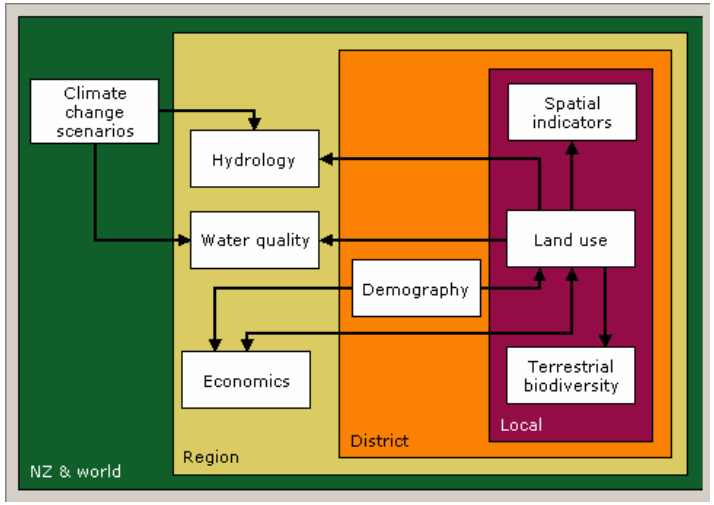
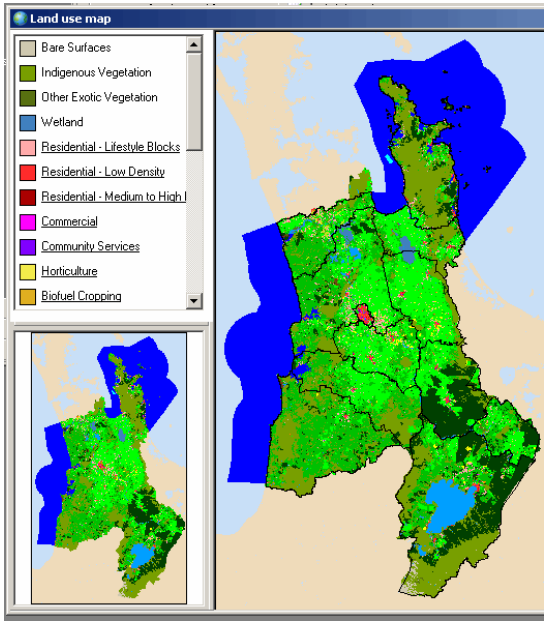
WISE

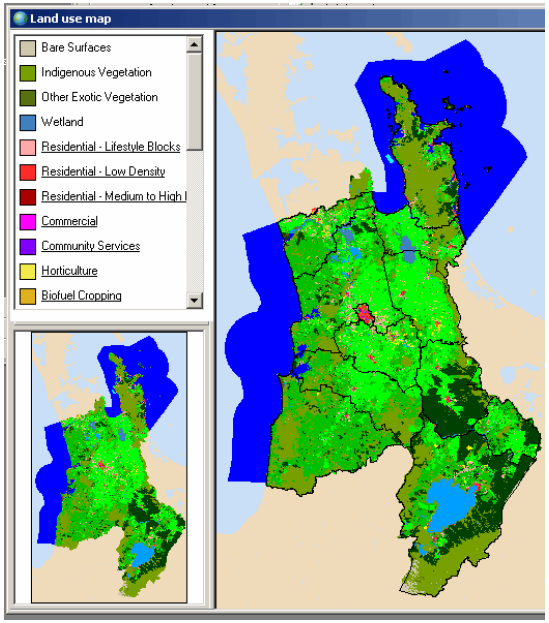
Waikato Integrated Scenario Explorer

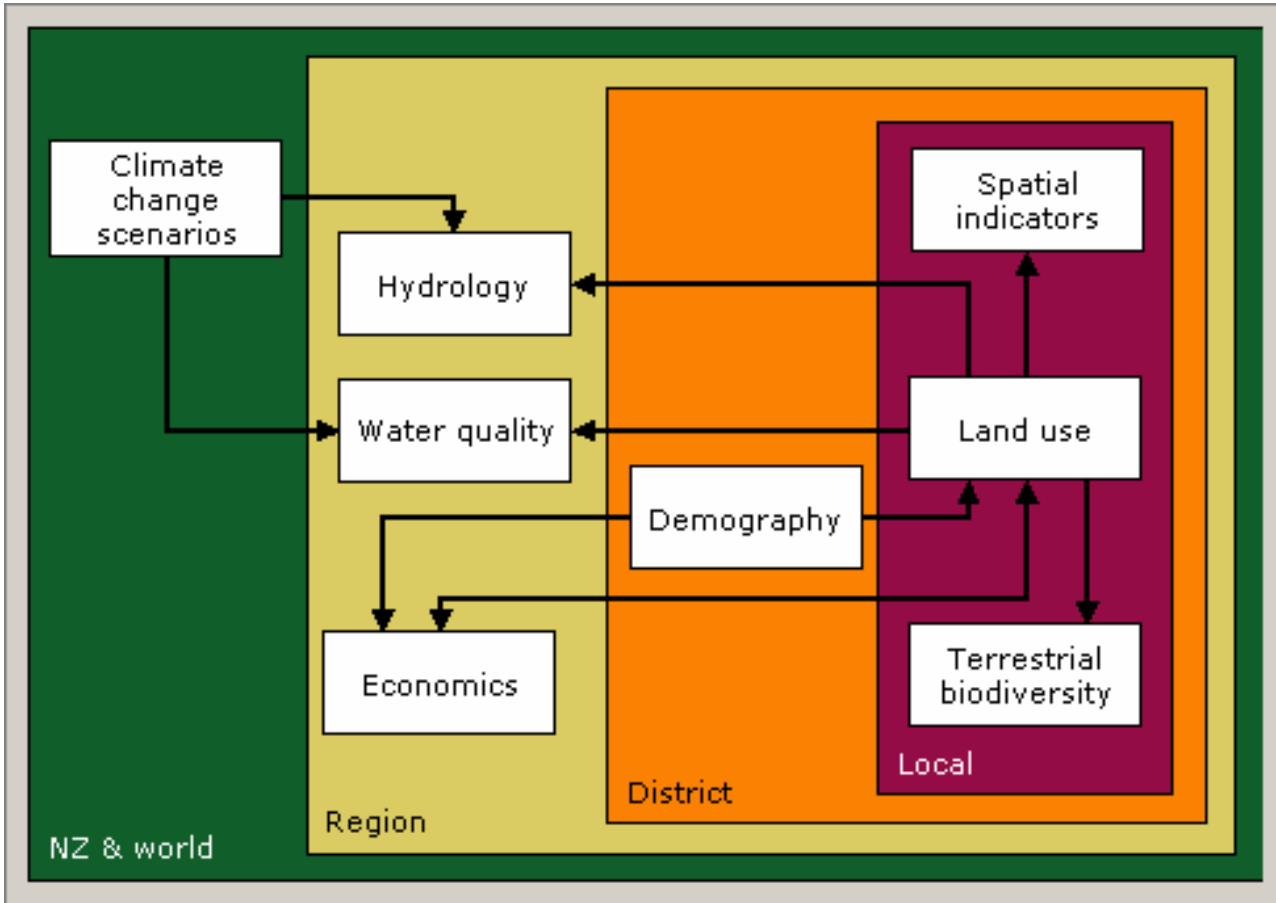




What is WISE?

