



Landcare Research
Manaaki Whenua

WISE

Catchment Prioritisation

Case Study

Introduction & Discussion

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Presentation to Waikato Regional Council

20 December 2011



Catchment Prioritisation: Policy Context

- 2nd Generation RPS Section 8
 - “Maintain or improve values of water bodies by identifying catchments that require specific intervention to address the adverse effects of activities and land-use changes”
- 8 considerations (detail to follow...)
- WRC will undertake a process to prioritise catchments

Freshwater Management 2011

Issued by notice in the Gazette on 12 May 2011

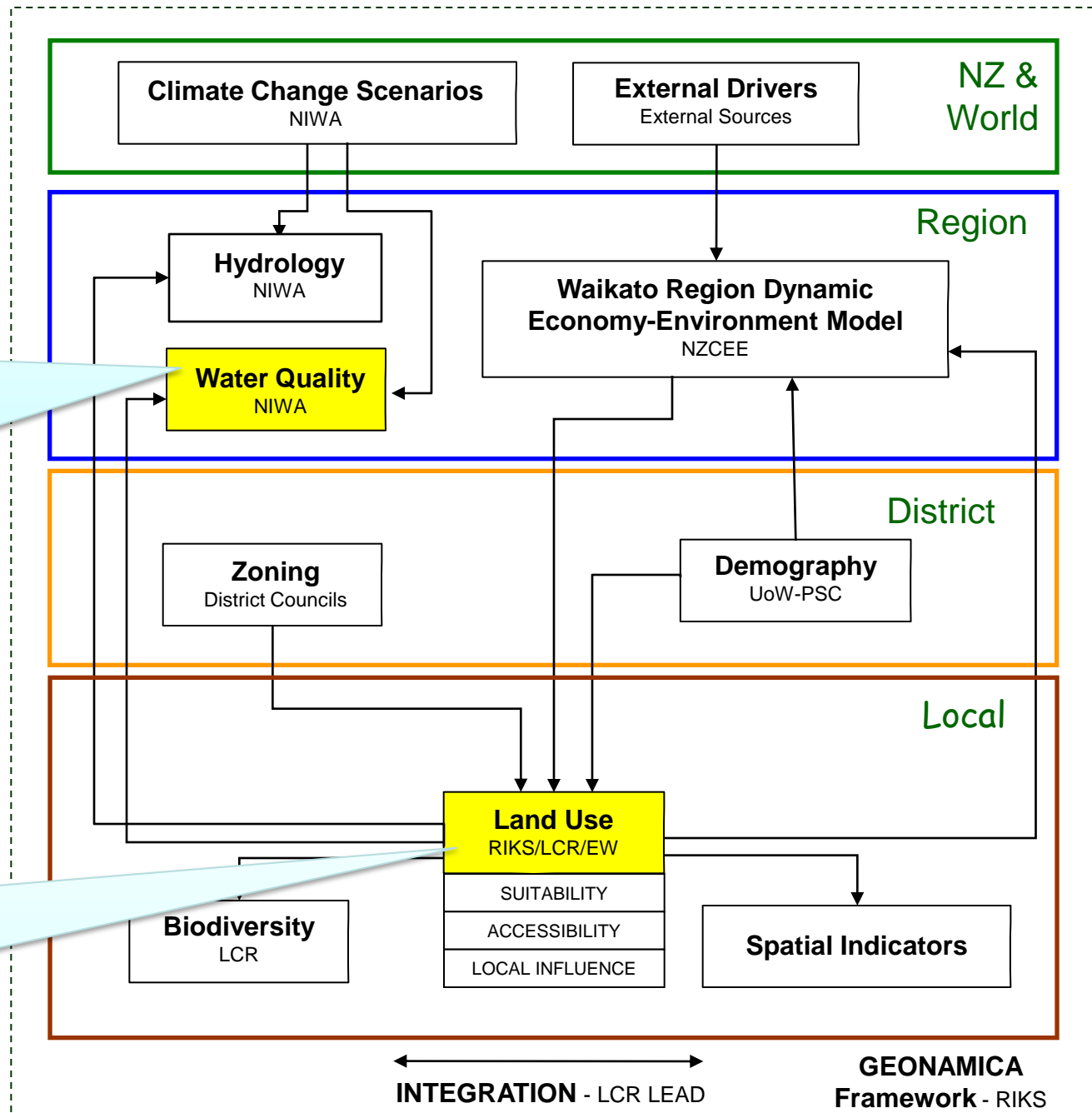
- Water quality
- Establish freshwater objectives and set freshwater quality limits for all bodies of freshwater, with regard to *at least*.
 - Climate change
 - Connections between water bodies
- Establish methods to avoid over allocation
- Specify targets and implement methods to improve water quality and meet those targets within a specified timeframe.
- Impose conditions on discharge permits to meet limits and targets set.
- Establish rules requiring the adoption of the best practicable option to prevent or minimise environment effects of discharges into fresh water

