Our Land and Water National Science Challenge

Developing a framework to assess the impacts of land use change - Using the wellbeing indicators

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Measuring the true (integrated) effects of land use change – selection of wellbeing indicators

1. Review issues with tools (frameworks, models and indicators) and requirements of stakeholders

2. Science and policy-making

3. Dr. Jay Whitehead and cultural indicators

4. Review existing wellbeing indicators (social, economic and environmental)

5. Identifying the key impacts associated with the two scenario's (peri-urban expansion and nitrate limits)

6. Developing the Framework

Review of Tools and Requirements of Stakeholders

How well do the current tools (frameworks, models and indicators) address key questions related to land use and land use change?

Some key findings:

- Tools can be time-consuming and complex to use.

- Uncertainty emerges when selecting tools and understanding limitations associated with them.

- Some can require considerable resources maintaining and updating.

- Tools are not often integrated across the economic, social, environmental and cultural domains of wellbeing.

- Some tools can lack clear practical implementation pathways for assessing land use and land use change (i.e., converting LSF into actionable insights).

So there is a need for an **easy-to-use integrated impact assessment (IIA) framework** that can inform/educate on the impacts and trade-offs associated with land uses and land use change across the four wellbeing's.

Science and Policy-making

1. **What is the role of science in policy? (Do you agree/disagree? Any more?)**

   - Helps to **define problems and issues.**

   - Aids **evaluation of policy options**. Important for balancing the values, interests and issues of different individuals/groups.

   - Supports the development of **evidence-based policy**.

   - Facilitates the **transfer of knowledge**. Science knowledge brokers can act as conduit between different stakeholder groups, and offers pragmatic understanding of different research/policy contexts.

Science and Policy-making

2. **What are key tensions and barriers at the science-policy interface? (Do you agree/disagree? Any more?)**

   - **Resourcing constraints** and high **staff turnover**. Can affect engagement and utilisation of research/science (i.e., turning data into actionable insights). **Nature of science funding** can be focused on short-term.

   - **Science + policy contexts** often **misunderstood.**

   - **Limited opportunities** for **interaction/collaboration** between policymakers and researchers.

   - **Complexity vs simplicity.**

3. **How could these issues be addressed? (Do you agree/disagree? Any more?)**

   - **Foster collaborative efforts** that prioritise early active engagement with key stakeholders.

   - **Encourage and incentivise knowledge brokers** that have strong contextual awareness and understanding.

   - Support long-term resourcing/funding that can facilitate shift in focus beyond narrow, immediate or short-term objectives/outcomes.

Cultural Wellbeing and Integrated Impact Assessment (IIA)

Cultural indicators built around 'two-generation thinking' or a 50-year timeframe, with 2070 be set as a target date for the aspirations of rūnanga.

Designed to measure progress toward these aspirations and are built around **ten dimensions**:

