Understanding Nexus dynamics and governance challenges in complex regional systems - Insights from the Berg River Catchment South Africa

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FUTURE EARTH WATER-ENERGY-FOOD NEXUS WORKSHOP

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Background

- Much of FEW Nexus literature is at national or international scale
- How does the Nexus play out within a complex regional system such as a catchment / river basin?
- Is a Nexus lens useful for regional and local economic development planning?
- What is a useful Nexus framework suited to this scale and for this purpose in a developmental context where difficult trade-offs are sometimes required?
- Tested in a system/region under intense resource (and climate change) pressure, the Berg River catchment, South Africa

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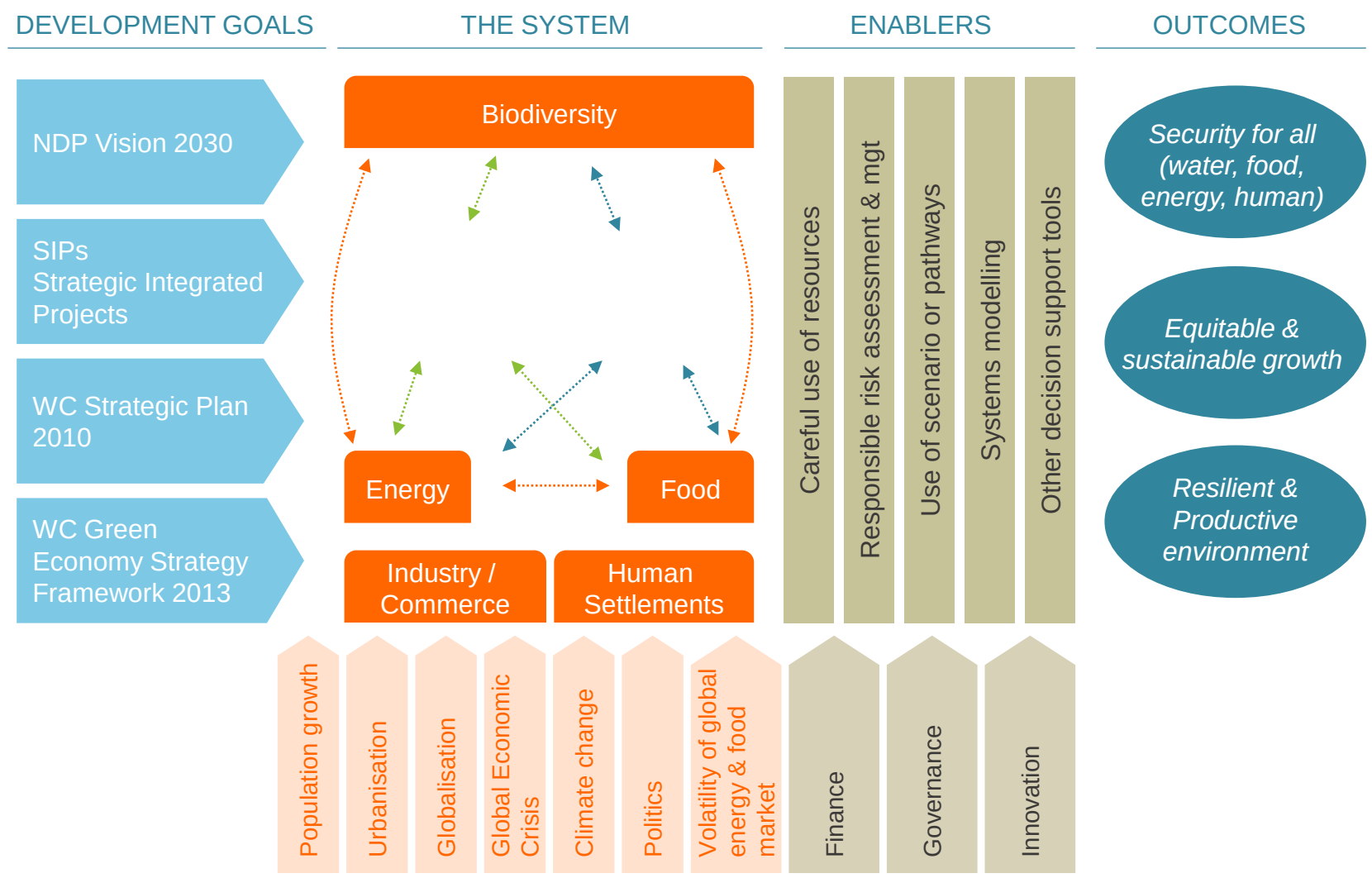