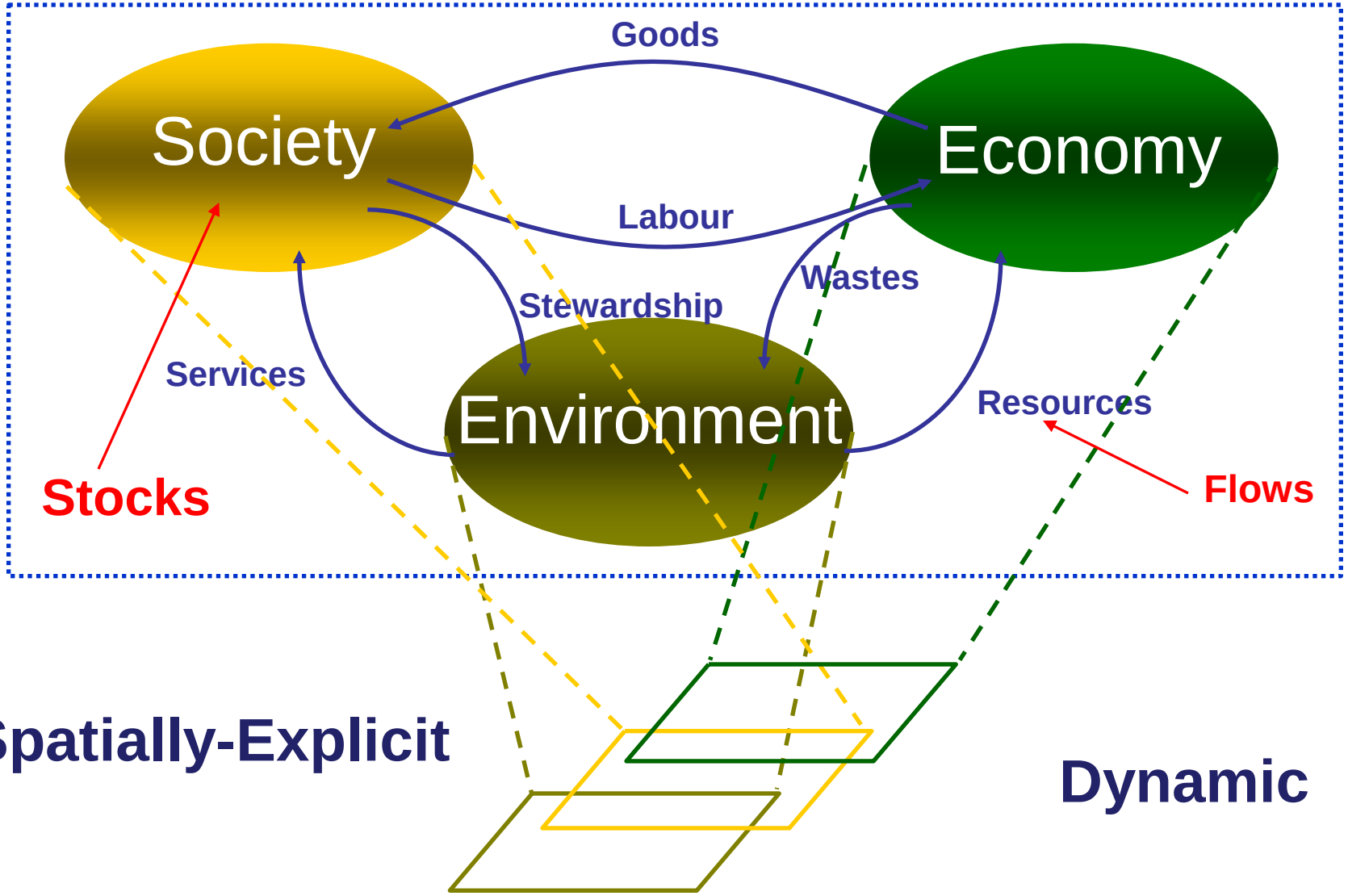
- WISE = Waikato Integrated Scenario Explorer
- **Stand-alone software application**
- **System of interacting models**





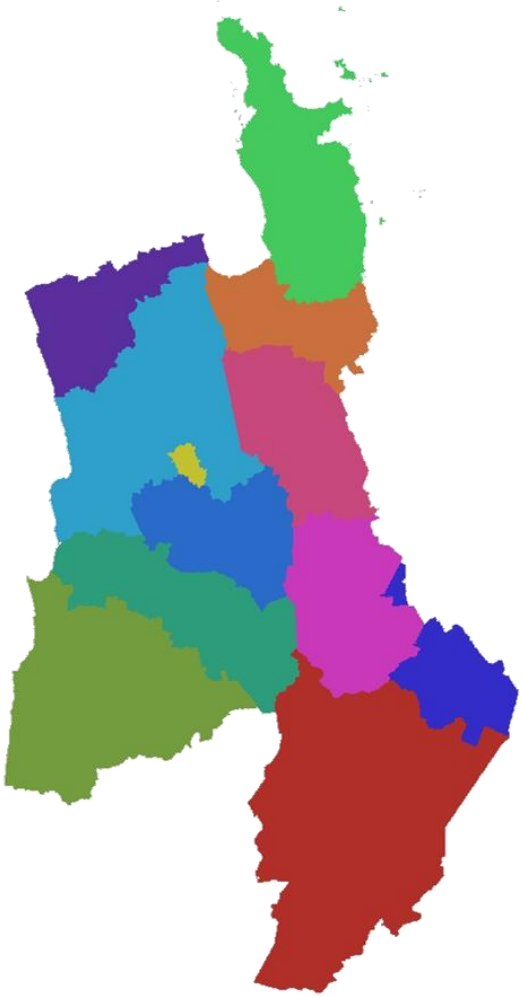
What is WISE?

- System of interacting models linking aspects of economy, environment, and society
- Integrated spatially explicit decision support system
- Spatial, dynamic systems model
- Stand-alone software application
- A tool to support policy & planning

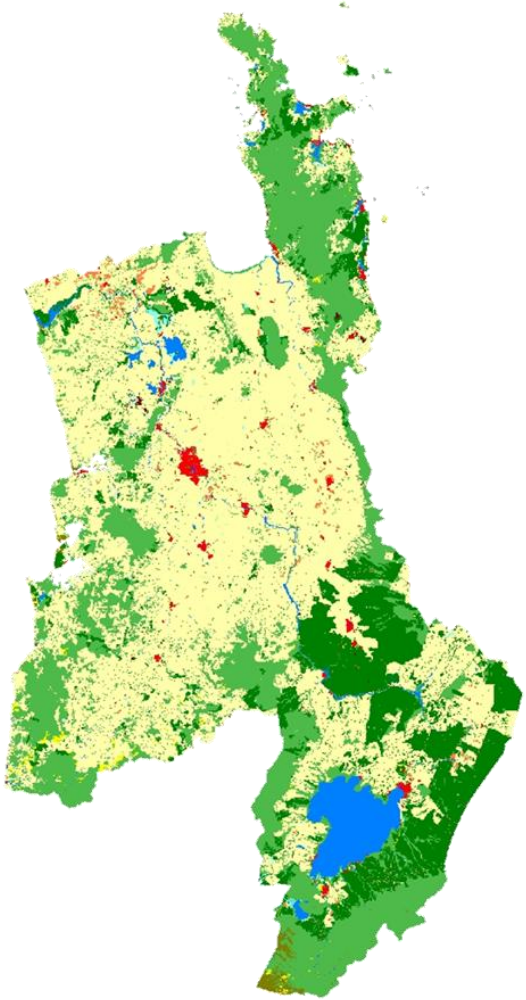

Goods
Society
Economy
Labour
Wastes
Stewardship
Services
Environment
Resources
Stocks
Flows
Spatially-Explicit
Dynamic