1. Tino Rangatiratanga
2. Wai Tipuna
3. Mahinga Kai and Ngahere
4. Mahere
5. Whare Kounga
6. Nohoanga Kainga
7. Whai Rawa
8. Ngāi Tahutanga
9. Mātauranga
10. Hauora
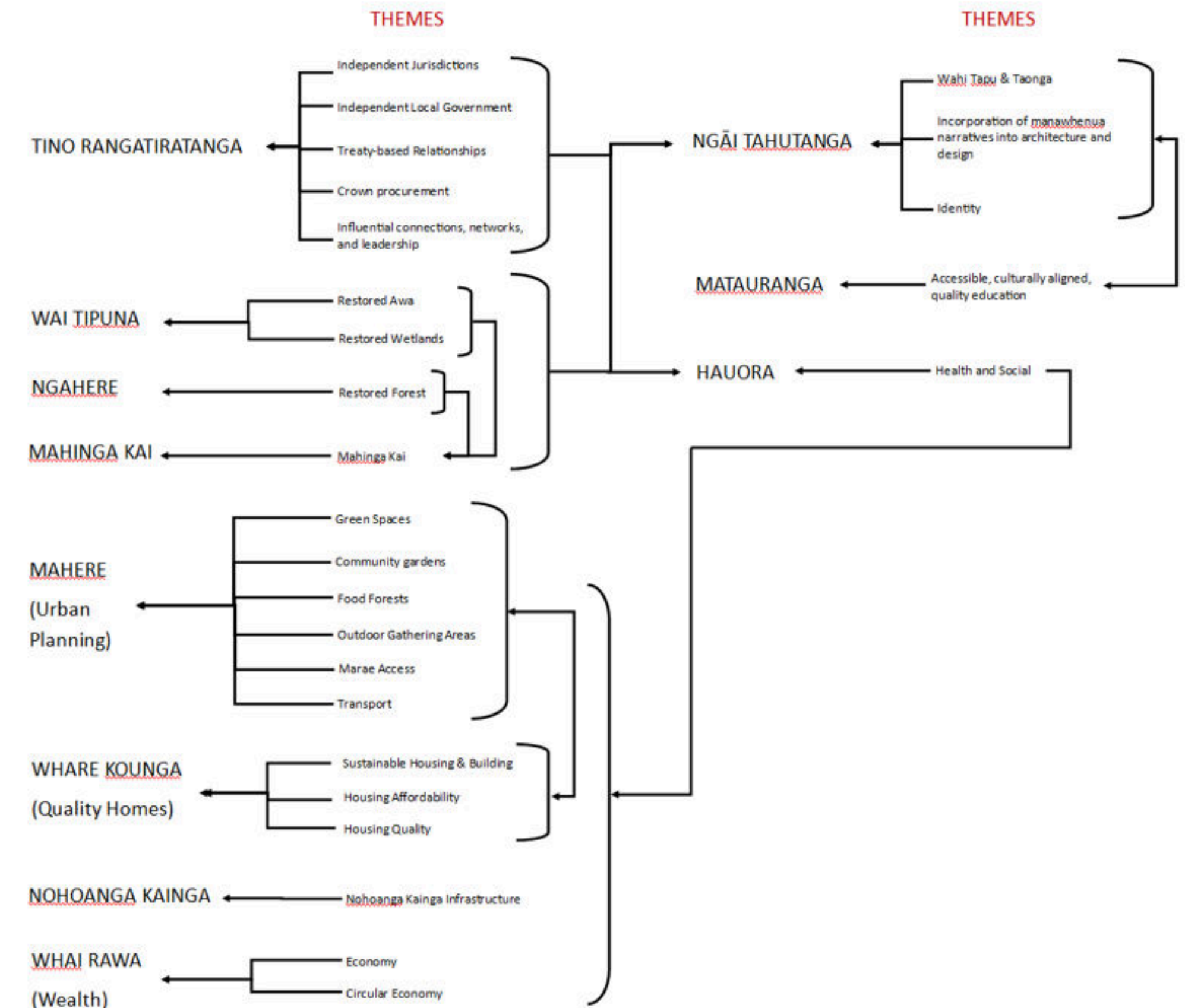
Existing Economic Wellbeing Indicators

Indicator	Data Source(s)
Employment Rate	Stats NZ - HFLS
Rateable Value	Councils
Income (Median Household Income)	Stats NZ - Income Survey
Regional GDP	Stats NZ
Unemployment Rate	Stats NZ HFLS
Farm Size and Number	Statistics New Zealand Agricultural Production Survey (APS)
Fertiliser Use	Stats NZ/Fertiliser Association of New Zealand
Agricultural and Horticultural Land Use	Stats NZ Agricultural Production Survey
Irrigated Land	Stats NZ Agricultural Production Survey
Fertilisers – nitrogen and phosphorous	Stats NZ Agricultural Production Survey
Consented Freshwater Takes	Stats NZ/Regional Councils/NIWA
Farm Land Use	Stats NZ