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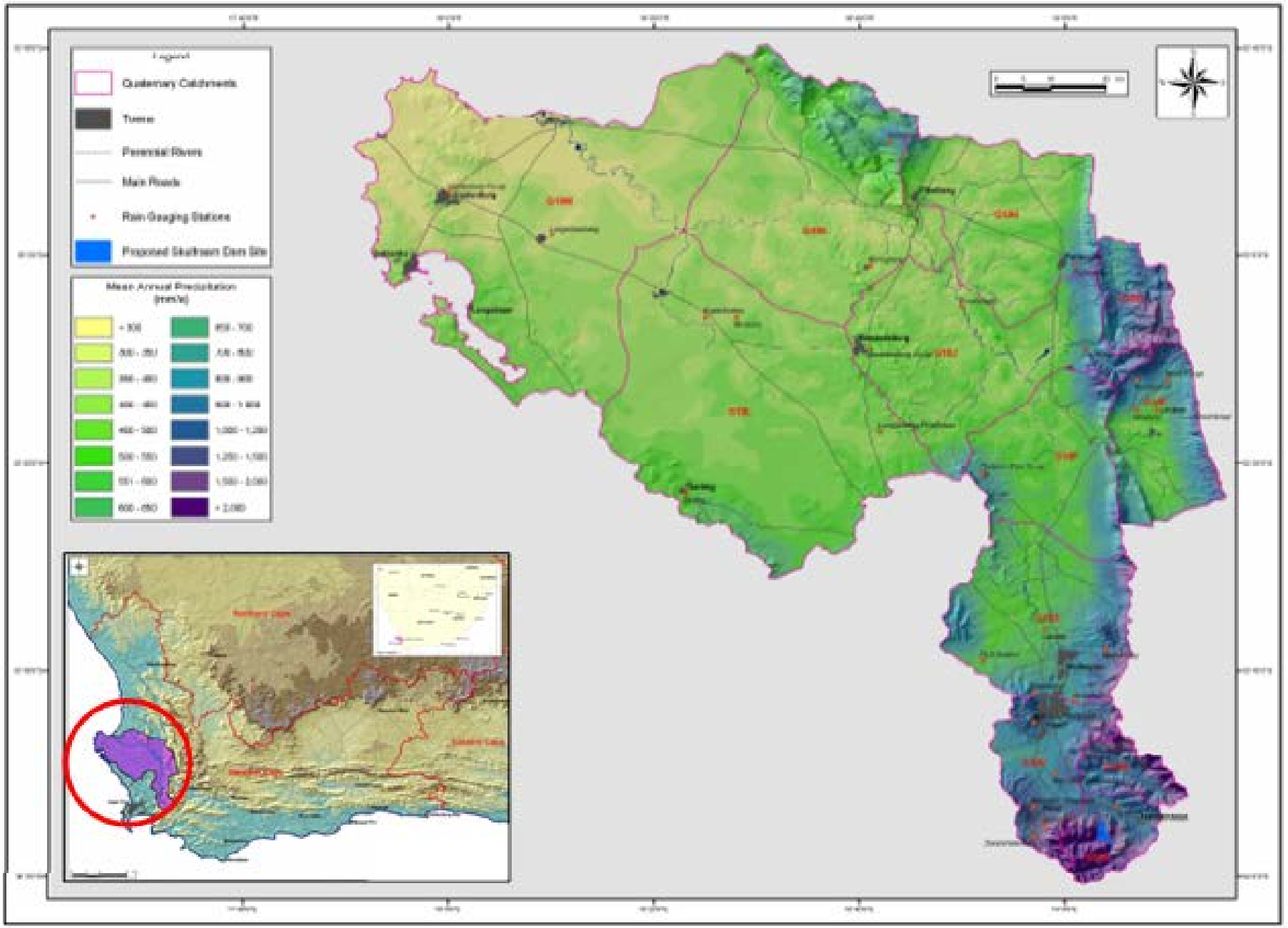
