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Applying Natural Capital Accounting at the landscape scale: some early ideas and lessons from South Africa

Mandy Driver

NCA Policy Forum

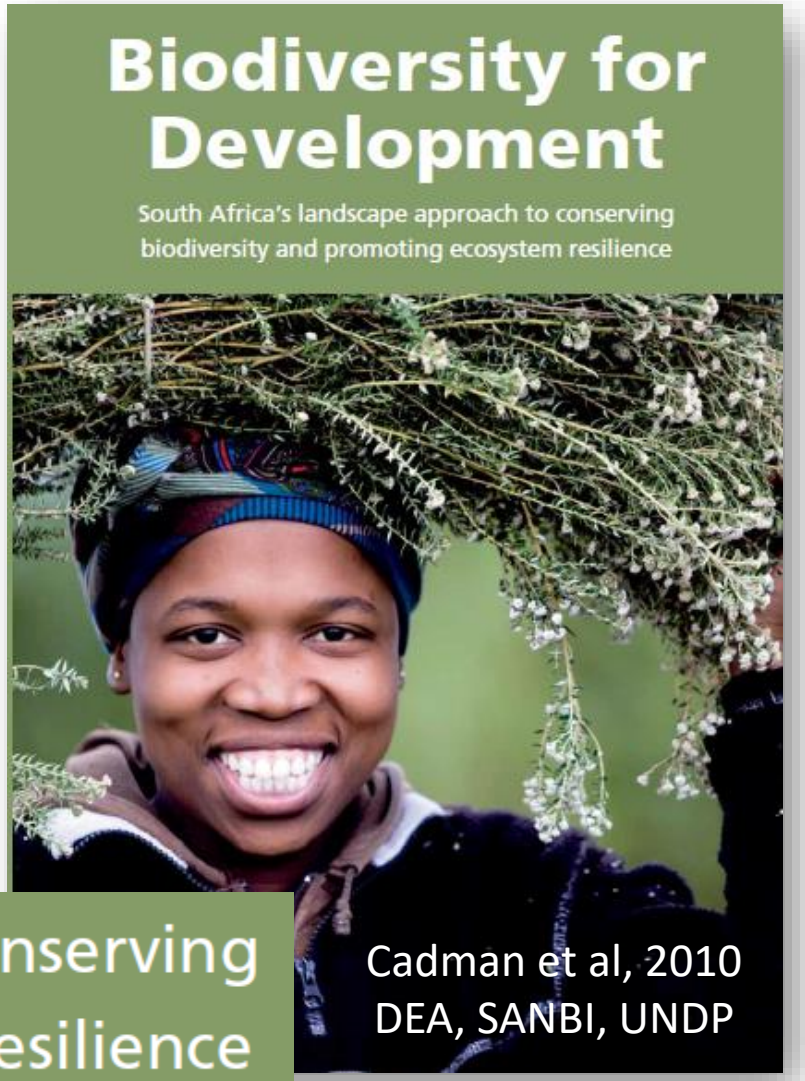
Kampala, 18 November 2019

Overview

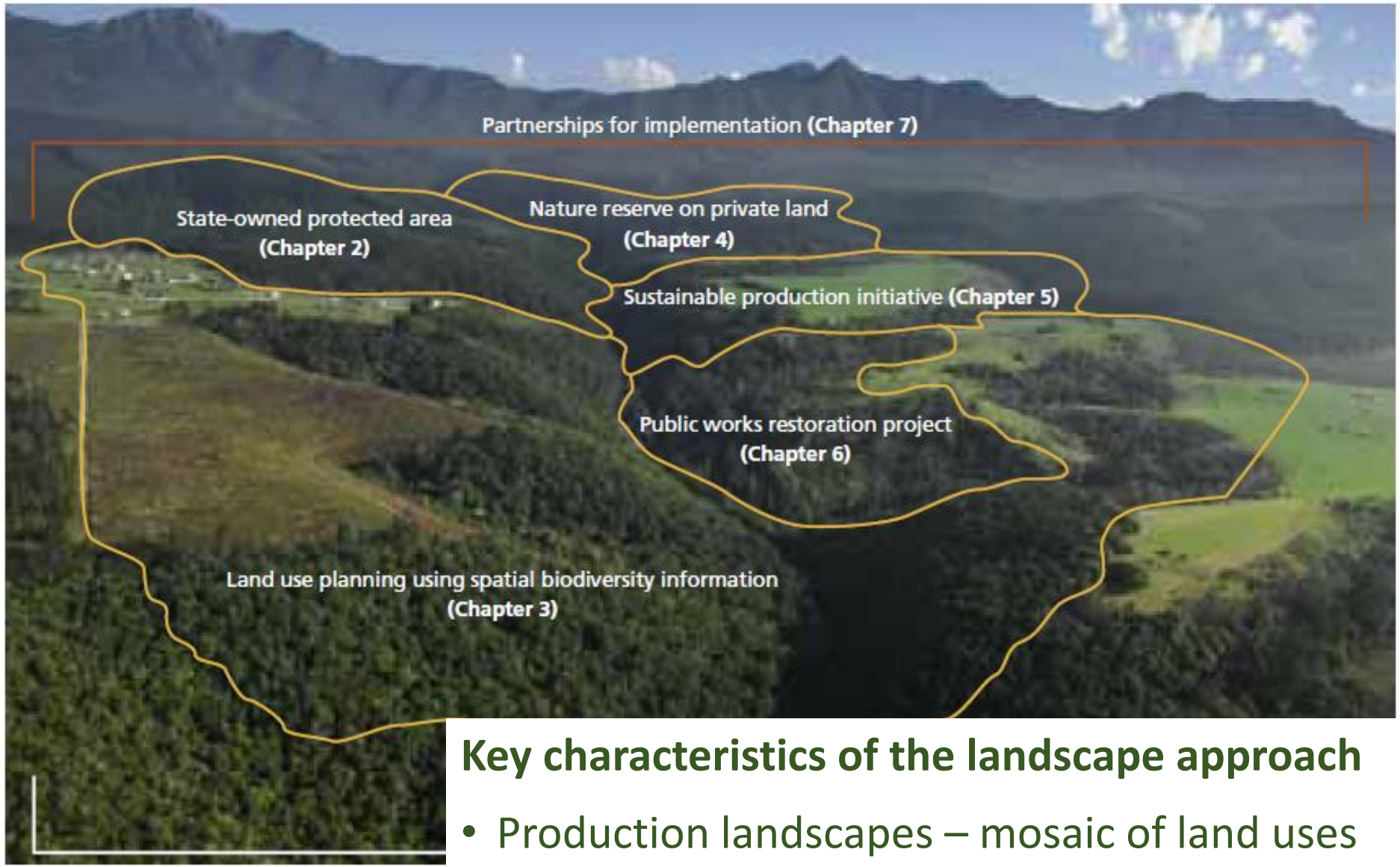
- The landscape approach in South Africa
- Applying NCA at the catchment scale
  - Ecological Infrastructure for Water Security (EI4WS) project
  - Case study: Greater uMngeni catchment
- Five emerging lessons

The landscape approach has a long history in SA

- Multi-partner landscape-scale initiatives since early 2000s
- Global Environment Facility (GEF) funding has played a key role
  - CAPE (GEF 3), Grasslands Programme (GEF 4), Biodiversity & Land Use Project (GEF 5)
  - All have included landscape or catchment initiatives in some form
- Approach captured in *Biodiversity for Development* book

