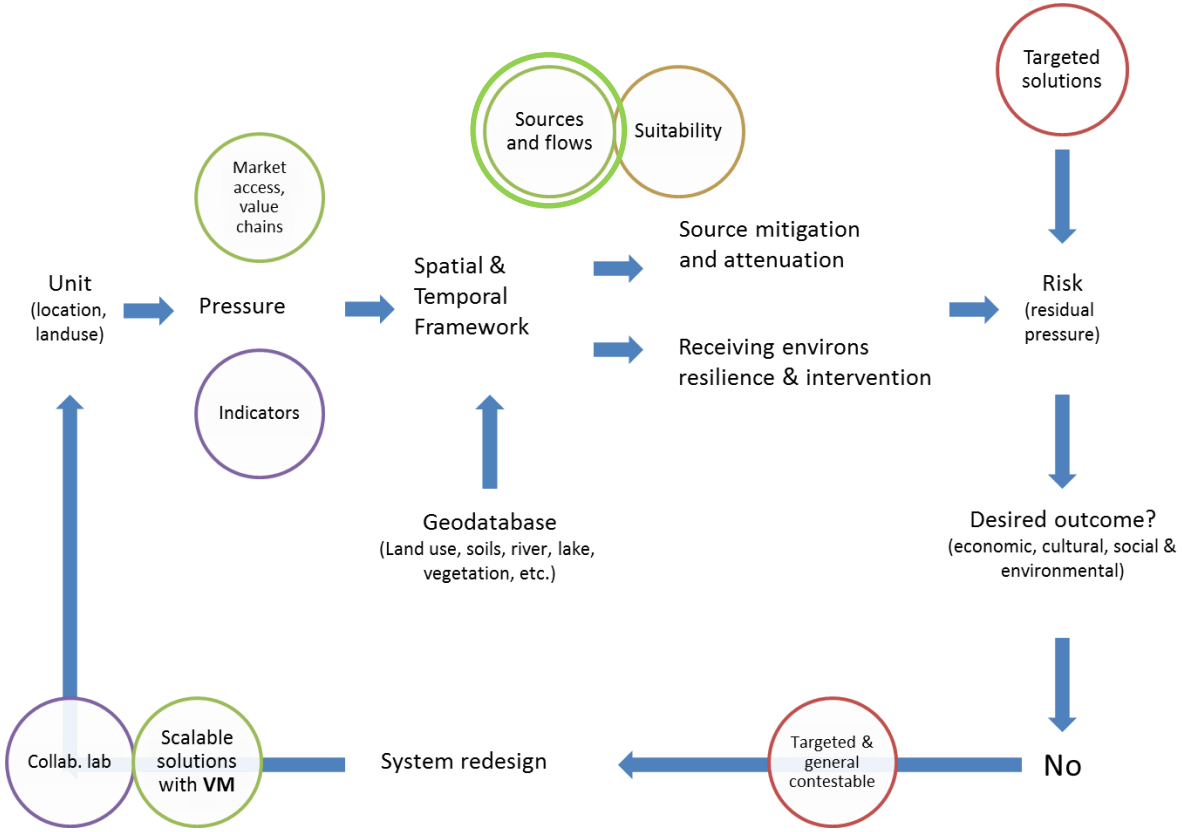
- MBIE CWPL, Transfer Pathways Programme, Smart Aquifers
- P21, Overseer, catchment modelling
- Southland–Fluxes and Flows Programme

Stakeholders

- Landcorp, DairyNZ, Beef+LambNZ, IrrigationNZ, Rabo Bank
- Regional Councils: Northland, Waikato and Southland

Where we sit in the big plan

Linkages between land use pressures and the receiving environment

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