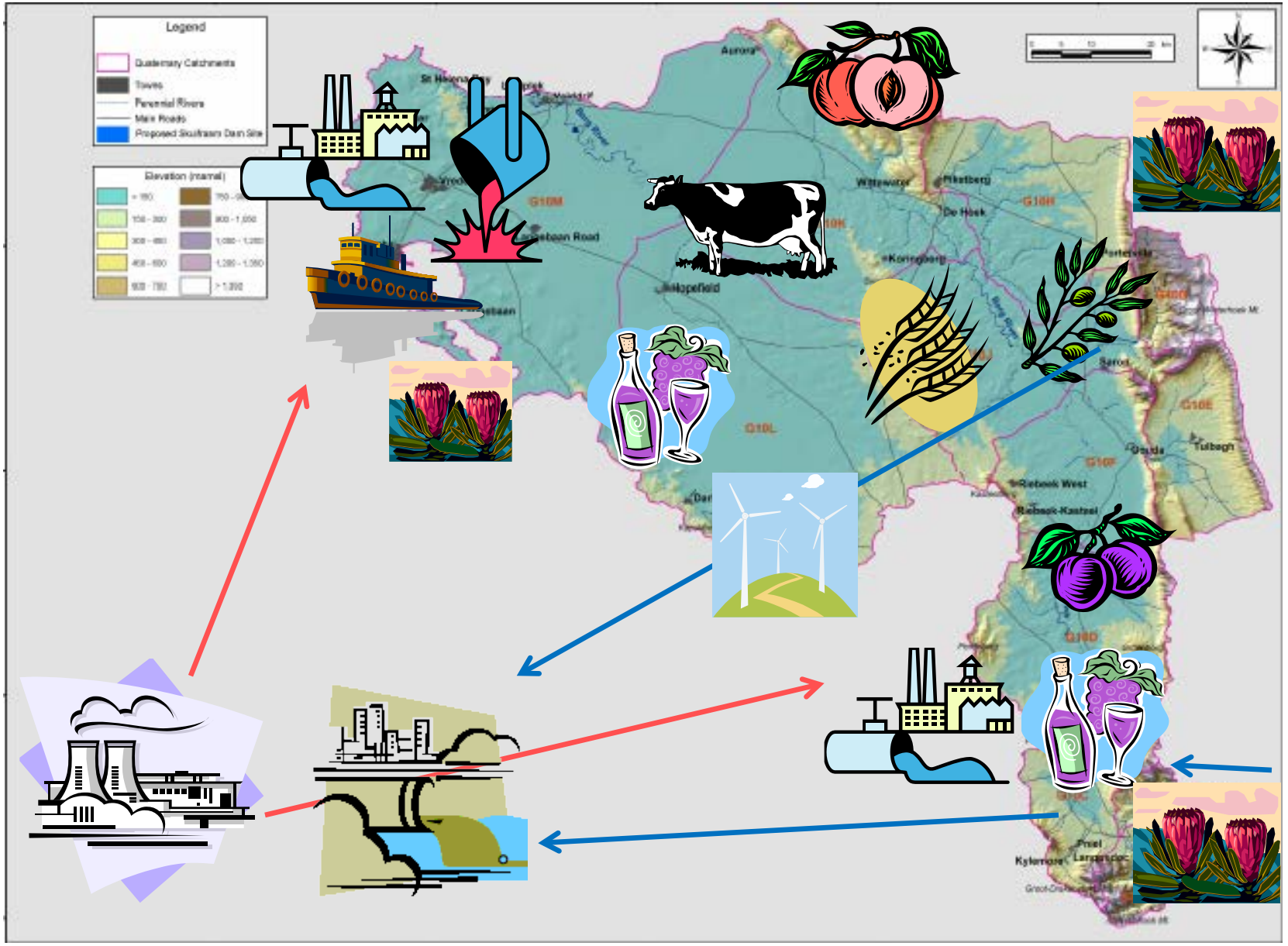
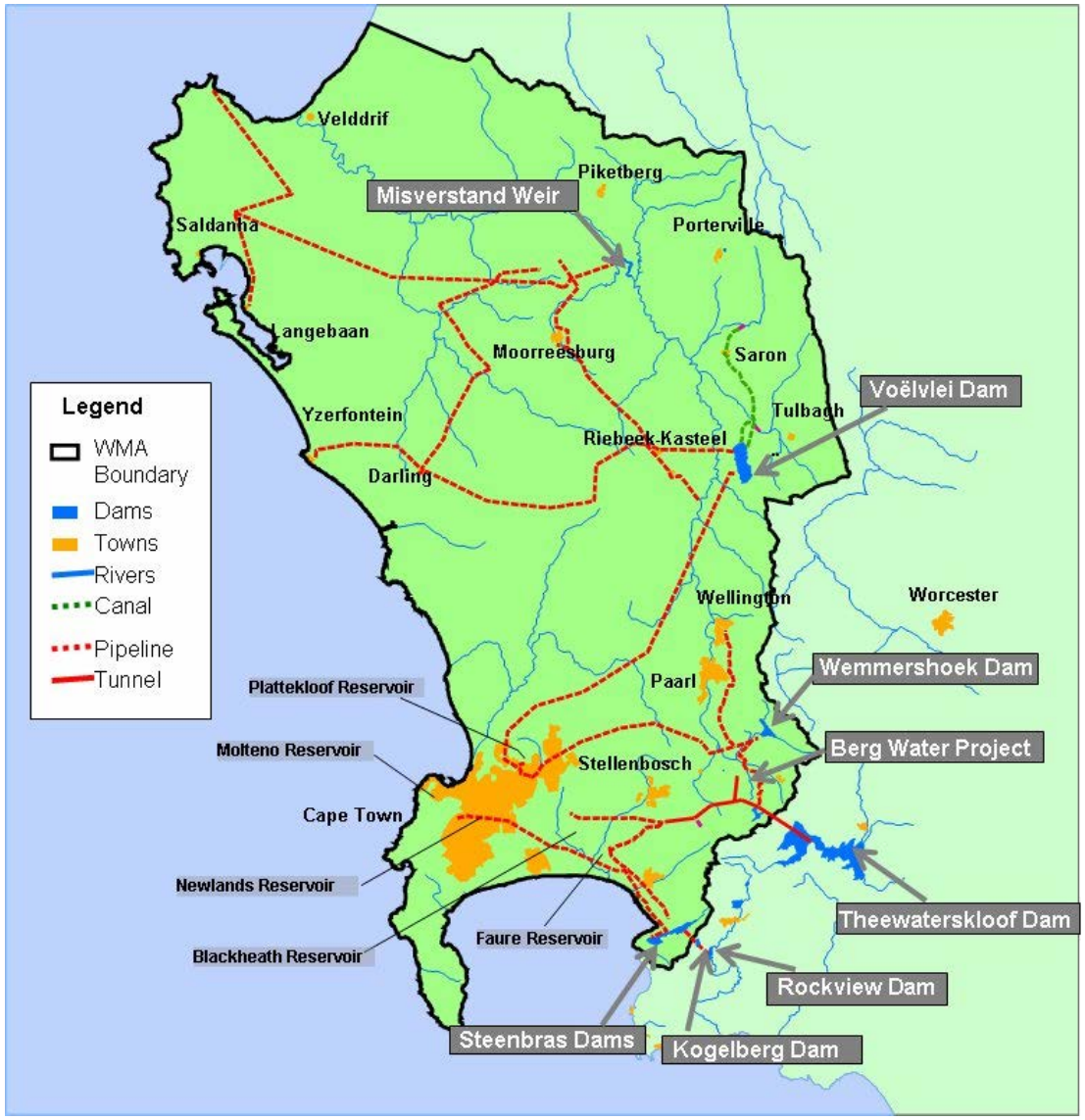
Berg River Catchment