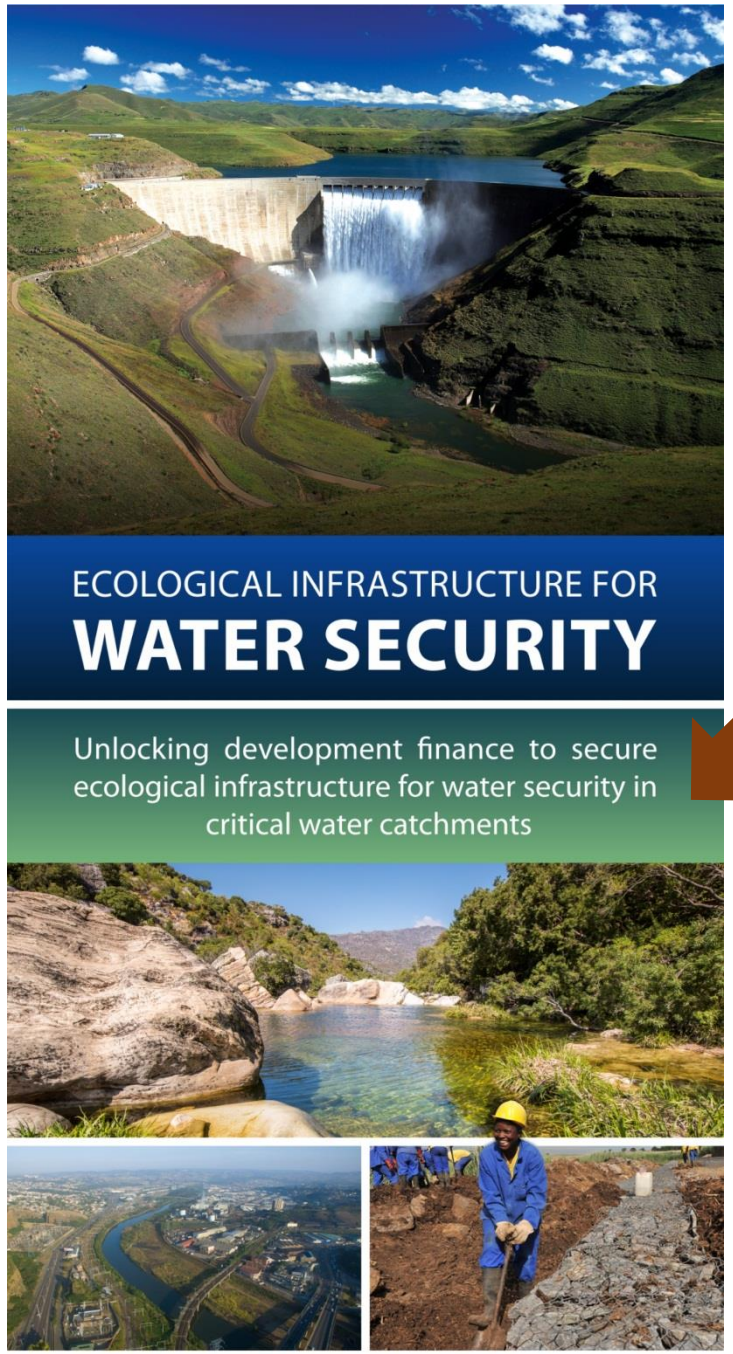


South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience



Key characteristics of the landscape approach

- Production landscapes – mosaic of land uses
- Multiple partners across government, civil society and private sector
- Critical role of champions and communities of practice



GEF 6
Ecological Infrastructure for Water Security (EI4WS) project (2018 – 2022)

- Includes a component on **natural capital accounting**
- Includes work in two **demonstration catchments**

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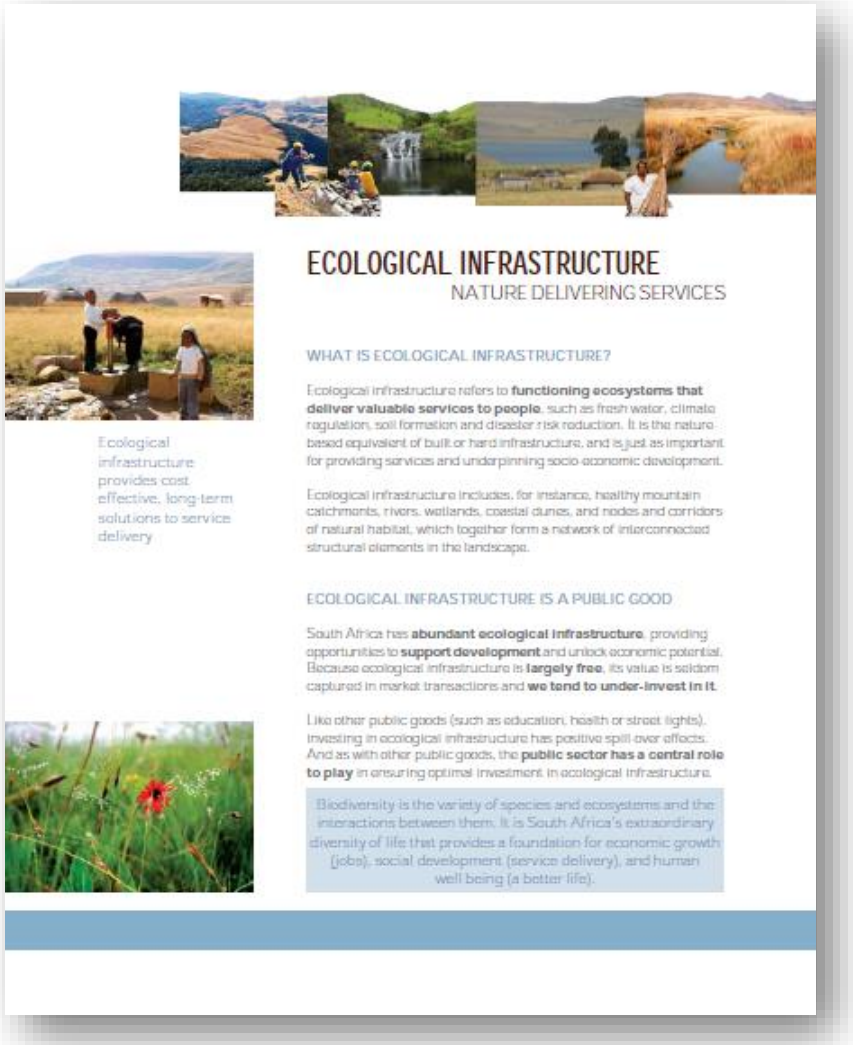
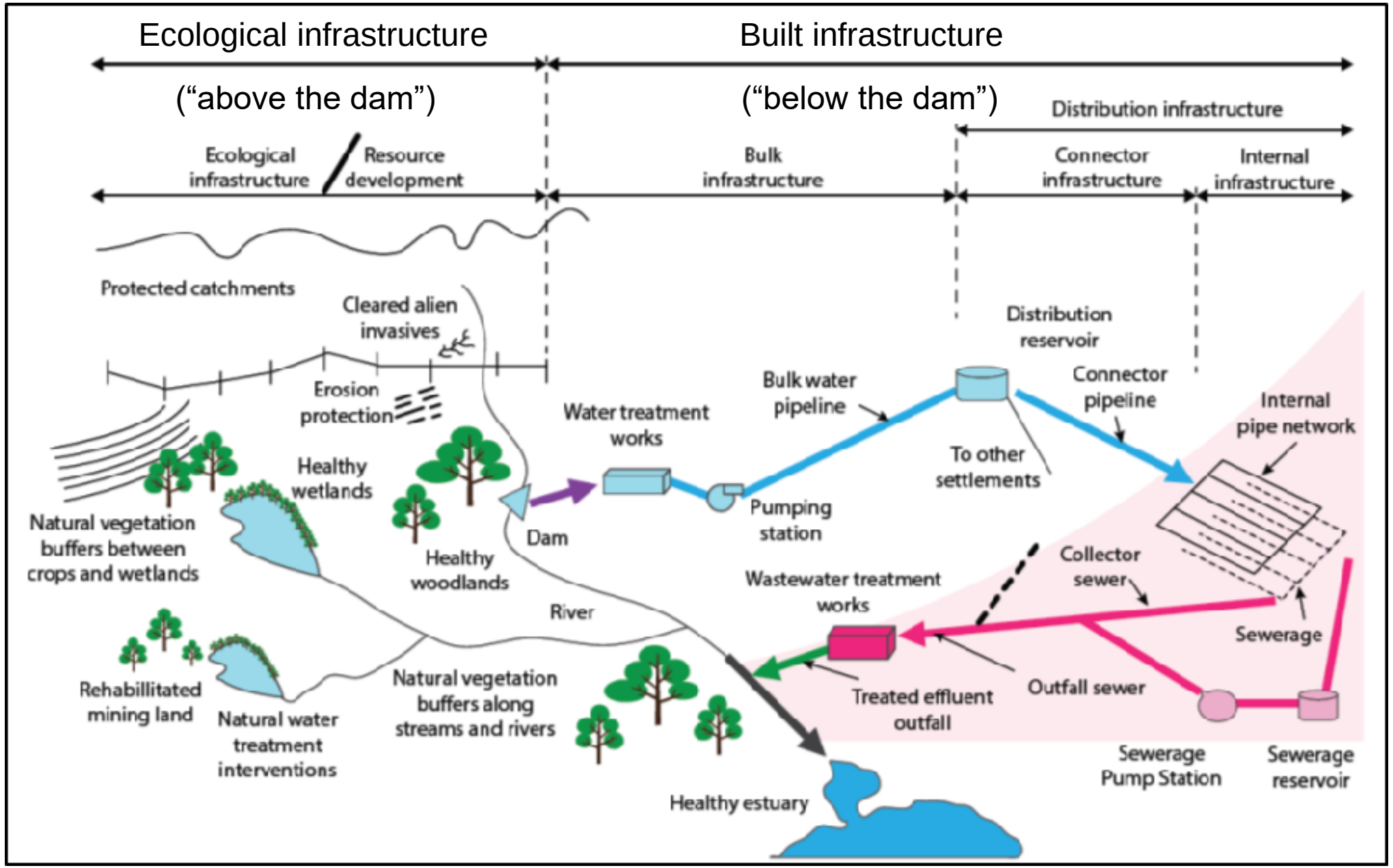
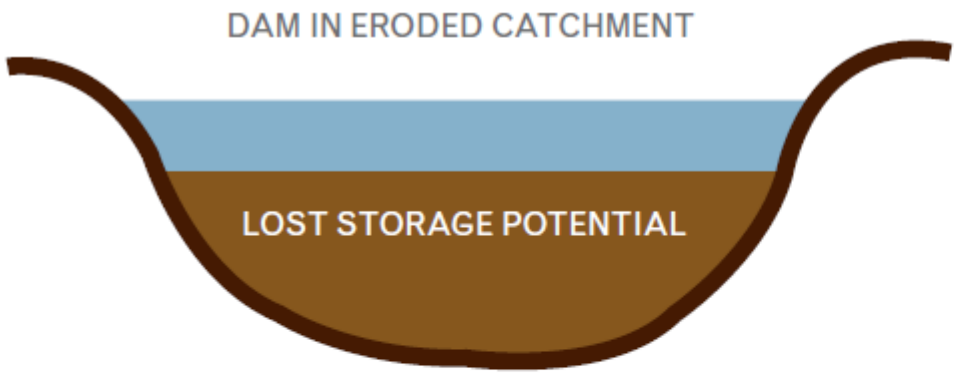
What is ecological infrastructure?