Existing Environmental Wellbeing Indicators

Indicator	Data Source(s)
Soil Quality	Statistics New Zealand/Manaaki Whenua/Regional and District Councils
Nitrate Leaching from Livestock	Stats NZ/Manaaki Whenua
River Water Quality: Clarity and Turbidity	Regional Councils/NIWA/LAWA
River Water Quality: E.Coli	Regional Councils/NIWA/LAWA
River Water Quality: Macroinvertebrate Quality	Regional Councils/NIWA/LAWA
River Water Quality: Nitrogen (nitrate-nitrite nitrogen, ammoniacal nitrogen, total nitrogen);	Regional Councils/NIWA/LAWA
River Water Quality: Phosphorous	Regional Councils/NIWA/LAWA
Lake Water Quality: Trophic level index (TLI), chlorophyll-a, E. coli, total phosphorus, total nitrogen, ammoniacal nitrogen, nitrate-nitrogen, and clarity	Regional Councils/NIWA/LAWA
Ground Water Quality	Stats NZ/Regional Councils
Freshwater Physical Habitat	Stats NZ - Cawthron Institute, via Regional Councils and Unitary Authorities
Deposited Sediment in Rivers	StatsNZ - Cawthron Institute, via Regional Councils and Unitary Authorities
River Water Quality: Heavy Metals	Stats NZ/Regional Councils/NIWA
Air Quality (PM 2.5)	LAWA
Air Quality (PM 10)	LAWA
Regional Greenhouse Gas Emissions	Stats NZ
Indigenous Vegetation Land Cover	Stats NZ/LAWA
Residential/Urban Land Cover	Stats NZ/LAWA
Exotic Land Cover	Stats NZ/LAWA
Wetland Land Cover	Stats NZ/LAWA
Artificial Night Sky Brightness	Stats NZ

Existing Social Wellbeing Indicators

Indicator	Data Source(s)
Life Satisfaction	Stats NZ Wellbeing Survey
Community Safety	Stats NZ GSS
Physical Health	Stats NZ Health Survey
Social Connectedness	Stats NZ HLFS/GSS
Housing Condition (cold, mould, damp)	Stats NZ Wellbeing Survey
Housing Repairs/Maintenance	Stats NZ Wellbeing Survey
Access to Basic Amenities	Stats NZ Wellbeing Survey
Overall Life Satisfaction (Future Expectations)	Stats NZ Wellbeing Survey

Next Phase: Exploring Wellbeing Indicators for IIA Framework

Next step of research programme - identifying key indicators that could provide stakeholders with useful insights on the two key scenario's

- Scenario #1: Nitrate limits

- Scenario #2: Peri-urban expansion

Things to consider during the selection process

1. What are the key impacts associated with each scenario?

2. Are there any indicators (qualitative and/or quantitative) not currently available that could provide useful insights for stakeholders on the two scenarios?