Berg River catchment: Nexus components

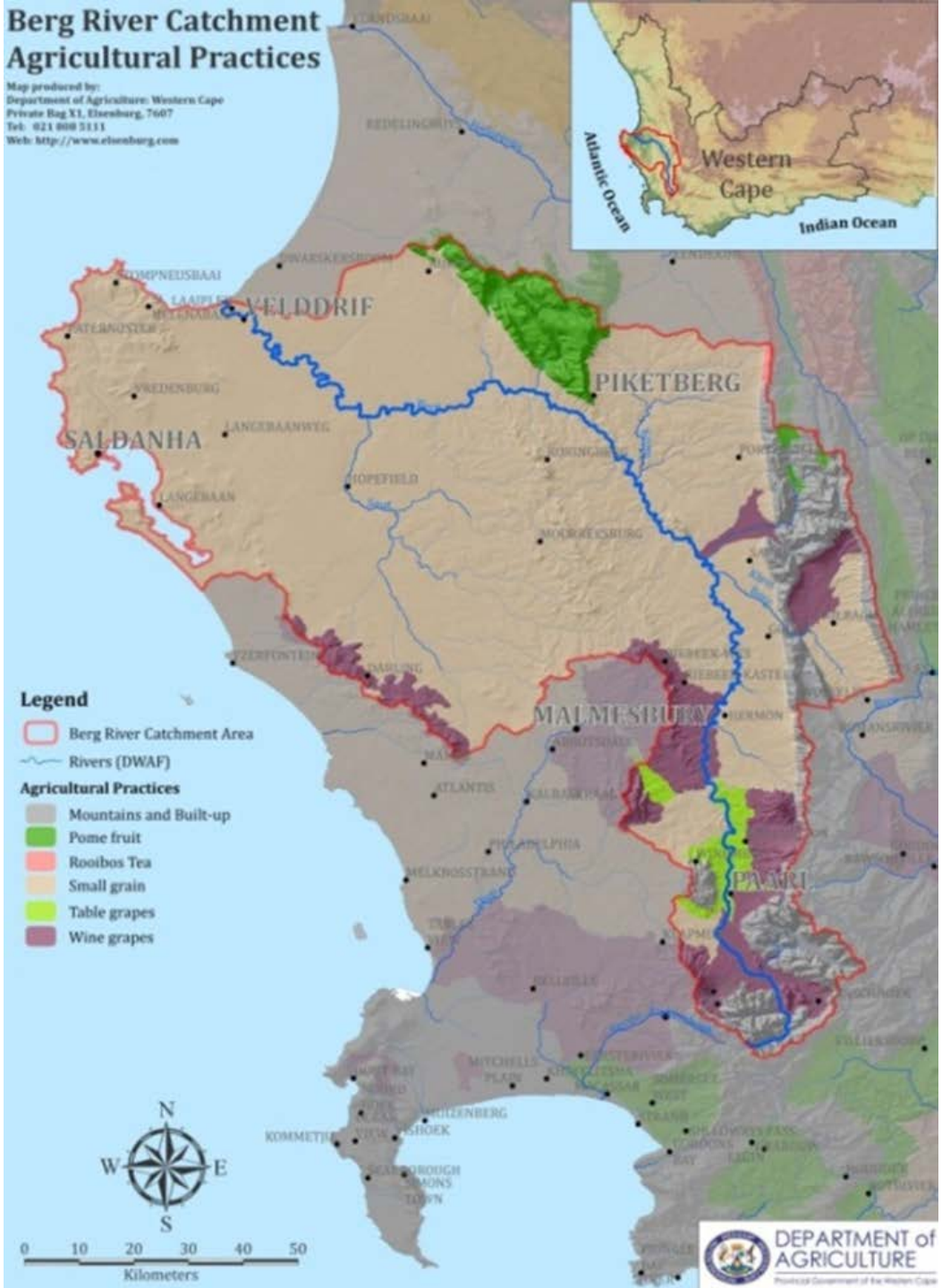


Surface water supply infrastructure



Total 1:50 Year Yield of the WCWSS: 559 million m^3/a

- **Western Cape Water Supply System (WCWSS)**
  - Berg River Dam
  - Wemmershoek Dam
  - Voelvlei Dam
  - Steenbras Dams (pump storage)
  - Misverstand Weir
  - 24 Rivers Diversion Canal
  - Klein Berg Diversion Canal
- Table Mountain Dams
- Farm Dams



Agriculture/Food: 60% of land area

Wine/table grapes
Deciduous fruit
Citrus fruit
Olives
Fynbos flowers
Rooibos tea
Vegetables/potatoes
Winter grains
Cattle/sheep
Dairy
Pigs & chickens/eggs
Fruit/veg processing