- **Naturally functioning ecosystems** that deliver valuable services to people
  - Narrower concept than “green infrastructure”
- Nature’s equivalent of built infrastructure
- Focus is on the **underlying asset**
- **Several services** can flow from one piece of ecological infrastructure

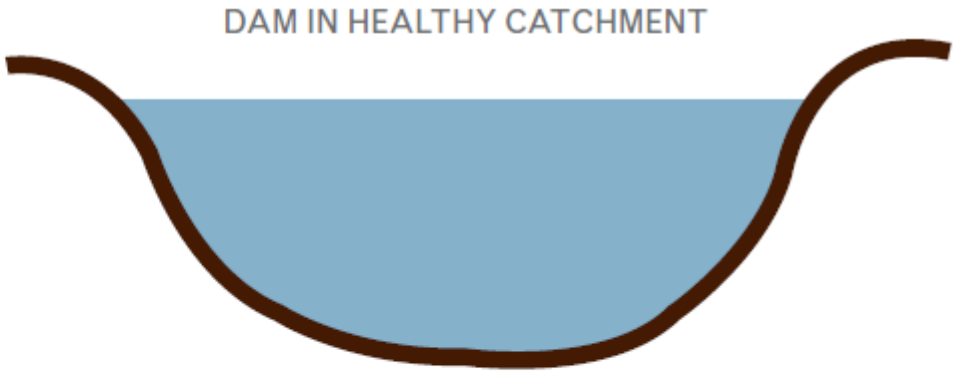


Ecological infrastructure supports and enhances built infrastructure





Degraded ecological infrastructure leads to reduced capacity and lifespan of dames, and increased maintenance costs



Healthy ecological infrastructure such as intact rivers, wetlands and natural vegetation enhances investment in built infrastructure

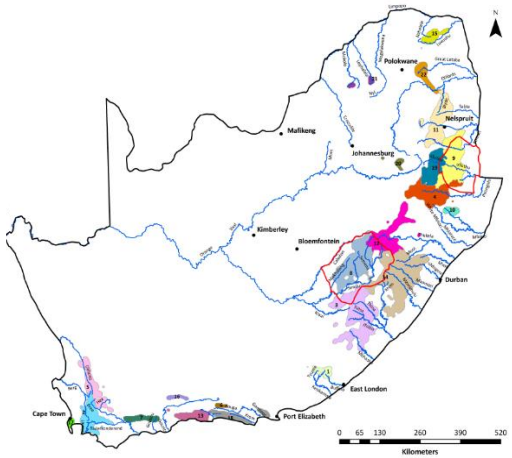
The concept of ecological infrastructure has gained a lot of policy traction in South Africa

Investing in ecological infrastructure is a **cost effective development strategy** that can **deliver multiple benefits**, including water security, food security, disaster risk reduction, climate change adaptation, job creation, rural development

Accounts to be produced in Ecological Infrastructure for Water Security (EI4WS) project

National

Accounts for **Strategic Water Source Areas –** the 10% of land that delivers 50% of water



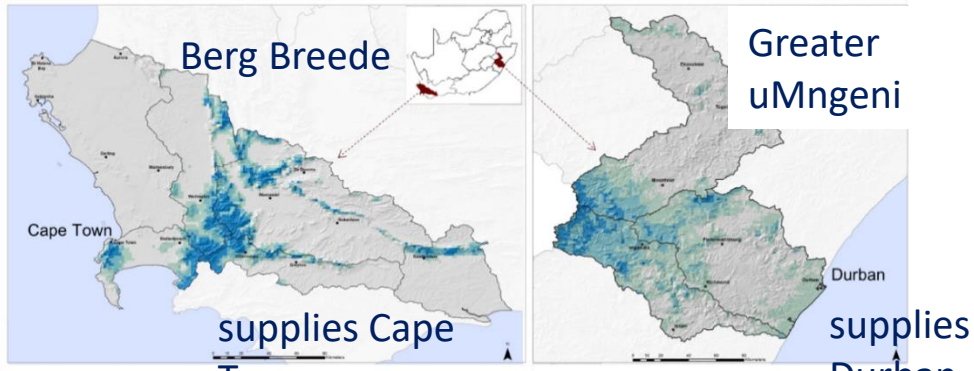
Specifically aimed to support policy and decision making throughout the **water value chain**

→ Accounts can enable analysis of **return on investment** in water-related ecological infrastructure

Sub-national

Demo catchments:

- Catchment-level **water resource** accounts
- Accounts for **ecological infrastructure assets**



