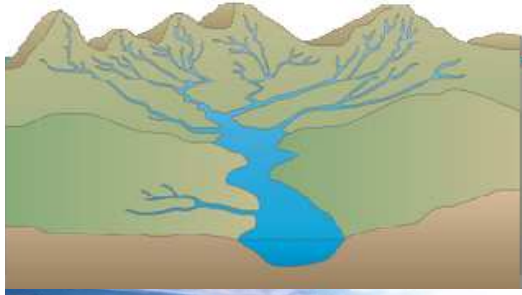
Diversified landscapes for resilient catchments



Problems/issues addressed:

- Need diverse land use & management options
  - Develop value chains consistent with values of NZers & premium markets
  - Reduce footprint
    - Meet NPS-FM, lower GHG, increase resilience to Climate Change
- Getting buy-in and engagement to address OLW challenge mission
  - Real catchments – enacting co-innovation
    - Farmers, communities, iwi, industry sectors and value-chains
  - Learning by doing and seeing
    - Focus on implementation
      - Key message from Co-innovation Advisory Group
- Integration across all themes of OLW
  - Value chains, Māori enterprises, collaborative, biophysical processes

Diversified landscapes for resilient catchments

Core Team

NIWA Taihoro Nukurangi — John Quinn, Chris Tanner, Sandy Elliott, Stephen Fitzherbert

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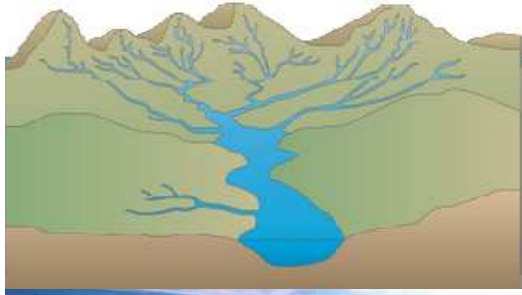
Manaaki Whenua Landcare Research — Holden Hohaia