Land: a key component

- Very little productive land remains undeveloped
- 1987-2007: increases in artificial bare areas (25%) and urban vegetated areas (202%) – urban expansion and golf courses
- Severe loss of lowland biodiversity (Renosterveld down to 5% of original area)
- Conversion of natural vegetation on shale to dryland grain farming – salinisation of mid-catchment
- New land needs: new farmers (access issues, land reform), wind farms 2000-3000 ha

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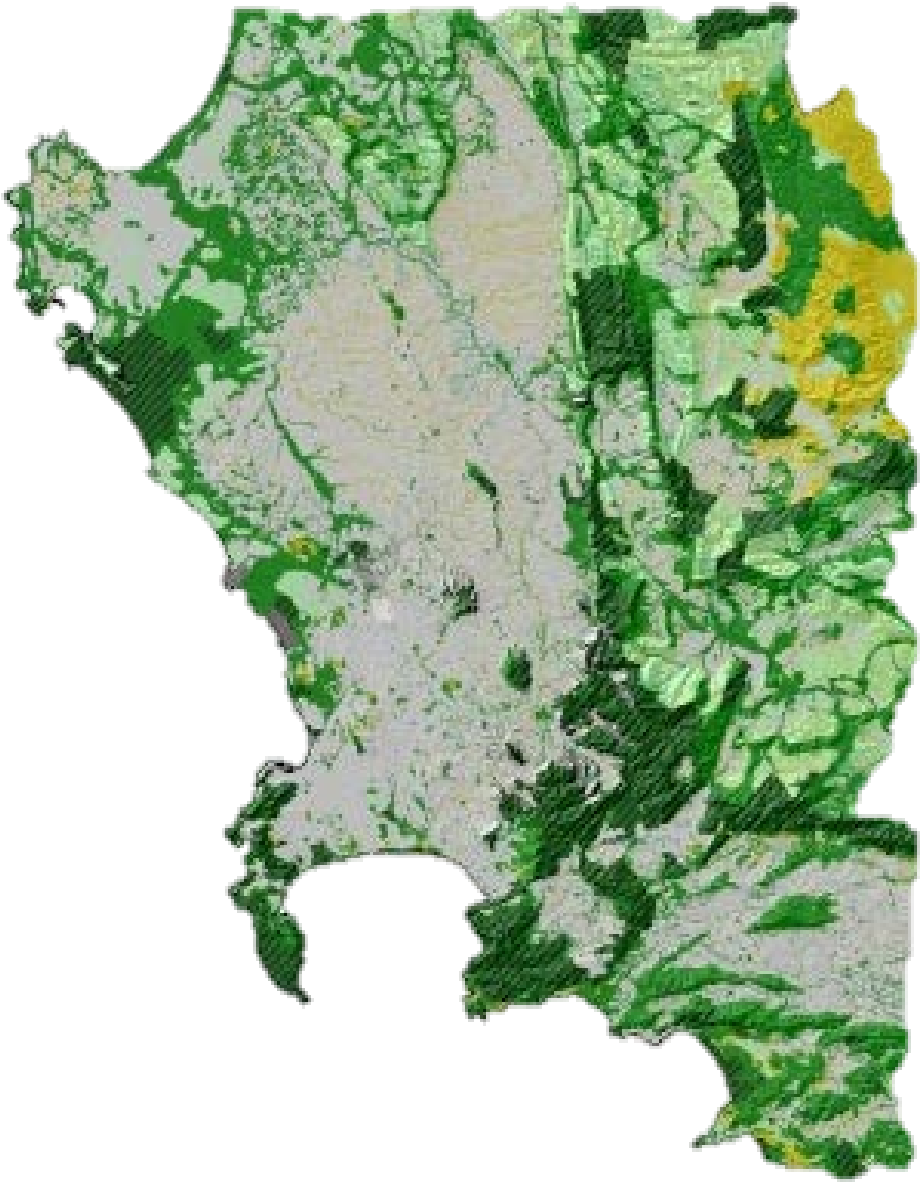
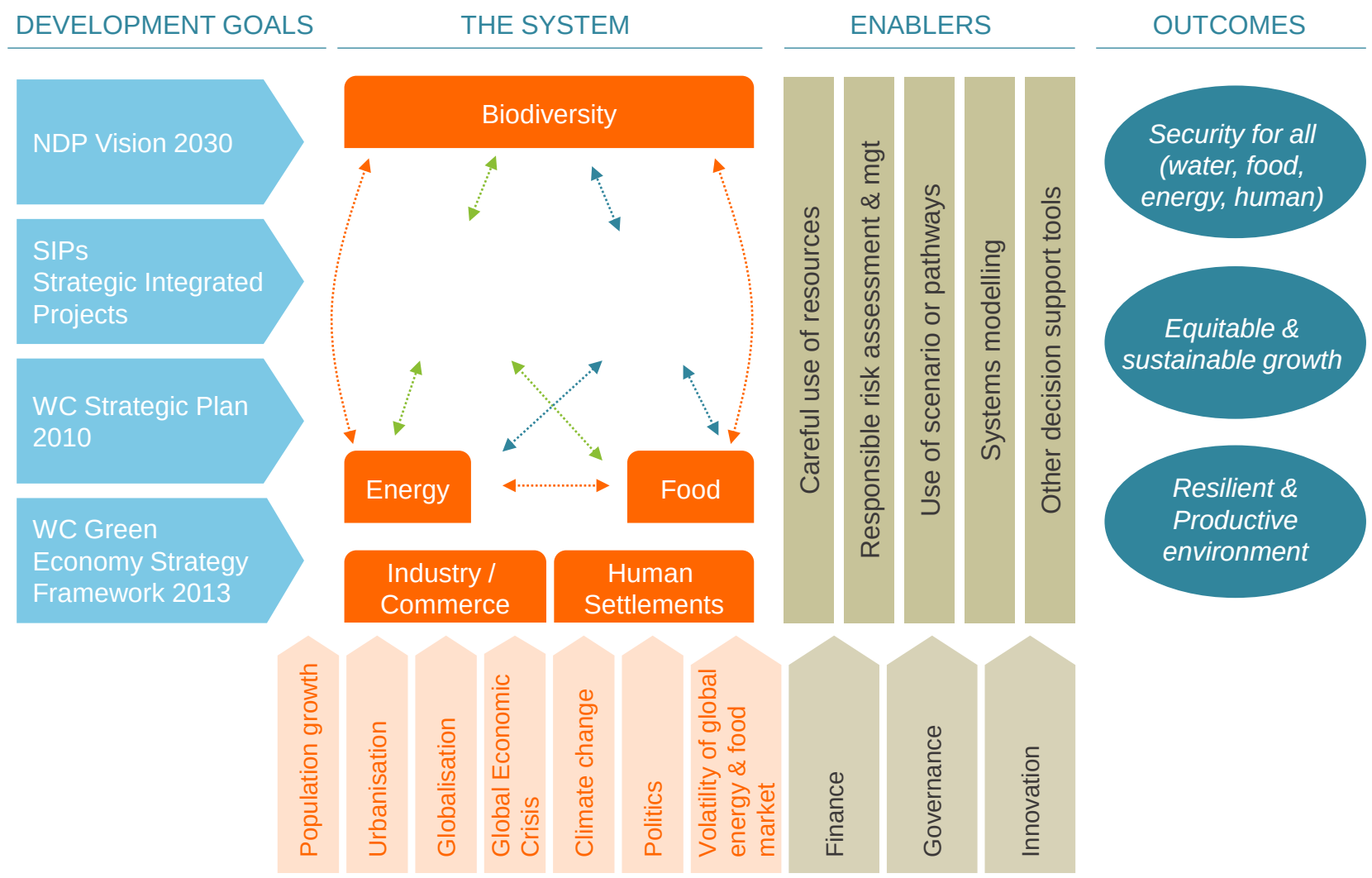
Ecosystems/Biodiversity: a key component