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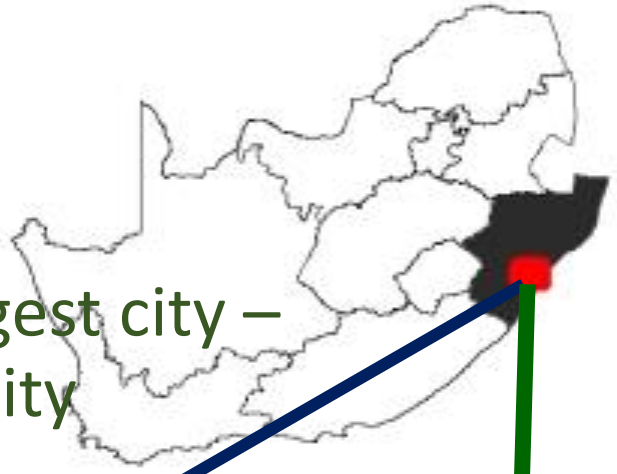
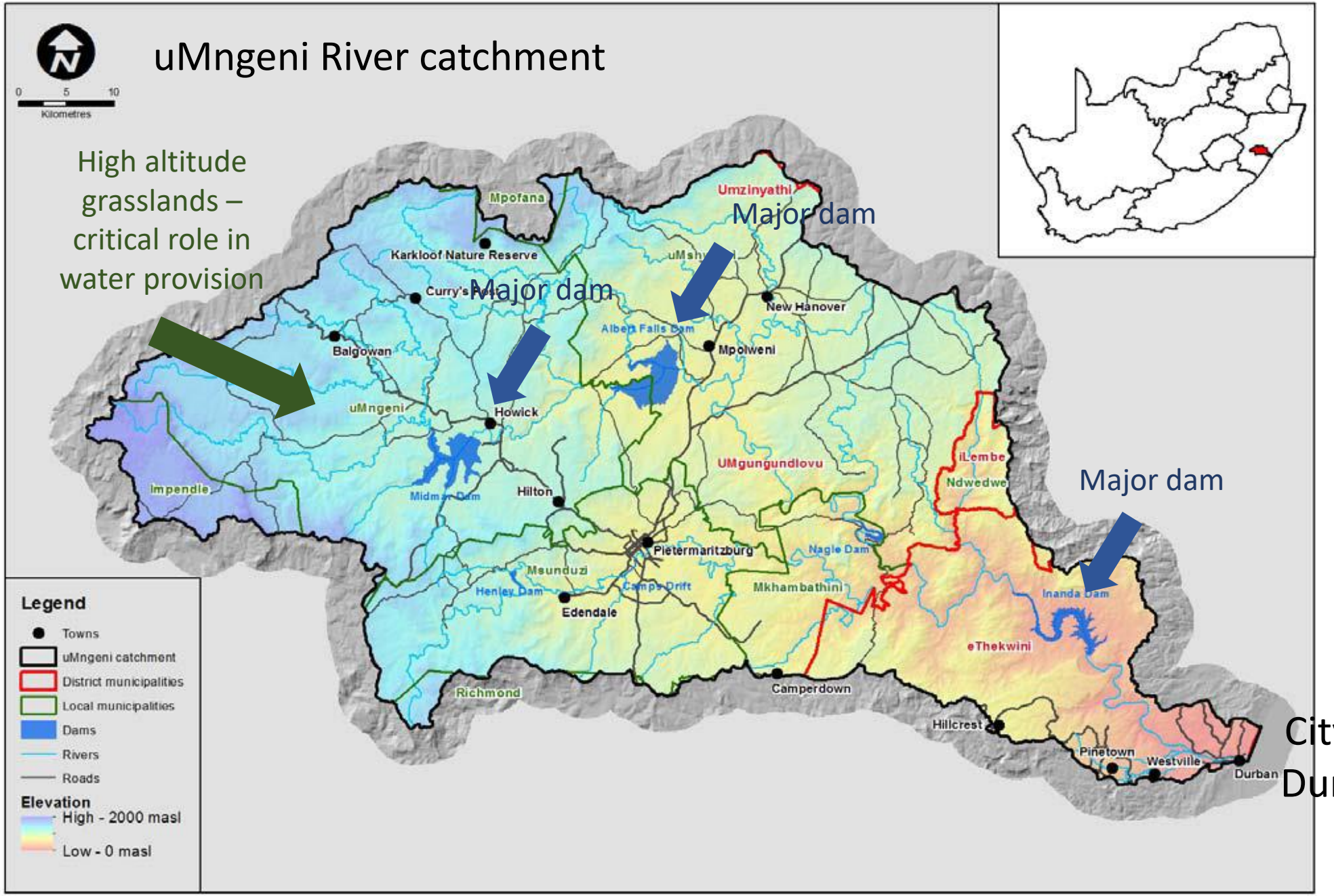
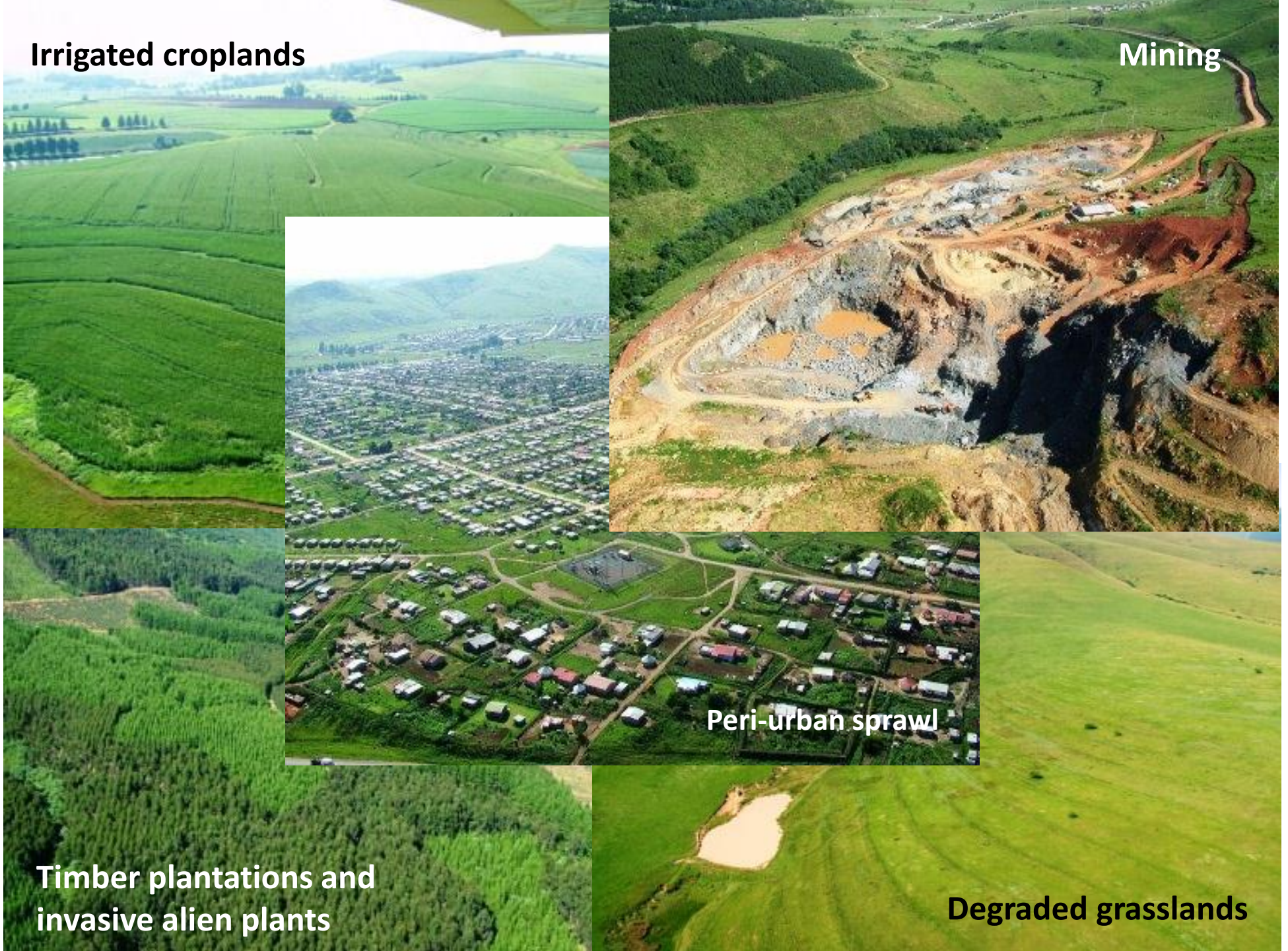
uMngeni catchment

- Supplies water to city of Durban: SA's 3rd largest city – major challenges with water quality & quantity
- Engineers have run out of conventional engineering solutions




uMngeni River catchment
0 5 10
Kilometres
High altitude grasslands – critical role in water provision
Major dam
Major dam
Major dam
City of Durban
Mpofana
Umzinyathi
Karkloof Nature Reserve
Curry's Post
New Hanover
Albert Falls Dam
Mpolweni
Balgowan
uMngeni
Howick
Impendle
Midmar Dam
Hilton
UMgungundlovu
iLembe
Ndwedwe
Pietermaritzburg
Nagle Dam
Msunduzi
Henley Dam
Camps Drift
Mkhambathini
Edendale
Inanda Dam
eThekwini
Richmond
Camperdown
Hillcrest
Pinetown
Westville
Durban
Legend
Towns
uMngeni catchment
District municipalities
Local municipalities
Dams
Rivers
Roads
Elevation
High - 2000 masl
Low - 0 masl


Irrigated croplands
Mining
Peri-urban sprawl
Timber plantations and
invasive alien plants
Degraded grasslands

uMngeni Ecological Infrastructure Partnership (UEIP)

- Formed in 2013
  - More than 20 signatories, including Durban Metro, Umgeni Water, local municipalities, private companies (especially forestry), depts of water and agriculture, conservation authorities, SANBI, NGOs
- Focus on water security for Durban through investing in maintaining and restoring ecological infrastructure in greater uMngeni catchment
- Including through strengthening institutional arrangements and knowledge
- Many co-benefits (e.g. disaster risk reduction, climate change adaptation)

How is NCA being applied in the uMngeni catchment?