Multi-scale

Region

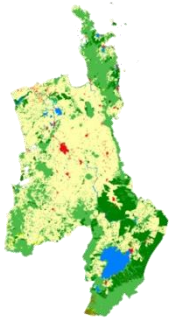


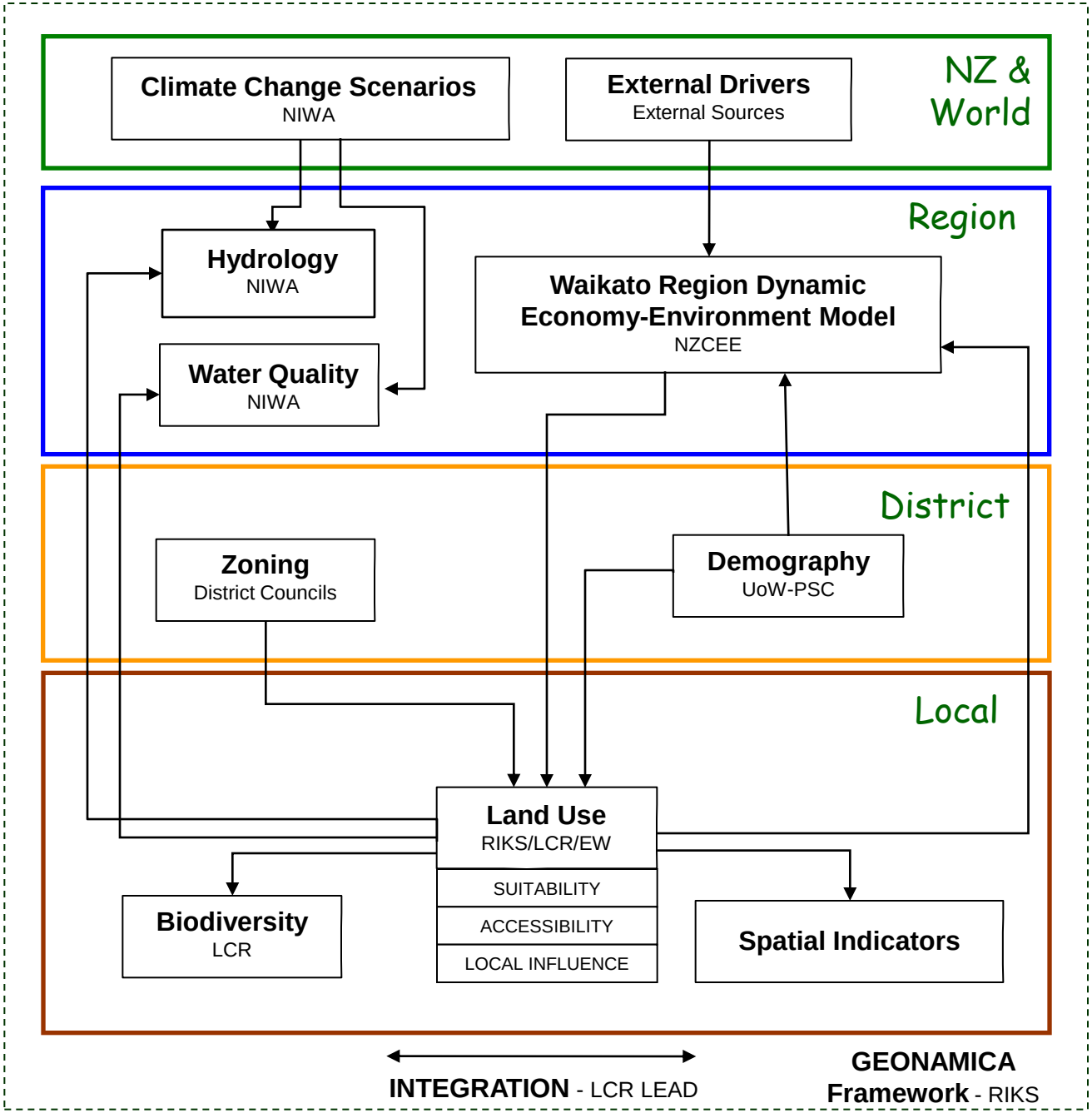
District



Local
(200 x 200 m cells)

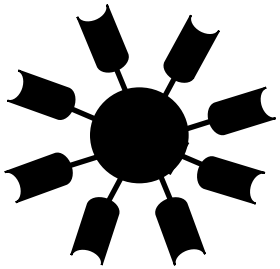
WISE Beta System Design





Dynamic and Spatial Modelling

Basic Framework



Geonamica

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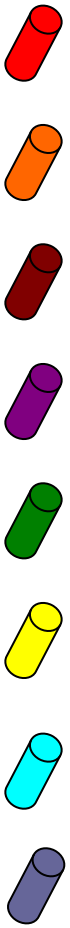
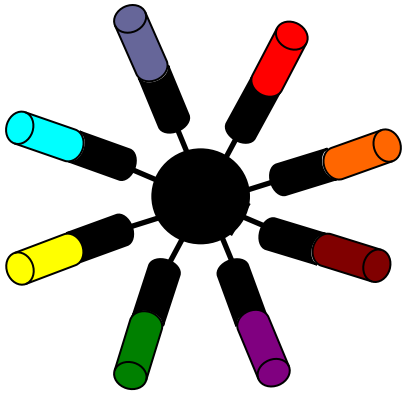
Models



- Climate Change
- Hydrology
- Water Quality
- Economy-Environment
- Zoning
- Demography
- Land Use Change
- Terrestrial Biodiversity



Product

WISE

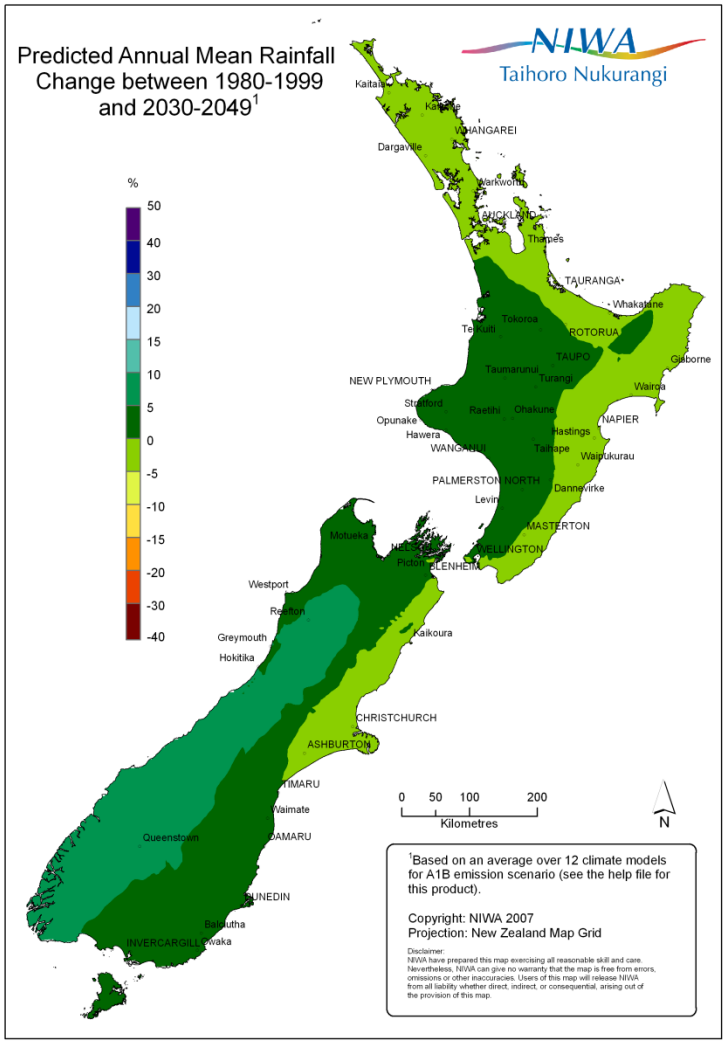
Climate Change Scenarios

- Layers for 2001 – 2050
  - Annual Rainfall
  - Temperature
  - PET

- 3 Scenarios (from IPCC AR4)
  - Low
  - Medium
  - High

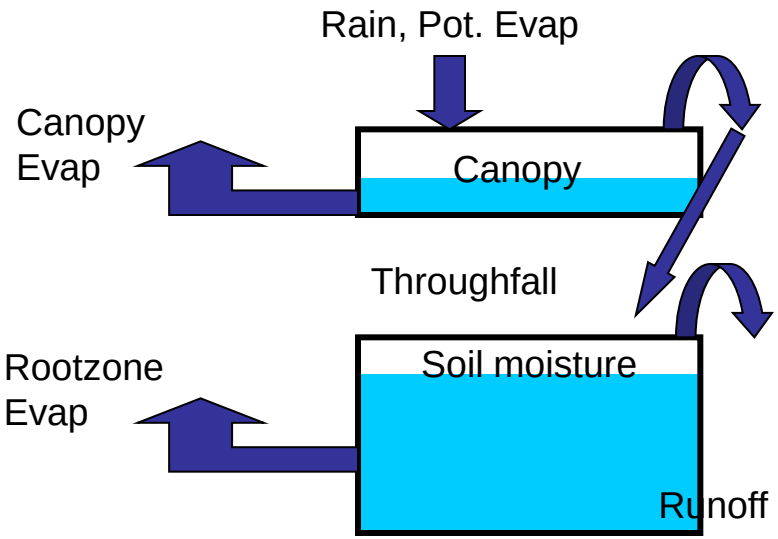
- User Options

		None	Low	Med	High
Interannual Variability	Yes				
	No				



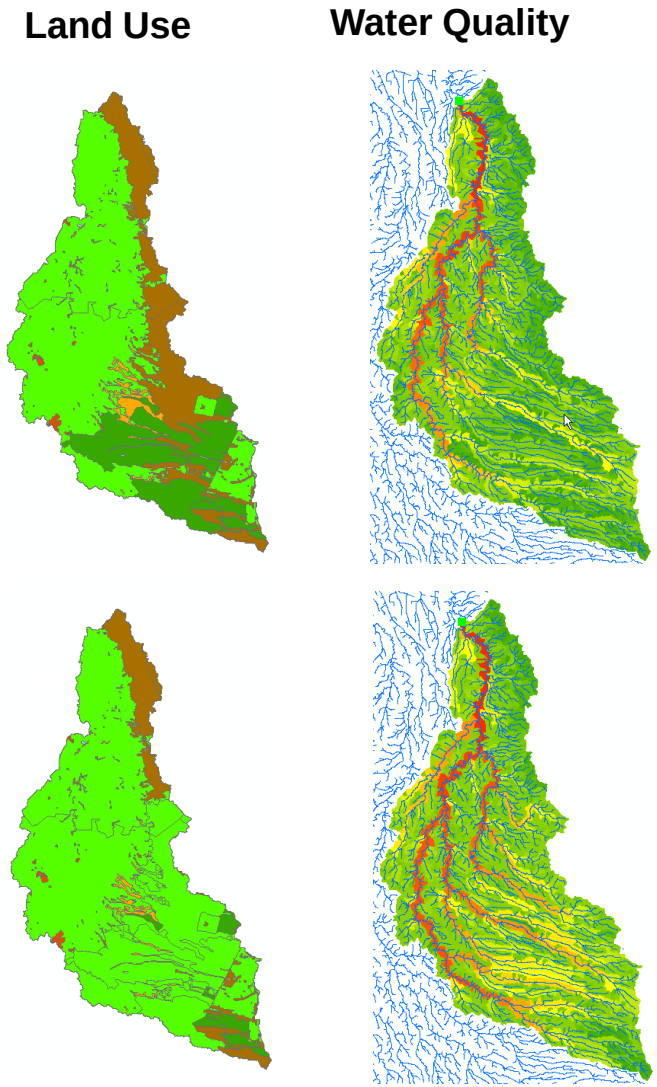
Hydrology

- Simple hydrological simulation model
- Outputs
  - Annual Runoff
  - Water Yield in Driest Summer Month