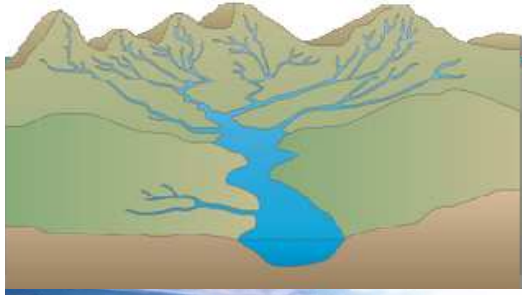
CAWTHRON INSTITUTE — Joanne Clapcott

Plant & Food RESEARCH RANGAHAU AHUMĀRA KAI — Mike Beare

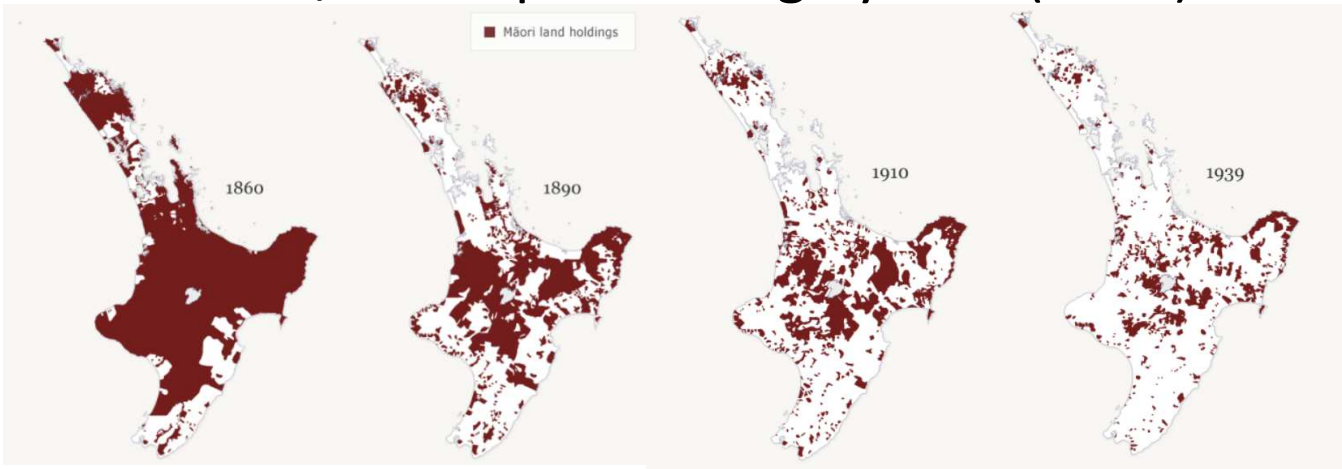


Māori land-based enterprise context

- 50% managed by ahu whenua trusts and 14% by incorporations
  - Inter-generational
- Some outstanding enterprises developing own value chains
- BUT
  - Mostly (c. 80%) hill country-steep land
  - 40% indigenous forest, 25% pastoral, 15% scrub, 15% planted exotic
  - Fragmented blocks and ownership
    - Difficult financing development
  - 80% considered under-utilised/under-performing by PwC (2013)

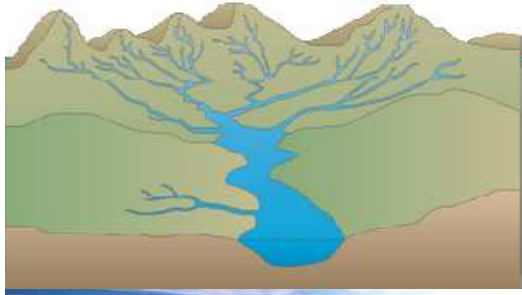


Maori Land Holdings:
1860 – 1939 (North Island)



Māori land-based enterprise context

- Treaty settlements
  - CFL & Landcorp land and $ for development
- **But** constrained
  - Hitting allocation limits (“last in”)
    - Water availability
    - NPS-FM emissions fully- or over-allocated in many catchments
    - GHG limits likely to be progressively imposed
  - Kaitiakitanga obligations/aspirations
- New **opportunities** needed
  - Generate income rather than capital gain
  - Fit Māori values



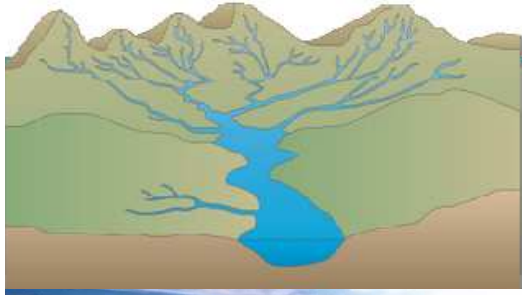
Reviews of NZ# & UK* Catchment studies

- Laboratories, Classrooms, Demonstrations
  - Need trans-disciplinary balance
  - Foster co-learning and co-development
- Interactions
  - Land use, water quality, quantity, catchment communities
- Generate/test tools for forecasting & deliberation
  - Enhance science-policy interaction
- $ one of many behaviour change drivers (lifestyle, norms)
  - Communities of place & interest alter individual's behaviour

#Dodd M., Wilcock B., Parminter T. 2009. Review of recent rural catchment-based research in New Zealand. AgResearch and NIWA Report to MAF Policy 119 p.
*McGonigle D.F., et al. 2014. Developing Demonstration Test Catchments as a platform for transdisciplinary land management research in England and Wales. *Environmental Science: Processes and Impacts 16: 1618-1628.*

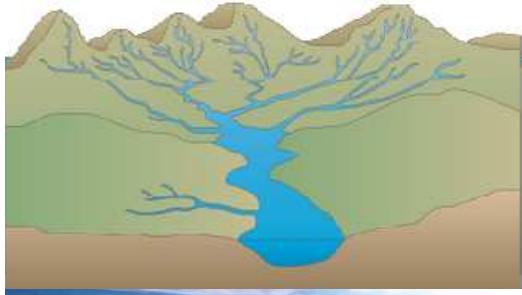
Six focus catchments: Criteria

- Impact delivery potential:
  - Contrasting enterprise and geographic settings
  - Significant Māori land areas/resource management
  - Varied land use and land-water management opportunities
  - Engaged, receptive communities and Reg. Council
  - Added product value from verifiable credentials