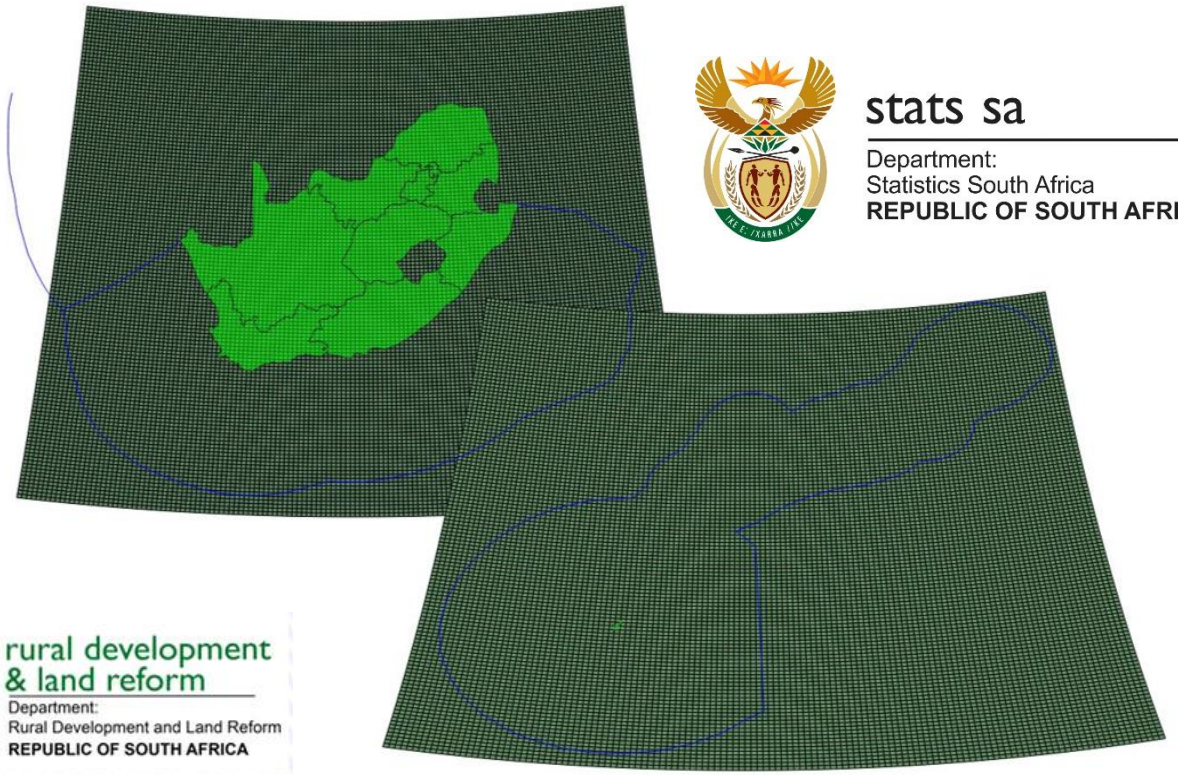
- A step back up to NCA work at the national level….

Natural Capital Accounting & Valuation of Ecosystem Services (NCA&VES) project

Five pilot countries: Brazil, China, India, Mexico, **South Africa**

Newly in place: Basic Spatial Unit for NCA

BSU 1 (728 million 1 ha cells):
South Africa + EEZ + Transboundary basins



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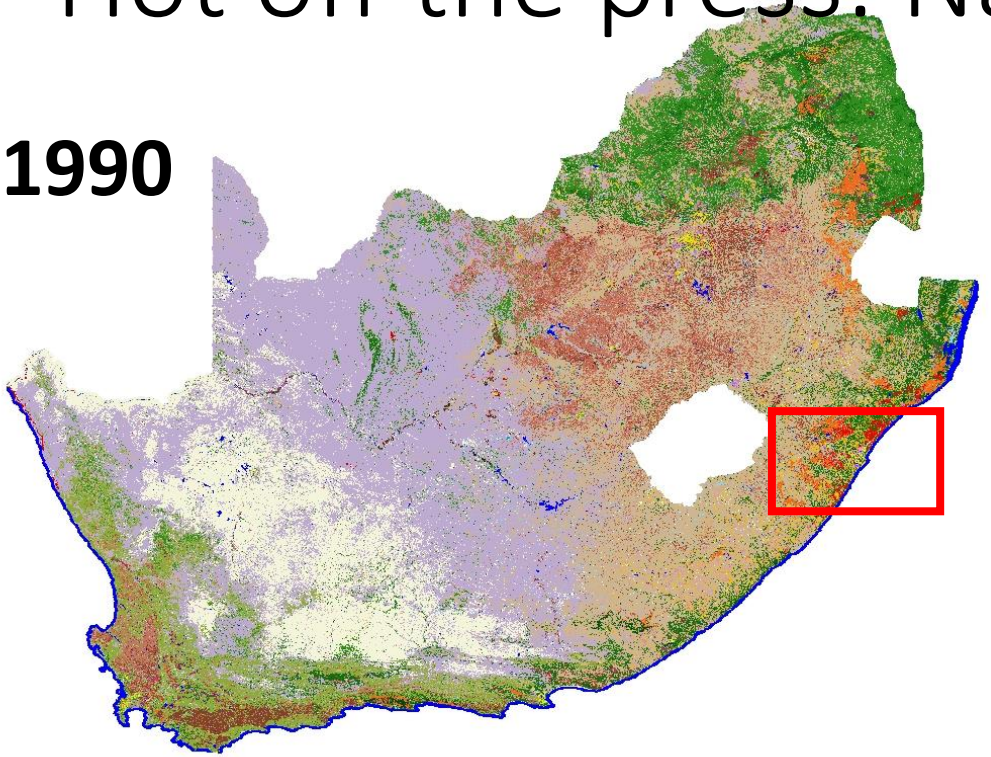
MAPPING OUR NATION

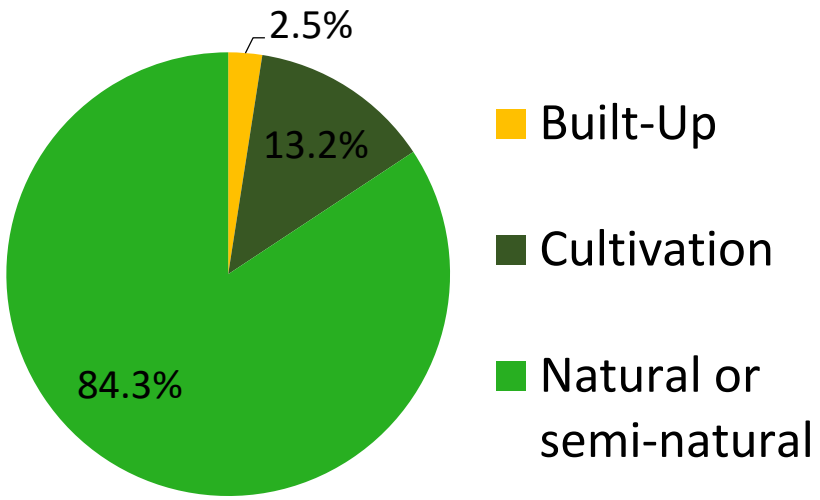
BSU 2 (624 million 1 ha cells):
South Africa's Prince Edward Islands + EEZ

- Finalised June 2019
- 1 hectare grid
- Covers entire SA territory and EEZ
- Fixed point of origin, registered projection
- Any ecological, social or economic dataset can be linked to this grid
- Formal process for Stats SA custodianship as a strategic national dataset underway

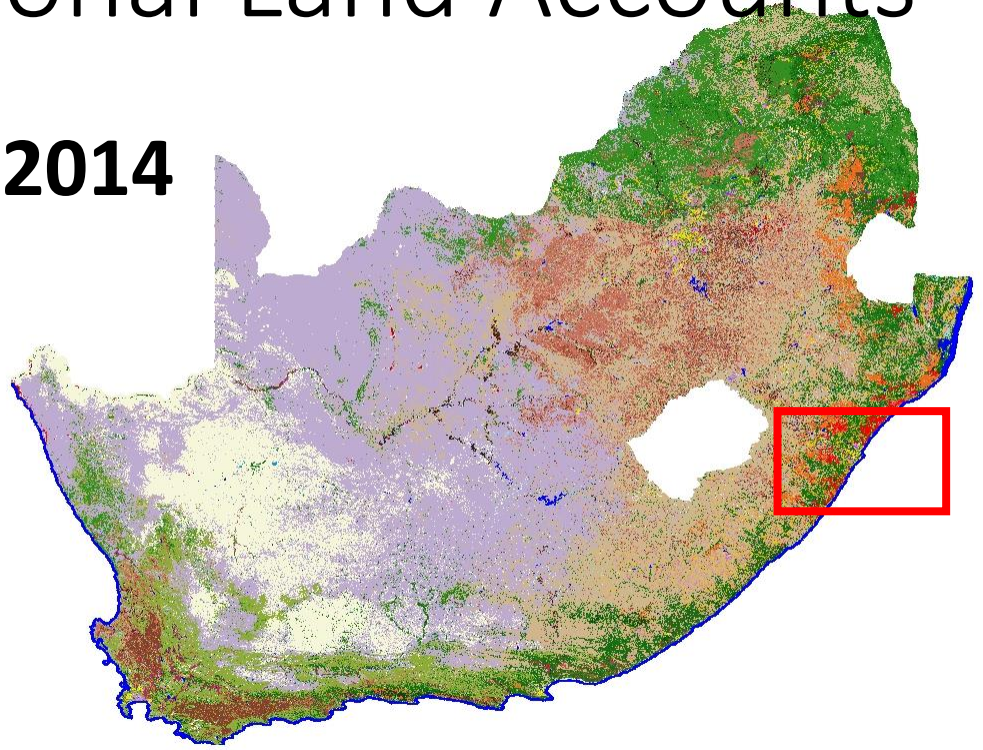
Hot off the press: National Land Accounts