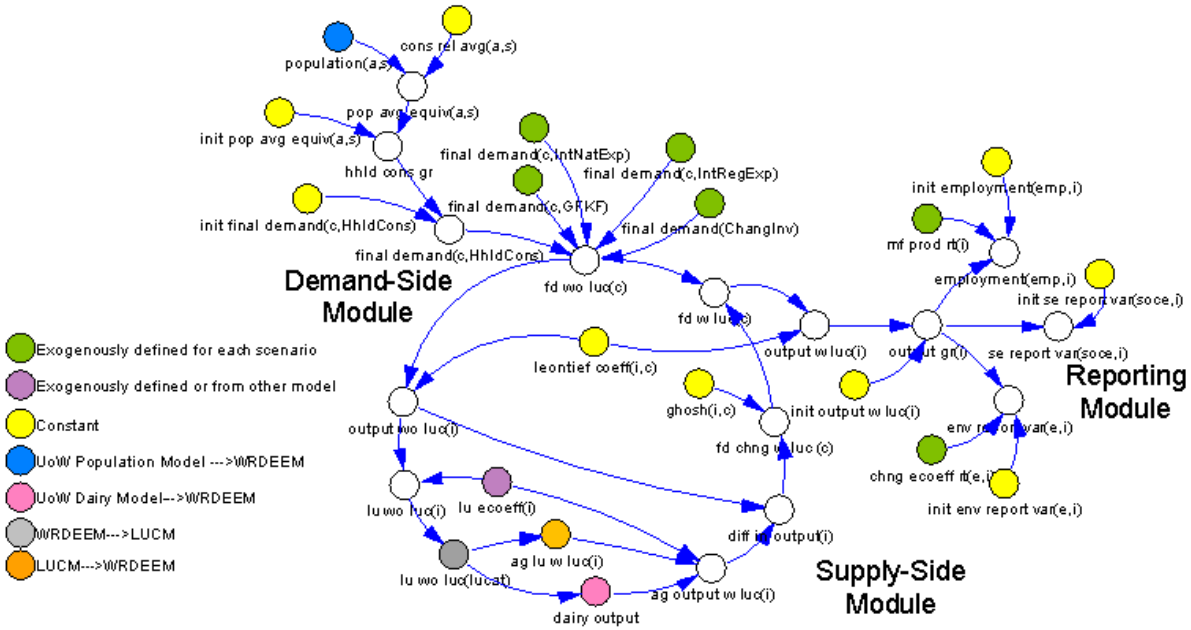
Water Quality

- Estimates nutrient loadings to surface water
- Based on USGS Sparrow model adopted to NZ (same model used in CLUES)
- OUTPUTS
  - N loads by reach
  - P loads by reach



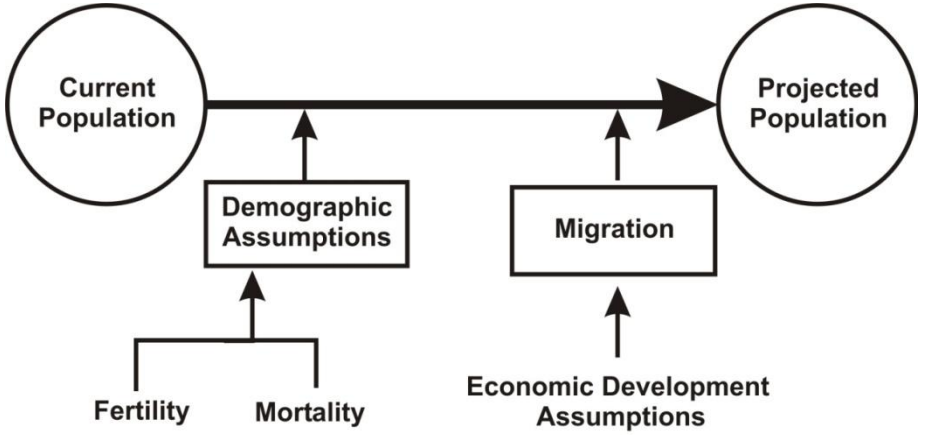
WRDEEM: Waikato Region Dynamic Economy - Environment Model

- Dynamic Input-Ouput Model
- Both Demand-Side and Supply Side
- User Inputs
  - International Exports
  - Interregional Exports
  - Gross Fixed Capital Formation
  - Change in Inventories
  - Efficiency Index
  - Labour Force Participation



Demographics

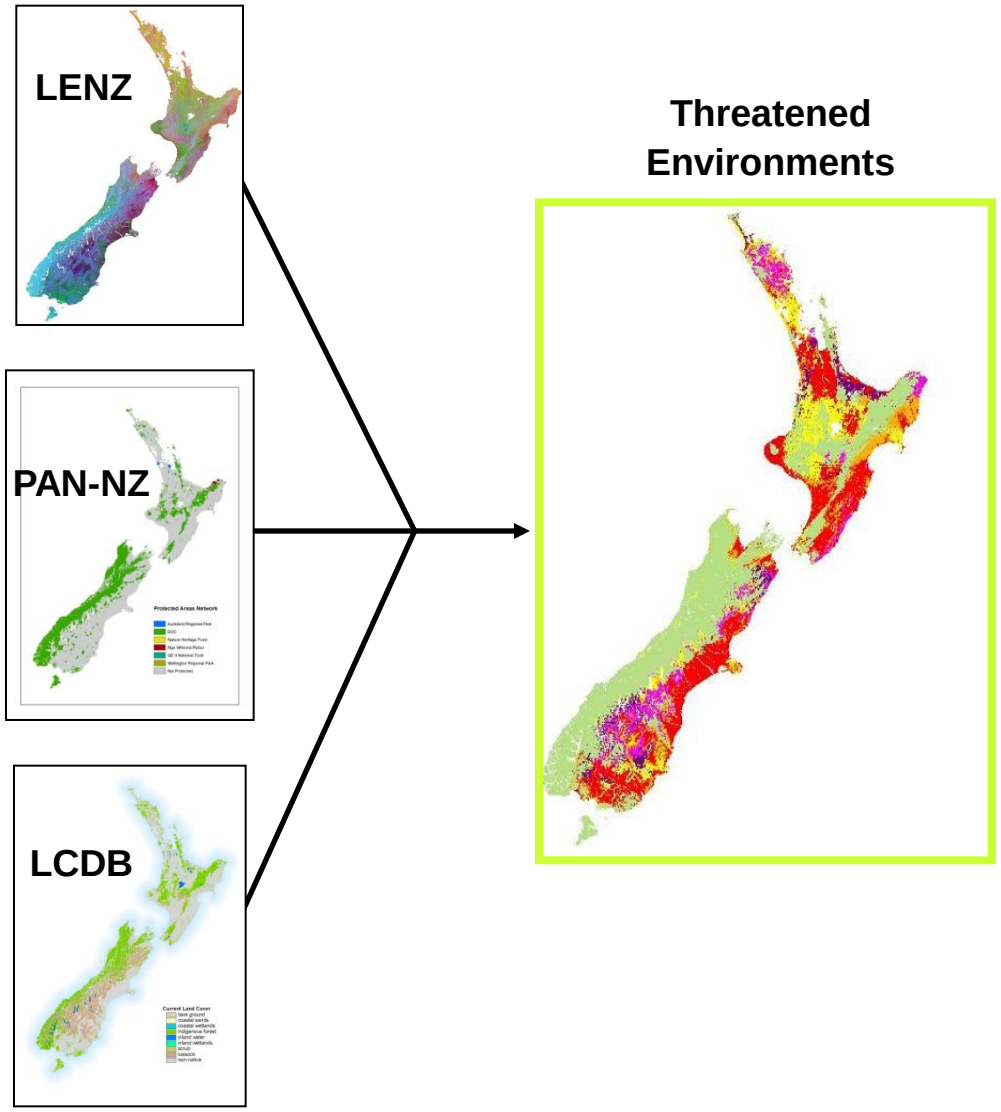
- 1-Year Age-Sex Cohort Component Model
- 12 Models – one for each district in the Waikato
- Outputs
  - By 1-Year Age-Sex Class
  - Births
  - Deaths
  - Net Migration
- User Options
  - Fertility Lever
  - Mortality Lever
  - Net-in migration by district