Protected Area
Critical Biodiversity Area (CBA)
Critical Ecological Support Area (CESA)
Ecological Support Area (ESA)
Other Natural
No Natural



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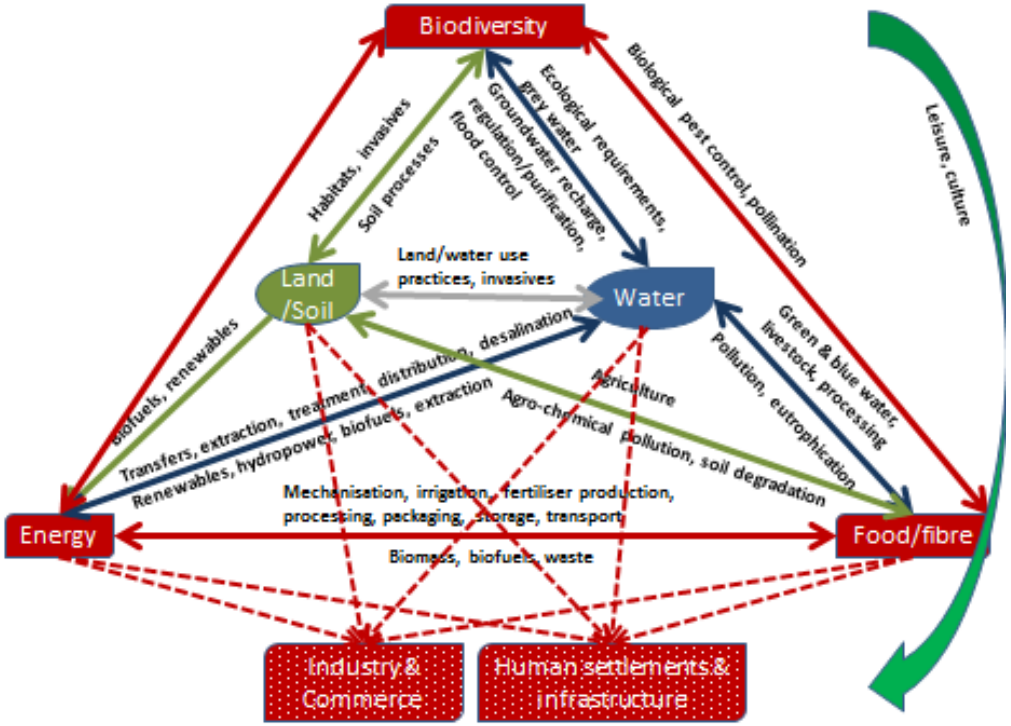
Unpacking the Nexus

Providing a localised understanding of Nexus components and their interdependencies