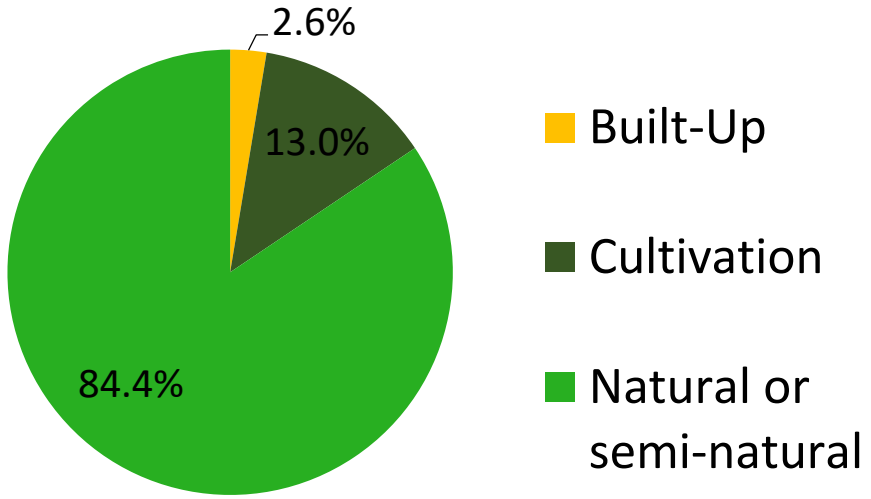
1990





2014





National Land Cover datasets for 1990 and 2014:

72 classes

30m, resampled to 100m BSU

Row	Color	Class_Names
0		
1		Water seasonal
2		Water permanent
3		Wetlands
4		Indigenous Forest
5		Thicket /Dense bush
6		Woodlan/Open bush
7		Grassland
8		Shrubland fynbos
9		Low shrubland
10		Cultivated comm fields (high)
11		Cultivated comm fields (med)
12		Cultivated comm fields (low)
13		Cultivated comm pivots (high)
14		Cultivated comm pivots (med)
15		Cultivated comm pivots (low)
16		Cultivated orchards (high)
17		Cultivated orchards (med)
18		Cultivated orchards (low)
19		Cultivated vines (high)
20		Cultivated vines (med)
21		Cultivated vines (low)
22		Cultivated permanent pineapple
23		Cultivated subsistence (high)
24		Cultivated subsistence (med)
25		Cultivated subsistence (low)

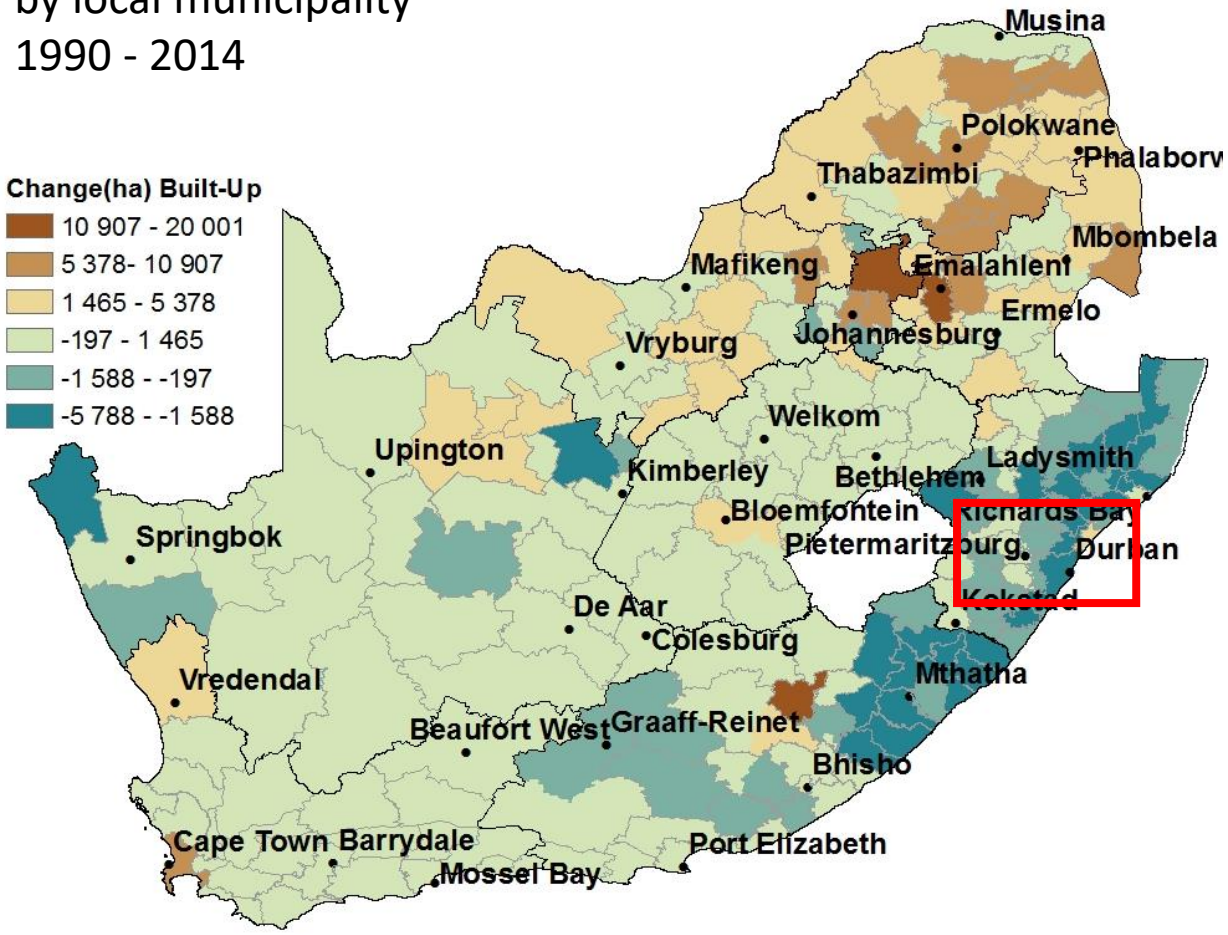
26		Cultivated cane pivot - crop
27		Cultivated cane pivot - fallow
28		Cultivated cane commercial - crop
29		Cultivated cane commercial - fallow
30		Cultivated cane emerging - crop
31		Cultivated cane emerging - fallow
32		Plantations / Woodlots mature
33		Plantation / Woodlots young
34		Plantation / Woodlots clearfelled
35		Mines 1 bare
36		Mines 2 semi-bare
37		Mines water seasonal
38		Mines water permanent
39		Mine buildings
40		Erosion (donga)
41		Bare none vegetated
42		Urban commercial
43		Urban industrial
44		Urban informal (dense trees / bush)
45		Urban informal (open trees / bush)
46		Urban informal (low veg / grass)
47		Urban informal (bare)
48		Urban residential (dense trees / bush)
49		Urban residential (open trees / bush)
50		Urban residential (low veg / grass)
51		Urban residential (bare)
52		Urban school and sports ground

53		Urban smallholding (dense trees / bush)
54		Urban smallholding (open trees / bush)
55		Urban smallholding (low veg / grass)
56		Urban smallholding (bare)
57		Urban sports and golf (dense tree / bush)
58		Urban sports and golf (open tree / bush)
59		Urban sports and golf (low veg / grass)
60		Urban sports and golf (bare)
61		Urban township (dense trees / bush)
62		Urban township (open trees / bush)
63		Urban township (low veg / grass)
64		Urban township (bare)
65		Urban village (dense trees / bush)
66		Urban village (open trees / bush)
67		Urban village (low veg / grass)
68		Urban village (bare)
69		Urban built-up (dense trees / bush)
70		Urban built-up (open trees / bush)
71		Urban built-up (low veg / grass)
72		Urban built-up (bare)