WISE System Design

Implementation of
SPARROW
model (also used
in CLUES) for N
& P loading



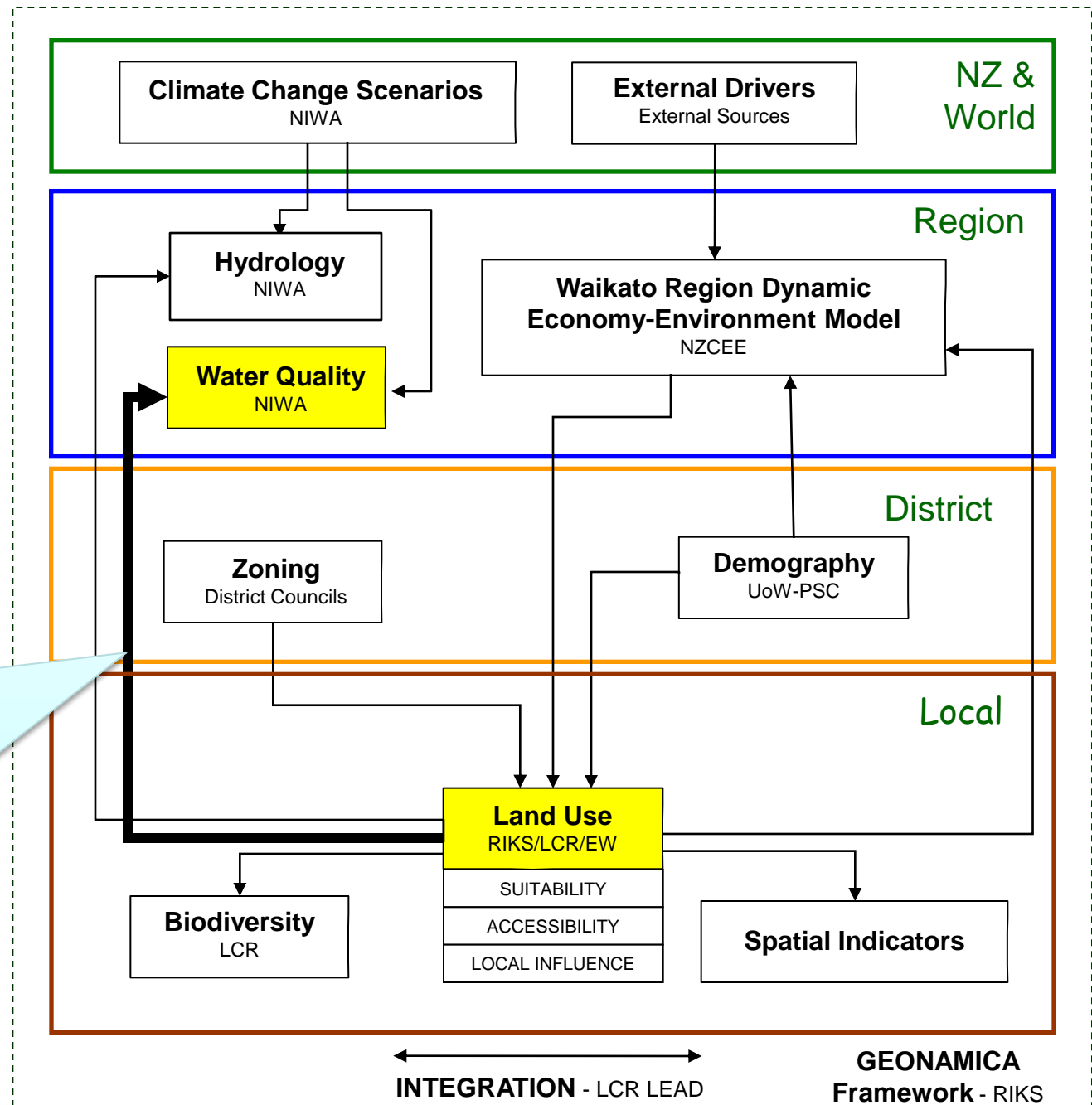
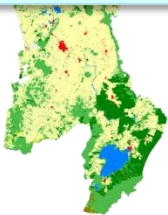
Land use
affects water
quality