Six focus catchments: Co-innovation process

- Listen
- Applying existing and evolving tools and knowledge
- Enhance resilience of land use/management
  - Economic, social, cultural and environmental
  - Fit within limits set by existing NPS-FM limits and low carbon economy directions
- Develop, visualise, test (virtual + nested quantification) land uses
  - Next generation enterprises
  - Different enterprise combinations/configurations
  - Mitigations
  - Footprint
  - Value chains

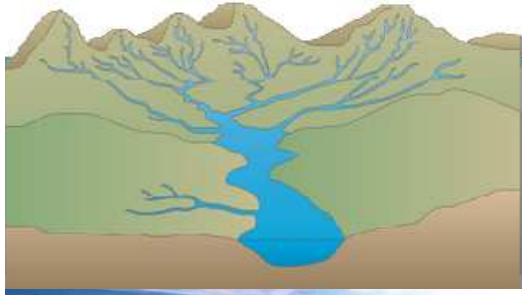


Examples of *potential* focus catchments

Catchment	Maori Land	Engaged community?	Land variety	Key receiving water
Awanui (Far North)	Yes	Yes, iwi led projects	Yes: forestry, S&B, dairy	Rangaunu Harbour
Waitetuna Valley (Raglan)	Yes	Nacient, analog to Whatawhata ICM	Yes: forestry, S&B, organic and conv. dairy	Raglan Harbour
Puniu (Waikato)	Yes	Yes https://puniuinc.org/	Yes, S&B, dairy, crops	Waipa/Waikato
Waiapu (East cape)	Yes	Yes	Yes: forestry, S&B, hort.	Pacific Ocean
Wairoa (Nth HB)	Yes	HBRC	Mainly S&B, forestry	Ngamotu Lagoon
Tutira (HB)	Yes	Yes, HBRC, MTT, DOC	S&B, dairy, reg park	Lake Tutira
Whangaehu/Whanganui	Yes	Yes, Te Awa Tipuna, HzRC	Mainly S&B, forestry	Whanganui R
Hurunui (N Cant)	Yes	Yes, Ngai Tahu, ECan	S&B, dairy, forestry	Hurunui
Aparima (Southland)	No?	Yes, ES, DairyNZ, Te Ao Marama, Fonterra	Yes, S&B, dairy	Jacobs River Estuary

Challenge linkages proposed

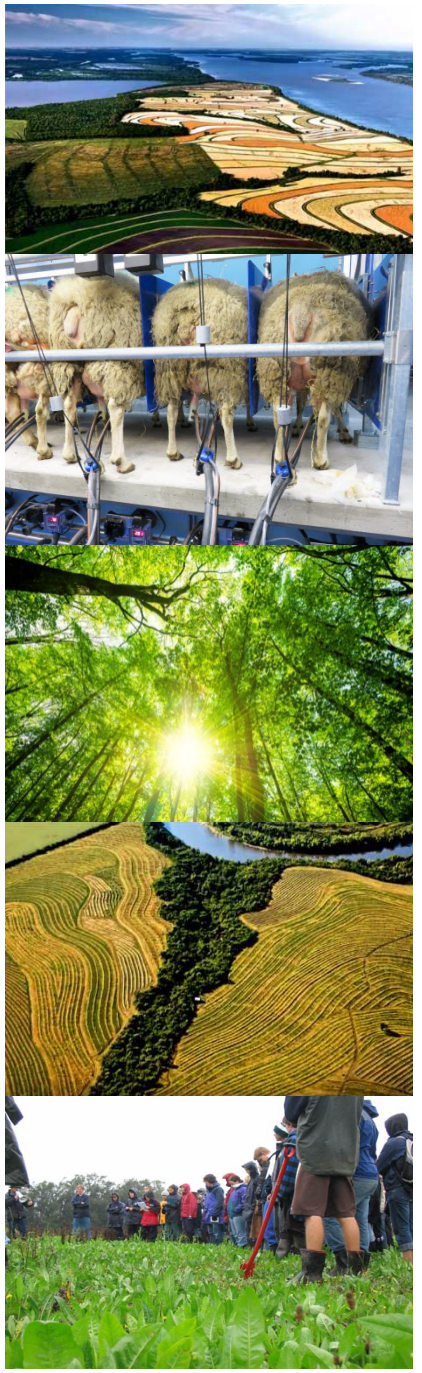
- **Existing programmes**:
  - ‘Interoperable Models’, ‘Land Use Suitability’, ‘Sources and Flows’, ‘Next Generation Systems’, and ‘Value Chains’
- **new Concepts**:
  - Fostering water management groups
  - Visualising and Enhancing Implementation
  - Opting Out
  - Achieving a Lower Carbon Economy
  - Future-proofing Environmental Credence Attributes
  - Biological Agriculture
- CRI SSIF programmes