Terrestrial Biodiversity

Landcare Research
Manaaki Whenua

- Terrestrial biodiversity indicator
- Combines information on condition and legal protection of native ecosystems
- Uses LENZ Level II as a surrogate
- Output
  - Threatened environment status of LENZ Level II Environments



Land Use Change

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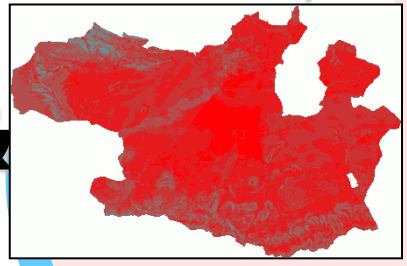
Landcare Research
Manaaki Whenua

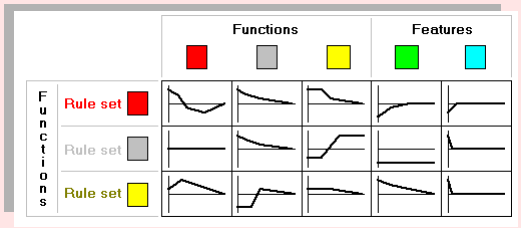
Environment Waikato
REGIONAL COUNCIL

Suitability

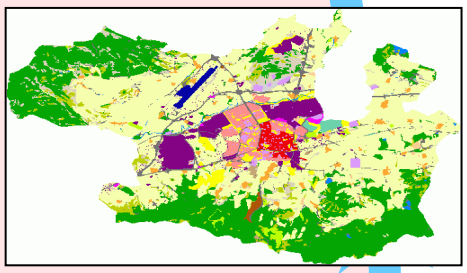
&



& CA-Rules

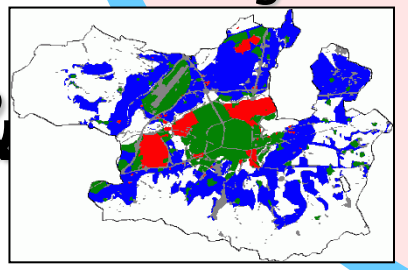


Land use at T_0

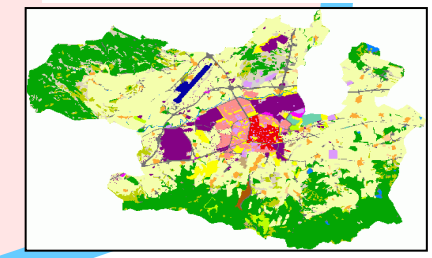


Zoning

&



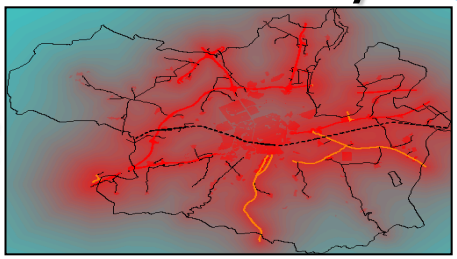
Land use at T_0+1



Transition Potential

Accessibility

&



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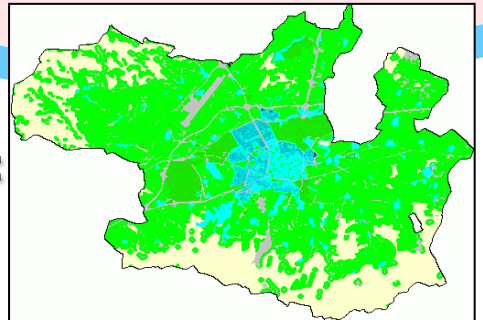
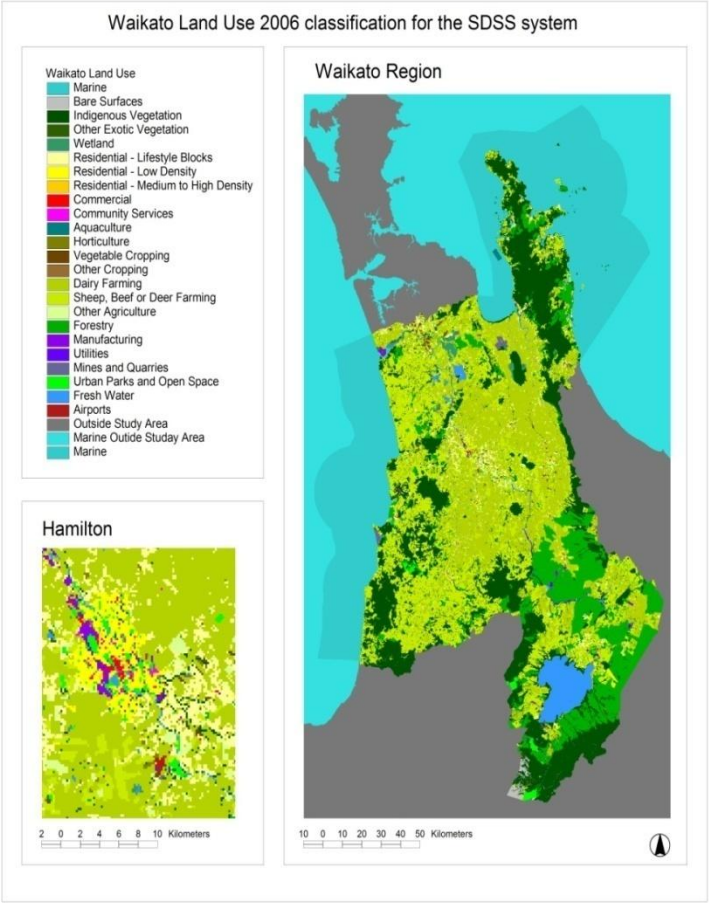


Land Use Classification

- 25 Land Use Classes
- Base Data
  - Land Cover Database
  - Valuation Database
- Generated via rule-based algorithm (also used for Zoning & Suitability)
- User Options
  - Neighourhood Rules
  - Zoning
  - Suitability
  - Accessibility (e.g., Transport)

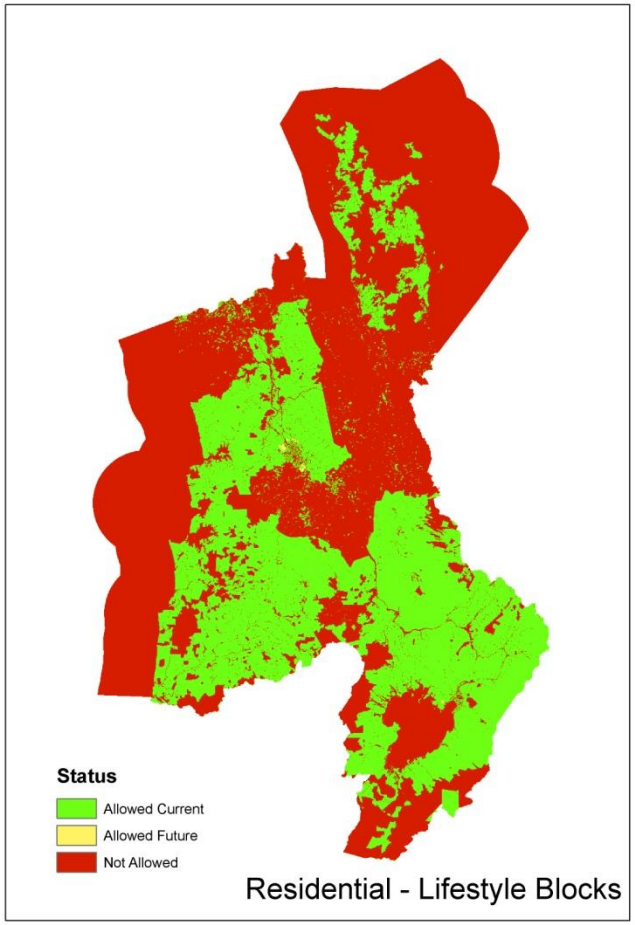


Land Use Classification

Functions	Vacant	Features
Residential – Lifestyle Block Residential – Low Density Residential – Medium-High Density Commercial Community Services Horticulture Biofuel Cropping Other Cropping Vegetable Cropping Dairy Farming Sheep, Beef, or Deer Farming Other Agriculture Forestry Manufacturing	Bare Surfaces Indigenous Vegetation Other Exotic Vegetation Wetland	Marine Aquaculture Utilities Mines & Quarries Urban Parks & Recreation Fresh Water Airports