3. How can we differentiate between the primary and secondary order effects/impacts associated with land use and land use change?
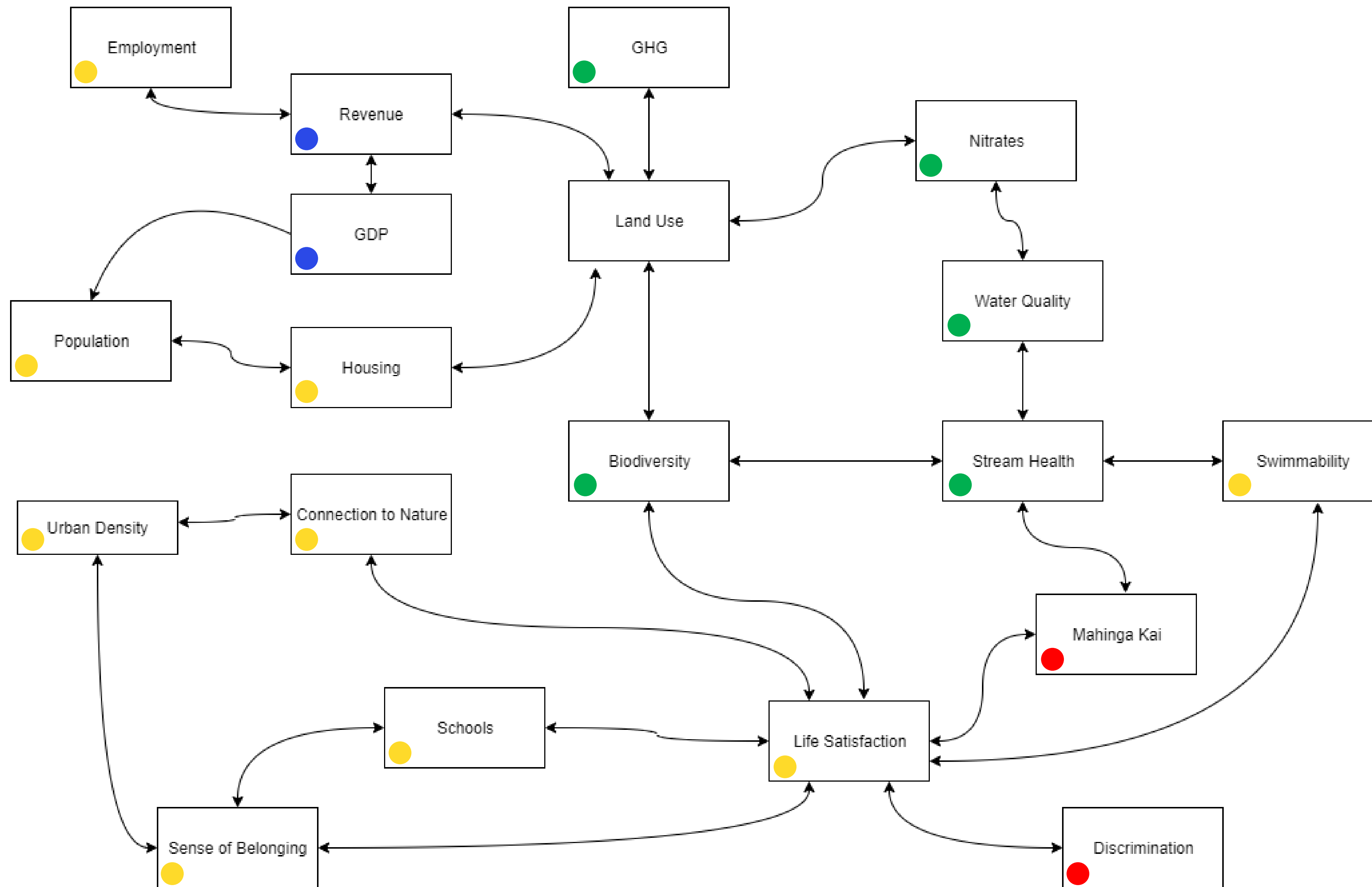
Integrated Impact Assessment Framework

Land Use

Economic Wellbeing
- Agricultural production/revenue
- Total GDP
- Total Employment
- Job Industry
- Income
- Job Types
- Value Add
- Household expenditure

Environmental Wellbeing
- Ground water quality
- Soil quality
- River water quality
- Biodiversity
- *E. coli*
- GHG Emissions
- Macro-invertebrate index
- Mahinga Kai
- Swimming index
- Night sky brightness