	Agr/F	Energy	Water	Land	Biod.
Agr/F		√√	√√√	√√√	√√
Energy	Negl.		Negl.	Negl.	Negl.
Water	XX	√		√√	√√
Land	XX	Negl.	√√		√√
Biodiversity	XX	Negl.	√√√	√√√	

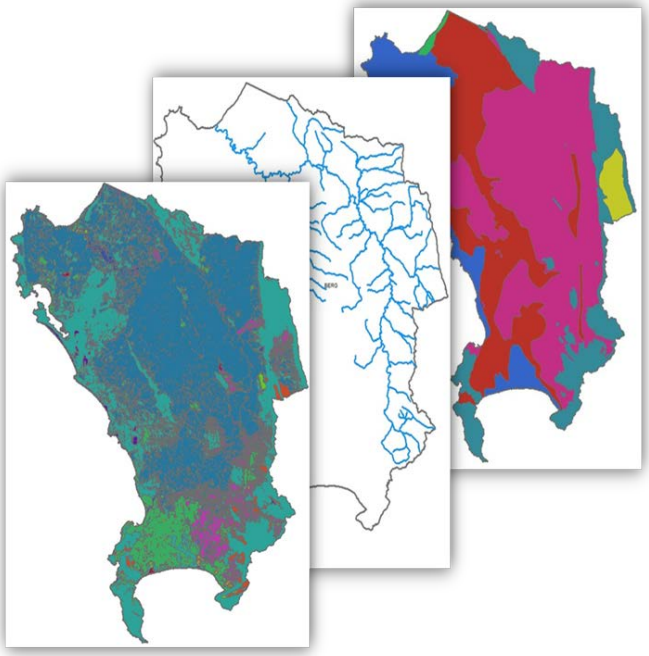
	Agr/F	Energy	Water	Land	Biod.
Agr/F		E	G	K	O
Energy	A		H	L	
Water	B	F		M	P
Land	C		I		Q
Biodiversity	D		J	N	

Status of current FEWLB Nexus interlinkages in the Berg River catchment

Opportunities for strengthened positive FEWLB Nexus interlinkages – regional/local economic development planning?

Reflections on the use of the FEWLB Nexus

- The FEWLB Nexus framework creates the necessary structure for a localised understanding of resource stocks and flows in a catchment, and their interdependencies
- In doing so the framework could become a practical tool to guide integrated local and regional economic development planning / decision making
- Need better integration of socio-economic situation
  - data issues
  - methodology



Base maps
Biophysical
Food/agric
Land
Water
Biodiversity
Energy

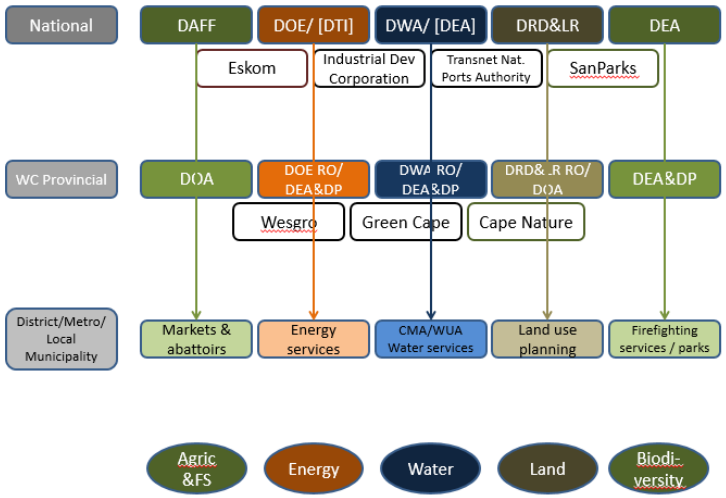
Governance challenges beyond knowledge gaps

Horizontal perspective:

- Continued dominance of a Silo approach for most sectors
- Unequal power relations across departments (Energy vs Agri.)

Vertical perspective:

- Some sectors don't have key institutions in place vital for cross-sectoral coordination and inclusive decision making
- Limited decision making power at local and catchment scale



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Opportunities to change unsustainable Nexus dynamics and to address governance challenges

Bottom up initiatives:

- *Water for agriculture*: FruitLook (DOA), water use efficiency
- *Water and land for ecosystems*: Water Stewardship (WWF), Landcare (DoA) & WfW (DEA) alien clearing and river rehabilitation
- *Energy for agriculture*: CCC (fruit & wine carbon calculator), efficiency and RE

Concerted effort:

- CC response strategy and implementation plan for the agricultural sector of the Western Cape (SmartAgri)

Saldanha Bay study: FEWLB Nexus at local scale

Future opportunities: operationalized CMA

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This is not enough!

Costs of unintended Nexus trade-offs continue to be paid by the most vulnerable communities because:

- They have limited means to influence higher levels of decision making
- They frequently lack the capacities to mediate (or take advantage of) changing nexus dynamics.