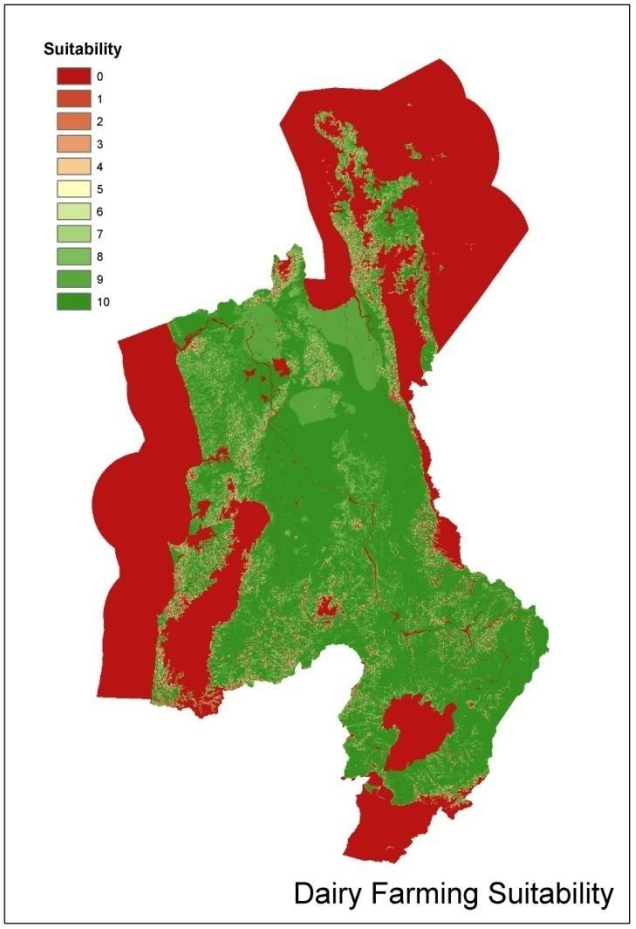
Zoning

- Regional-wide layer for each
  - Function
  - Vacant State
- Base Data
  - District/City Councils
  - PAN-NZ Database
  - EW Databases
- Simplification of RMA Activity Status to Yes/No Status



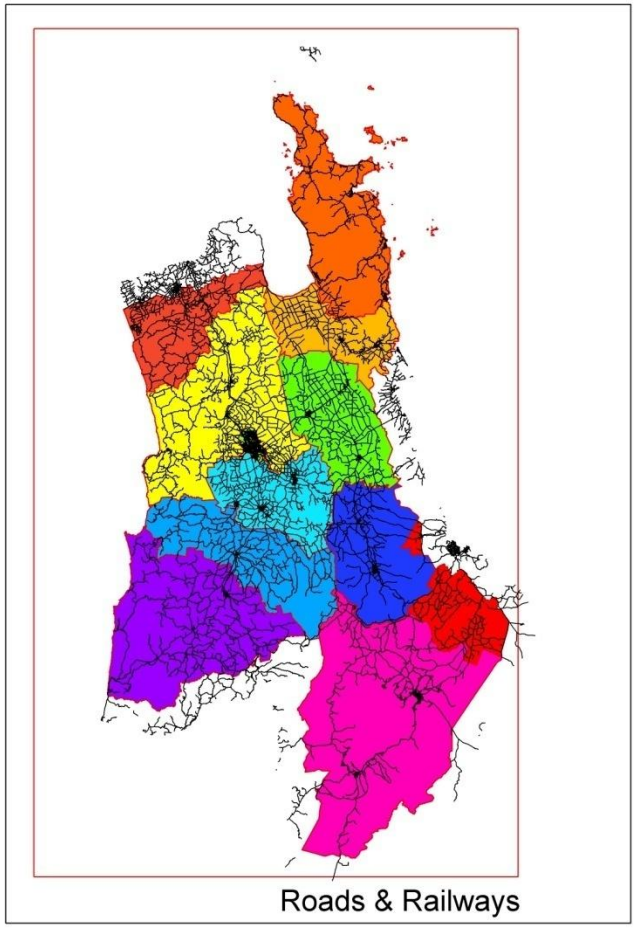
Suitability

- Regional-wide layer for each
  - Function
  - Vacant State
- Range
  - 0 (None)
  - 10 (High)
- Base Data
  - Land Resource Inventory
  - LENZ
  - Climate
  - NZ Erosion Model
  - Landform



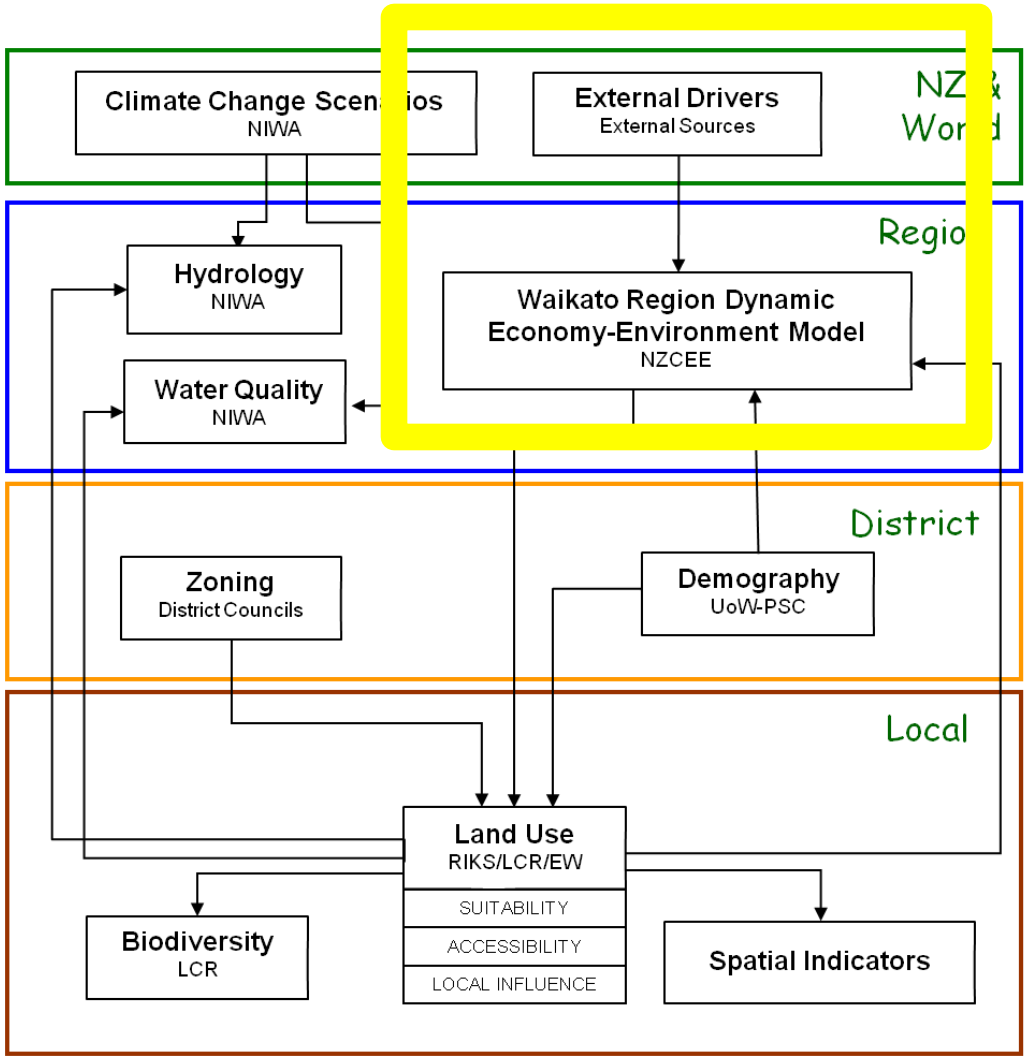
Accessibility

- Factors
  - Transport Network
  - Major processing centres
  - Residential attractors
- Range
  - 0 (None)
  - 10 (High)
- Varies by land use