Social Wellbeing
- Life Satisfaction (current)
- Housing Affordability
- Life Satisfaction (future)
- Rateable Value (RV)
- Access to basic Amenities
- Housing Quality + Maintenance
- Connection to Nature
- Housing Mould Issue
- Highest qualification
- Housing Coldness Issue
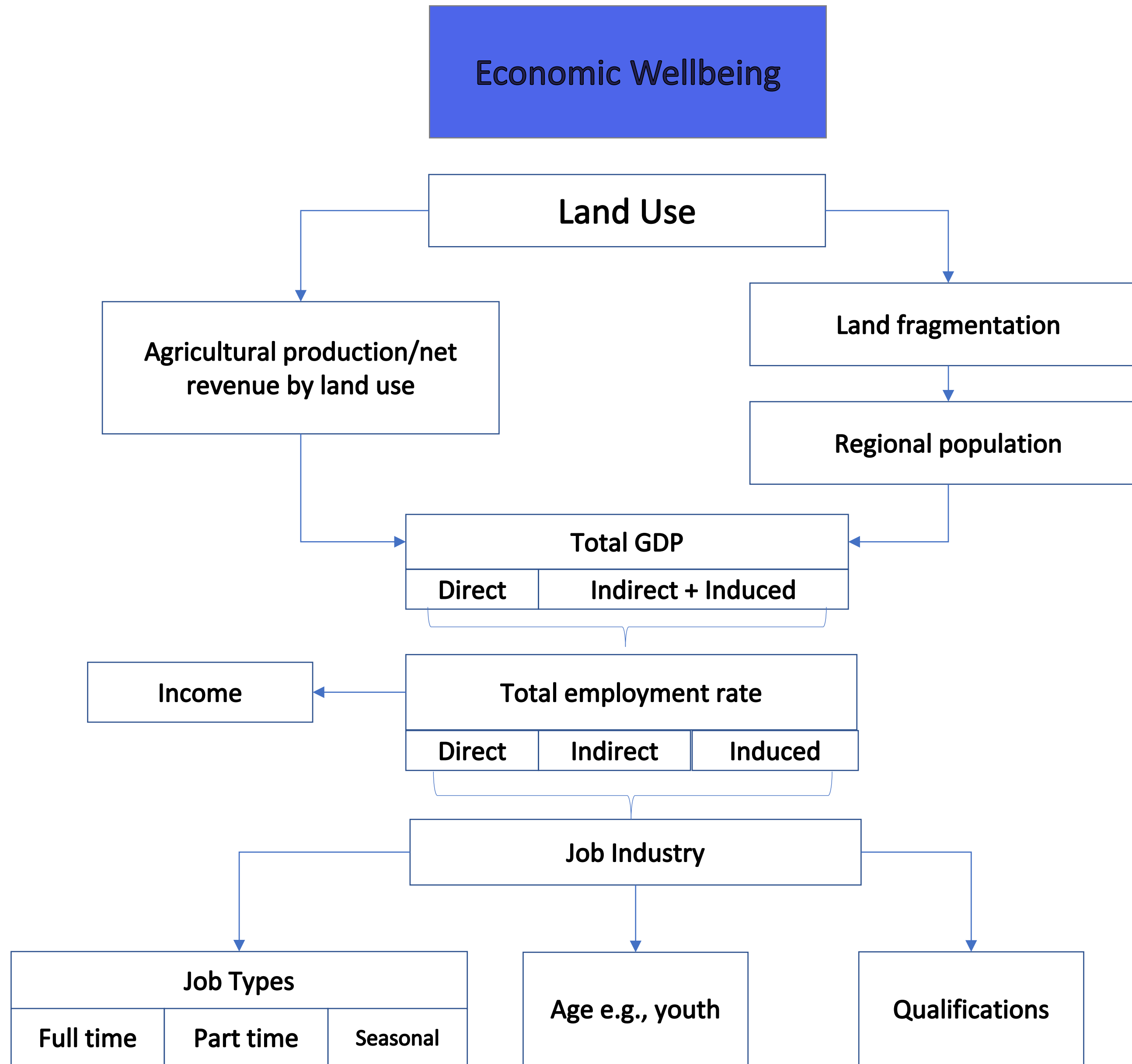- Self-rated Health
- Alcohol licences
- Voting status
- Public Transport

Cultural Wellbeing
- Discrimination
- Sense of belonging