WISE System Design



Land use –
water quality
relationship via
1) source
2) drain
3) rain
coefficients



Source
Coefficients

Drain Coefficient

Rain Coefficient

Clima

Ext

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&
d

Water quality model

Input

Catchment area look-up table: [WaterQuality\catchment_area_lookup.dat]

River network map: [C:\Documents\Geonamica\WaterQuality\reaches.shp]

Delivery type: Mean delivery variable

Drainage	4.21
Rain	1.58

Parameters

Land use / parameter	Source coefficient phosphorous [tonnes/year/km ²]	Source coefficient nitrogen [tonnes/year/km ²]	Drainage exponent phosphorous	Drainage exponent nitrogen	Rain exponent phosphorous	Rain exponent nitrogen
Bare Surfaces	0.054	0.07	0	-0.35	0	0.59
Indigenous Vegetation	0.054	0.234	0	-0.35	0	0.59
Other Exotic Vegetation	0.054	0.234	0	-0.35	0	0.59
Wetland	0	0	0	0	0	0
Residential - Lifestyle Blocks	0.223	1.48	0	-0.35	0	0.59
Residential - Low Density	0.054	0.8	0	0	0	0
Residential - Medium to High Density	0.054	0.8	0	0	0	0
Commercial	0.054	0.8	0	0	0	0
Community Services	0.054	0.8	0	0	0	0
Horticulture	0.223	20	0	-0.35	0	0.59
Biofuel Cropping	0.223	20	0	-0.35	0	0.59
Vegetable Cropping	0.223	20	0	-0.35	0	0.59
Other Cropping	0.223	20	0	-0.35	0	0.59
Dairy Farming	0.223	1.74	0	-0.35	0	0.59
Sheep, Beef or Deer Farming	0.223	1.48	0	-0.35	0	0.59
Other Agriculture	0.223	1.48	0	-0.35	0	0.59
Forestry	0.054	0.234	0	-0.35	0	0.59
Manufacturing	0.054	0.8	0	0	0	0
Marine	0	0	0	0	0	0

Nutrient / parameter	Reservoir decay [per year]	Stream attenuation low flow	Stream attenuation high flow
Phosphorous	17.4	0.176	0
Nitrogen	10.6	0	0

Output

Show phosphorous load map

Show nitrogen load map

←→
INTEGRATION - LCR LEAD

**GEONAMICA
Framework - RIKS**

RPS Considerations

Consideration	Addressed by WISE?	Comments
Current and desired values of water bodies	Yes	Future trends in water quality for whole region (N & P impacts only at this stage)
National or legislation direction	Yes	Zoning can implement national, regional or local rules
Degree of improvement influence by human action	Yes	Land-use change
Potential to address more than one issue through intervention	Yes	Integration of economics, environment, demographics; soft links to other models
Timing, intensity, and scale of change to land use and activities required	Partial	Via land-use change only; cannot model impacts of different activities within a single land use
Vulnerability and values of receiving waters	Yes	Could be reflected via zoning rules
Tangata whenua values	Possible	Could be reflected via zoning rules
Net benefit to community	Possible	Evaluation & comparison of multiple trends from WISE; requires formulation of 'net benefits algorithm'

Case Study Approach

1. Establish 1-3 scenarios of future change to 2050
2. Analyse future changes to land-use and impacts to water quality (N, P loading only) in WISE under each of three scenarios
3. Assess potential future impacts
 1. Absolutely: loading trends relative to likely water quality thresholds (e.g., FW NPS)
 2. Relatively: loading trends relative to perceived FW values (need a way to assess this)
4. Use land-use outputs from WISE as inputs to CLUES (may require some reclassification via LU-CLASS) – note also can assess impacts to E. coli and sediments
5. Evaluate mitigation options via CLUES to reduce loadings/increase water quality in target catchments

Case Study Approach (Visual)