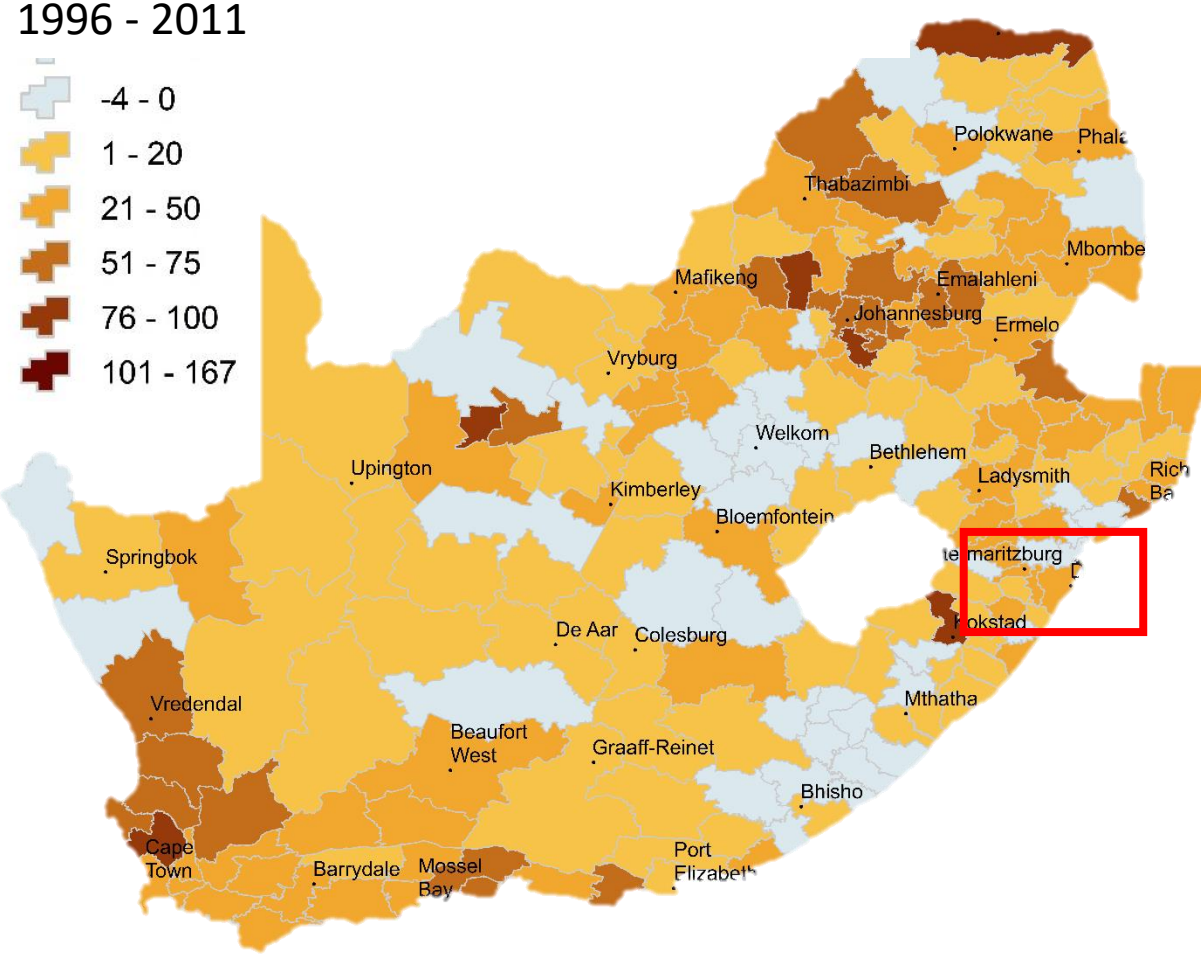
How does land cover change relate to changes in population?

Census data also being linked to BSU layer to enable analysis

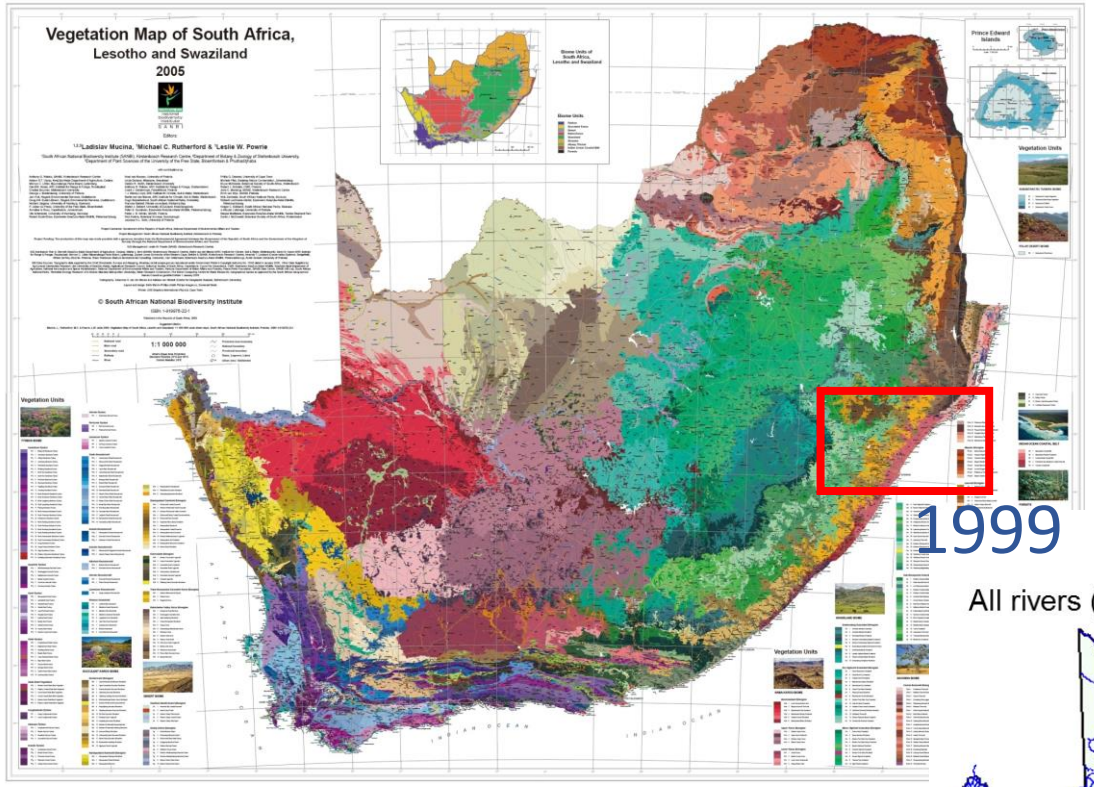
Change in built-up area (ha)
by local municipality
1990 - 2014



% change in population by local municipality
1996 - 2011



National **ecosystem asset accounts**: extent and condition

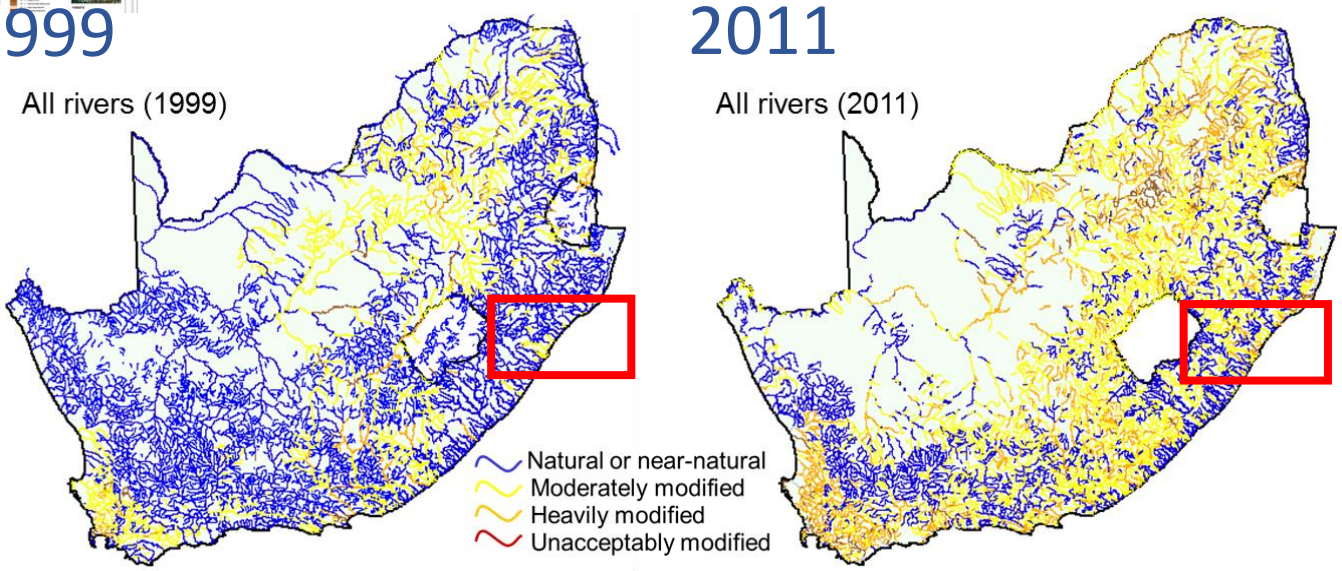


For terrestrial ecosystems
(vegetation types)