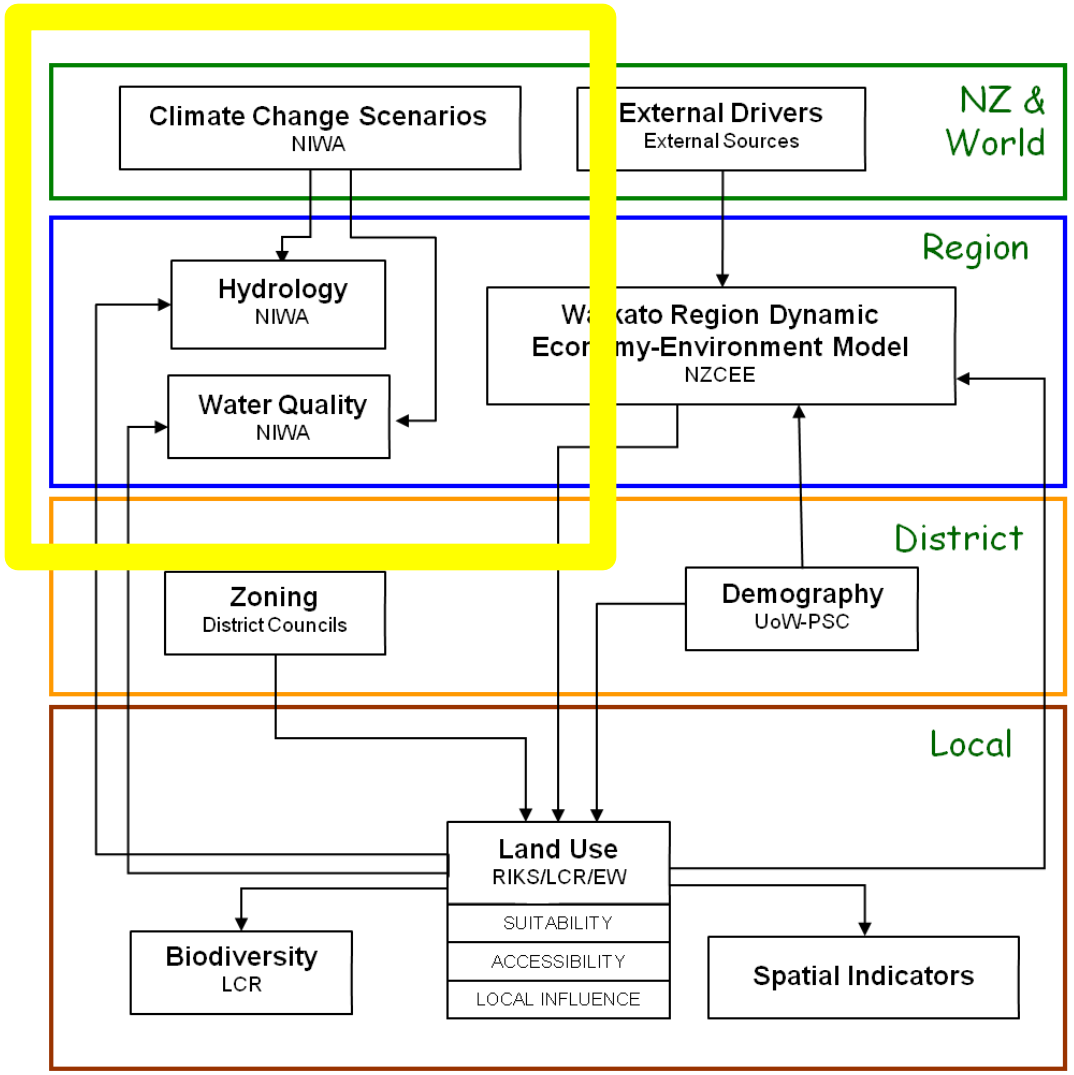
Interactions

- External Drivers – WRDEEM
  - Assumptions regarding external economic conditions affect economy
  - International Exports
  - Interregional Exports
  - Gross Fixed Capital Formation
  - Change in Inventories



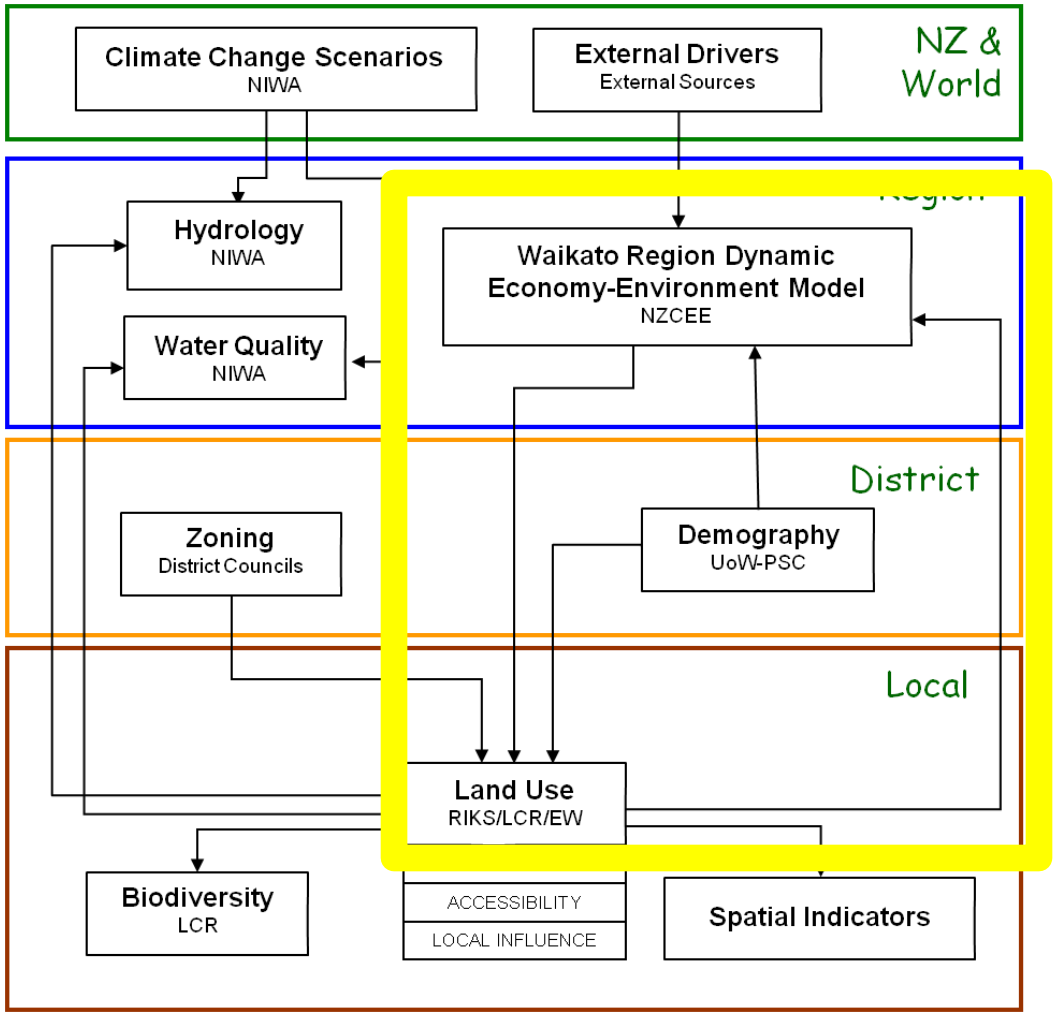
Interactions

- Climate – Hydrology
  - Rainfall and PET affect total annual runoff & seasonality
- Climate – Water Quality
  - Rainfall affects nutrient loadings