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Future Nexus work: linking the FEWLB framework to livelihoods

- New project under **the WRC Water-Energy-Food security Lighthouse**
- Title: *Exploring the Evidence of Water-Energy-Food Nexus Linkages to Sustainable Local Livelihoods and Wellbeing in South Africa*
- Tracing resource and livelihood insecurities at household level in vulnerable communities
- 2 case studies in each of 3 catchments:
  1. the Berg river catchment in the Western Cape
  2. the Fish-to-Sundays River catchment in the Eastern Cape
  3. the Umgeni river catchment in KwaZulu-Natal
- Particpatory research: Youth training & community empowerment

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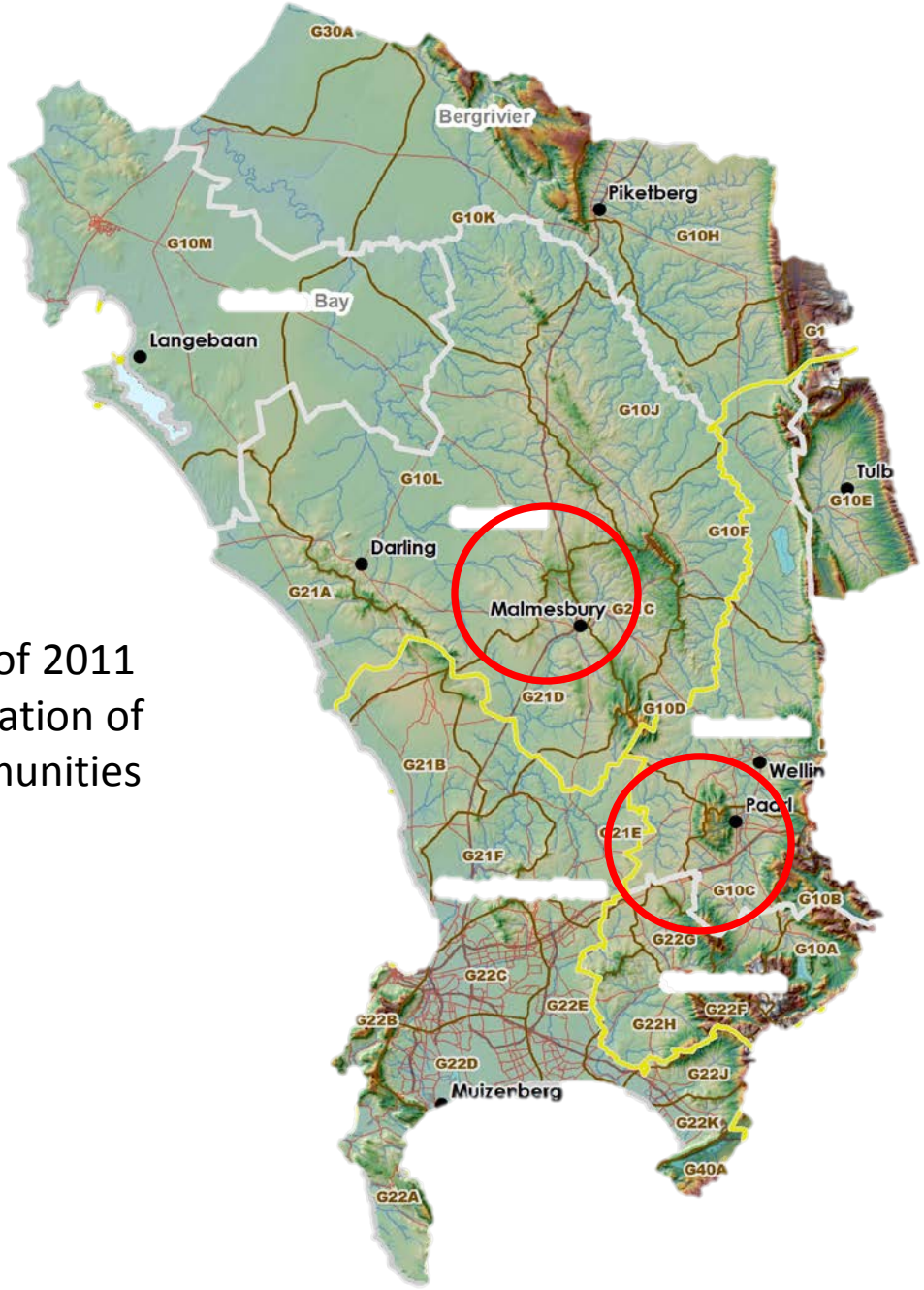
Step 1: Analysis of 2011 data for identification of vulnerable communities



Household Level:

1. **Household resource modelling** (energy, food and water use audits) **one week** per season
2. Qualitative assessment of **resource availability, affordability and use** over the **past five years**.
   - instances of resource scarcity (e.g. during drought, energy crisis, etc.)
   - general scarcity/affordability trends over the previous five years

Community level:

1. Joint exploration of **trends and bigger interacting drivers affecting household resource use and availability** over the **past five years**
2. **Joint mapping key structures and role players** that have a responsibility in the governance of the water, food and energy systems

Municipal to national level:

1. Mapping of the **multi-level institutional arrangements of NEXUS components**
   - ➔ Identify **scale(s) of key decision making processes relating to resource allocation** and extent of consideration of resource interdependencies
   - ➔ how livelihood insecurities at the local level can be traced to decision making processes at higher levels

Thank you

Household Level:	How can households change resource use to increase WEF security at household level: • Resource efficiency • Alternative resource options
Community level:	How and where can communities influence decision making over resource allocation that affects their household WEF security and livelihood opportunities
Youth Development:	How can the next generation being empowered to: • deal effectively with nexus trade-offs and • to develop alternative development pathways (sustainable/ integrated resource use and management and equitable sustainable development outcomes)