Delivering Impact to the Challenge

Coalescing activities around a number of contrasting case study catchments & land/waterscapes

- **Provide physical platform of catchments**
  - Explore, pilot, demonstrate and validate “plausible resilient futures”
    - Nested plot/farm/sub-catchment & catchment studies
  - Co-develop with industry, iwi, regional and central government
    - Leverage buy-in and co-investment
  - Options suiting Maori land enterprise and capturing value
  - Modelling to upscale and integrate
    - Forecast cumulative outcomes and factor in climate change
  - Demonstrate
    - **verifiable** environment, social and cultural credentials that add value.
  - **Magnet** to attract aligned research activity and facilitate trans-disciplinary collaboration
    - Potential for new long-term research initiatives



Co-innovation *potential* partners- Science providers

Linkages between science, extension, adoption and policy development

agresearch	Farm sources of contaminants, farm systems analysis, profitable future farm systems and value chains, collaborative processes
NIWA Taihoro Nukurangi	Scale-appropriate model application, edge of field and off-farm attenuation, hydrology, high-frequency real-time monitoring, climate change adaption, serious game collaborative tools
Manaaki Whenua Landcare Research; CAWTHRON INSTITUTE	National scale model application; erosion modelling, collaborative processes
Lincoln University Te Whare Wānaka o Aoraki CHRISTCHURCH•NEW ZEALAND	Developing new integrated value chains
GNS SCIENCE TE PŪ AO; LINCOLN AGRITECH LTD; E/S/R	Groundwater systems and modelling, ground/surface-water interactions, sustainable attenuation potential
DairyNZ Profitability. Sustainability. Competitiveness.; beef+lamb new zealand; Fonterra	Future farm systems, facilitating industry uptake and change, 50 catchments
SCION FORESTS▪PRODUCTS▪INNOVATION	Profitable future forestry systems and value chains, carbon credits, manuka honey and other alternatives
Plant & Food RESEARCH RANGAHAU AHUMĀRA KAI	Profitable new horticulture and cropping systems and value chains
THE UNIVERSITY OF WAIKATO Te Whare Wānanga o Waikato	Remote sensing; lake, river and estuary modelling; isotopic tracing; receiving water interventions
Other universities and RCs in focus catchment regions	Capability and capacity-building, assessing & monitoring outcomes, policy incentives & compatibility

Co-innovation potential partners- Other

- Other Science Challenges
  - Biological Heritage – biodiversity co-benefits
  - Deep South – climate change adaption
- Central government - MPI, MfE, DoC
- Proposed Climate Commission
- Pastoral Greenhouse Gas Research Consortium
- Agribusiness
  - Landcorp/Pamu Farms
  - Dairy - Fonterra, Synlait, Tatua, Open Country, Miraka, Yashili etc
  - Meat - Affco, Silver Fern Farms, Anzco etc
  - Fertiliser - Ballance, Ravensdown etc
  - Banking and Finance
- Iwi Authorities and Agribusiness
- NGOs - WRA, The Nature Conservancy, Landcare Trust
- Economic and Public Policy/Rural Investment - Motu, EnviroStrat
- International – Demonstration Test Catchment Programmes
  - e.g. Lancaster Uni/Hutton Inst; Critical Zone Observatories