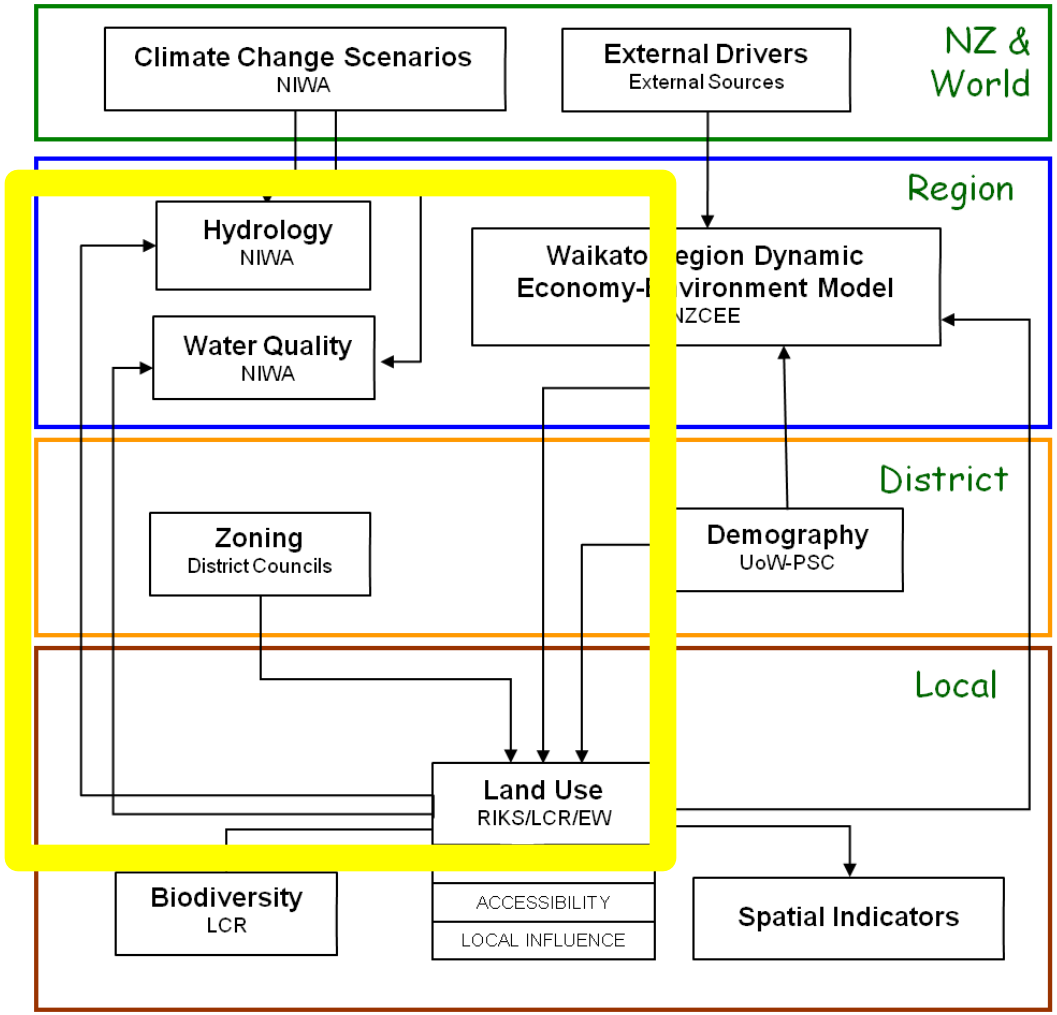
Interactions

- Demands for Land Use to LUC Model
  - Demography (Residential)
  - WRDEEM (other LU functions)
- LUC Model determines supply of land for WRDEEM, leading to re-adjustment of economy using supply-side module
- Demographics determines Final Household Consumption in WRDEEM



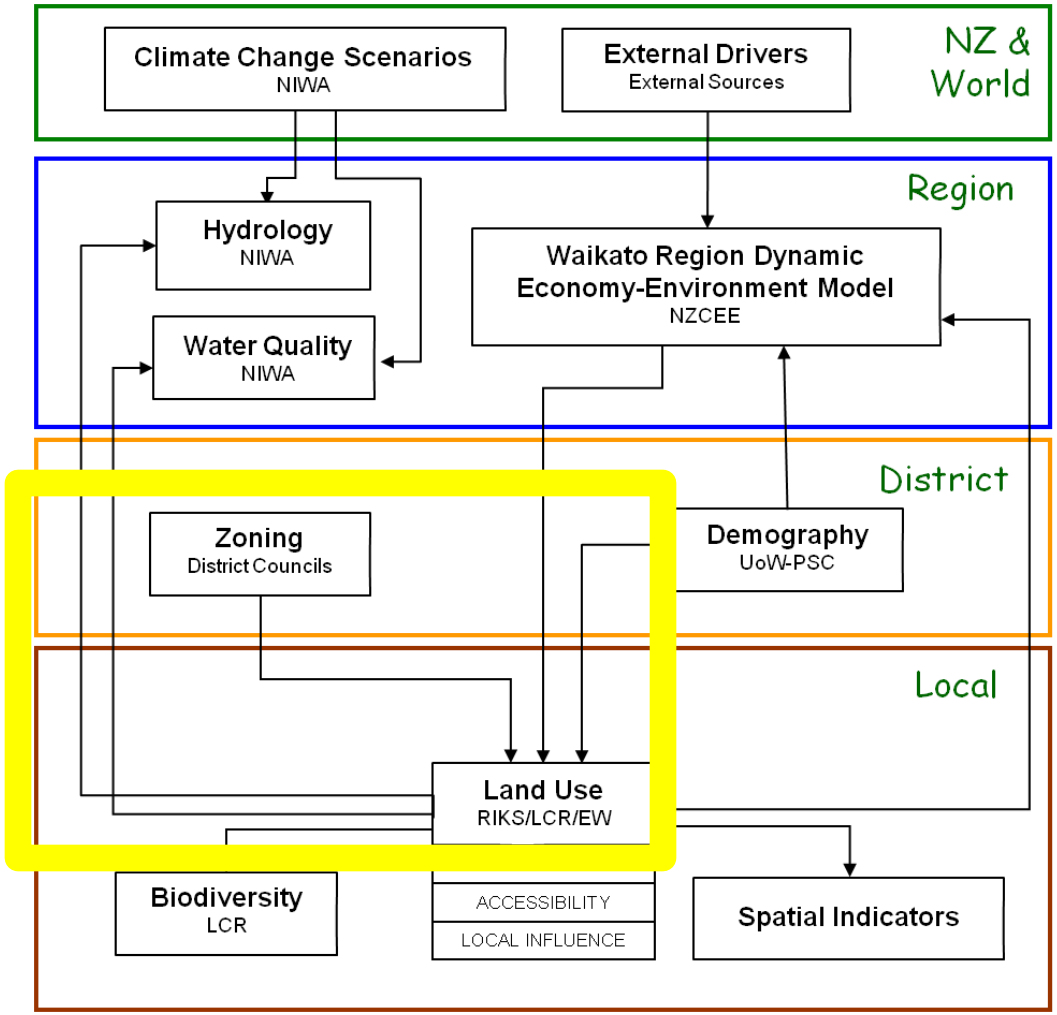
Interactions

- LUC – Hydrology
  - Land Use affects inception rates
- LUC-Water Quality
  - Land Use affects nutrient loadings



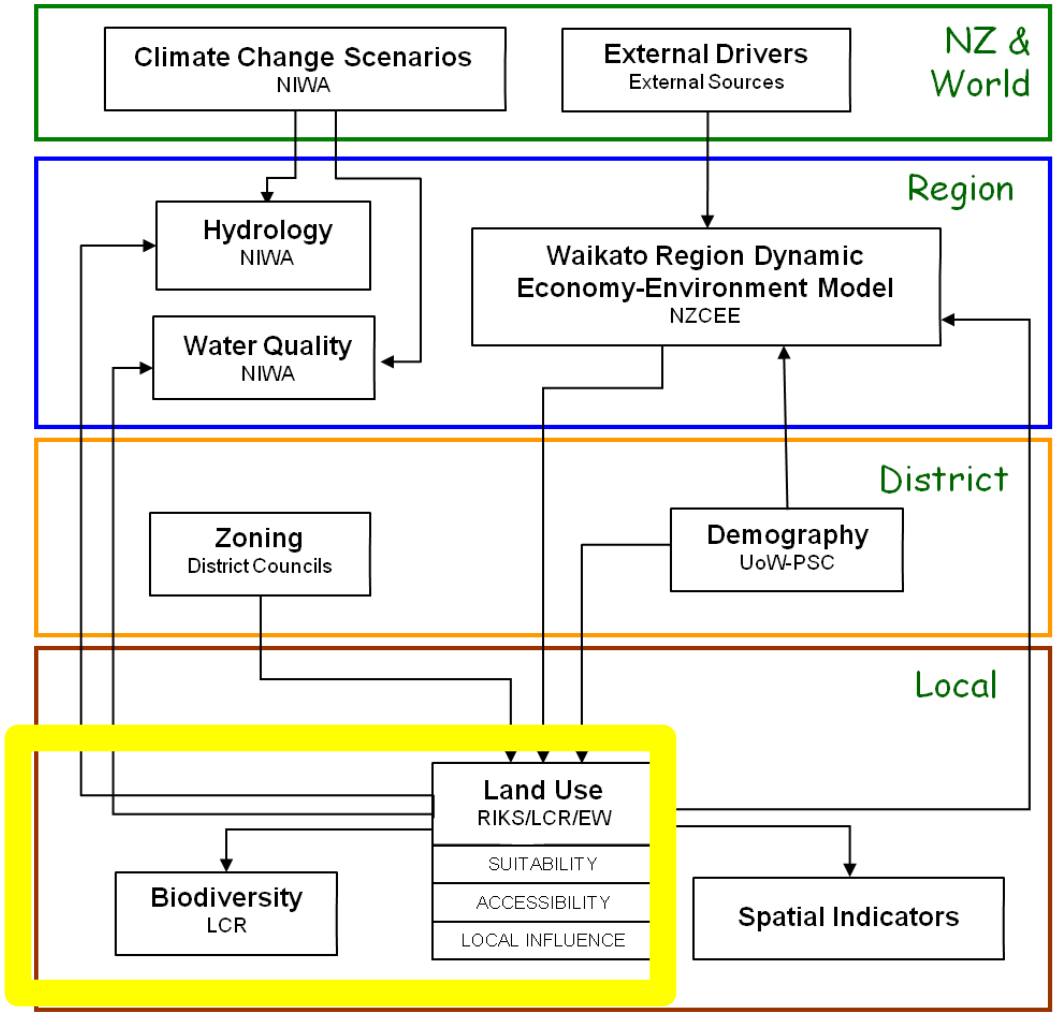
Interactions

- Zoning – LUC Change
  - Zoning has a strong influence on land use change
  - Determines where different land uses could/could not occur



Interactions

- LUC – Terrestrial Biodiversity
  - Land Use determines condition (state) of ecosystems
  - Native vs. Non-native
  - Affects Threatened Environment calculation



Interactions

- Various spatial indicators can be generated via the LUC model or via other models (e.g., water quality)