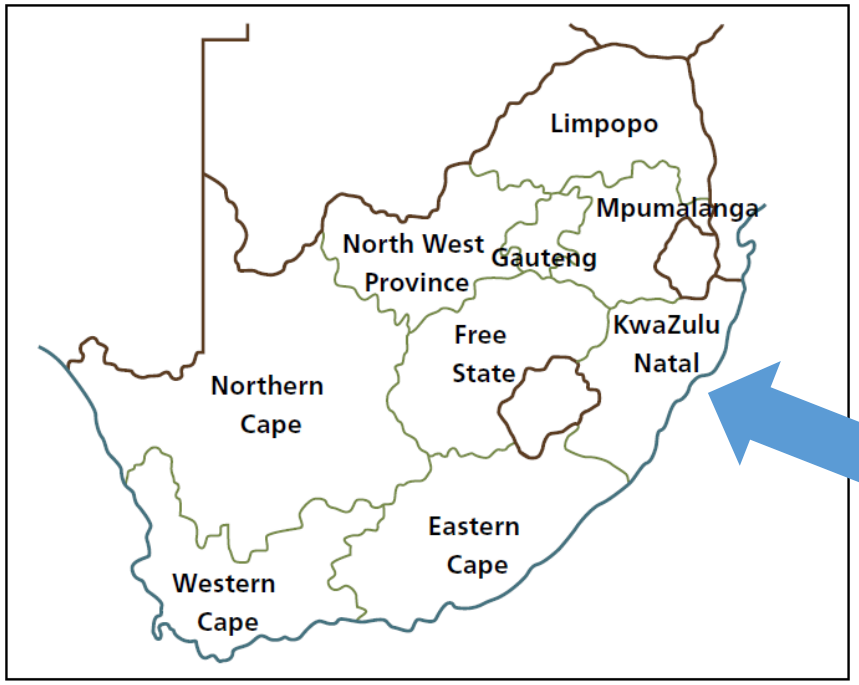
For river ecosystems
(quaternary river reaches)

1999

2011



NCA&VES project: Pilot ecosystem service accounts for KZN province



Broad category	Ecosystem service
Provisioning services	Harvested wild biomass
	Reared animal production
	Cultivated production
Cultural services	Experiential value associated with active or passive use
Regulating services	Sediment retention
	Water quality amelioration
	Seasonal flow regulation
	Carbon sequestration

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United Nations

UN environment

System of Environmental Economic Accounting

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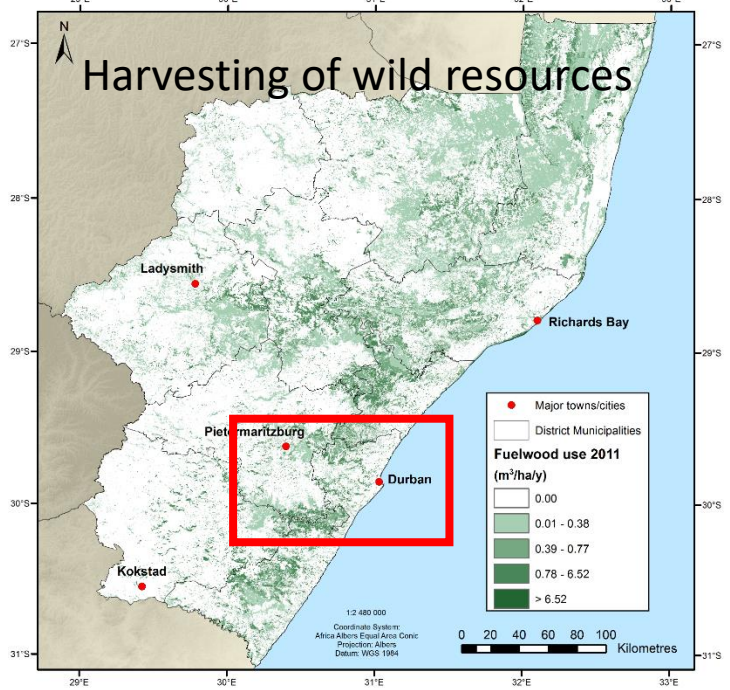
ANCHOR environmental research & monitoring

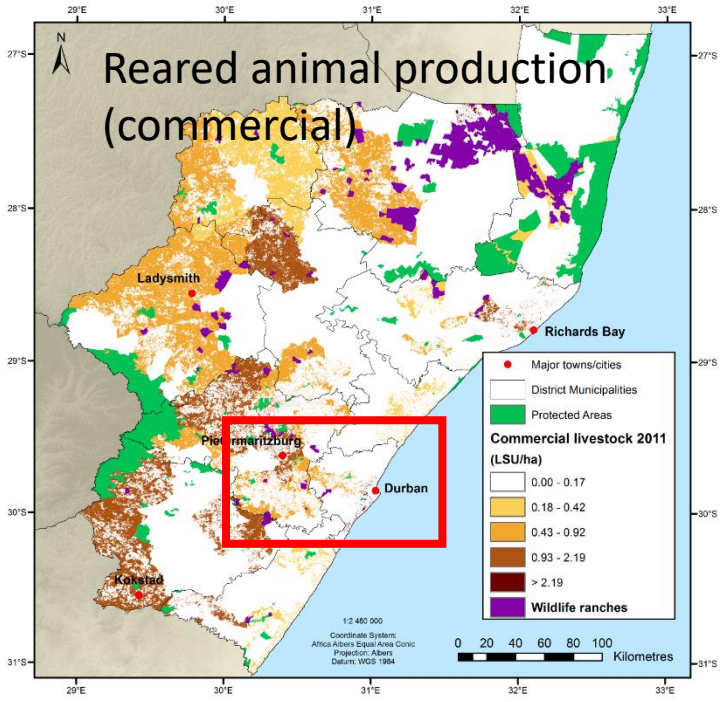
NCA&VES project: Pilot ecosystem service accounts for KZN province (physical and monetary)

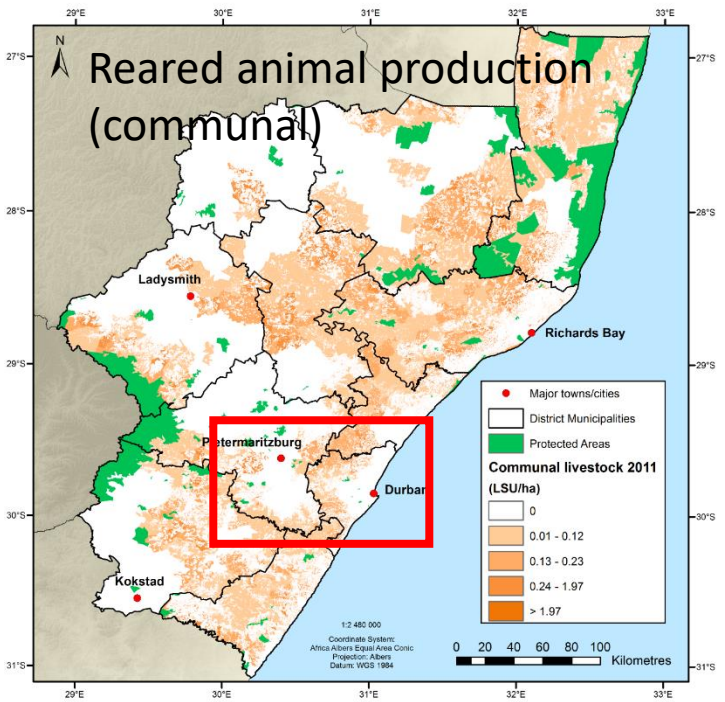
Led by Jane Turpie

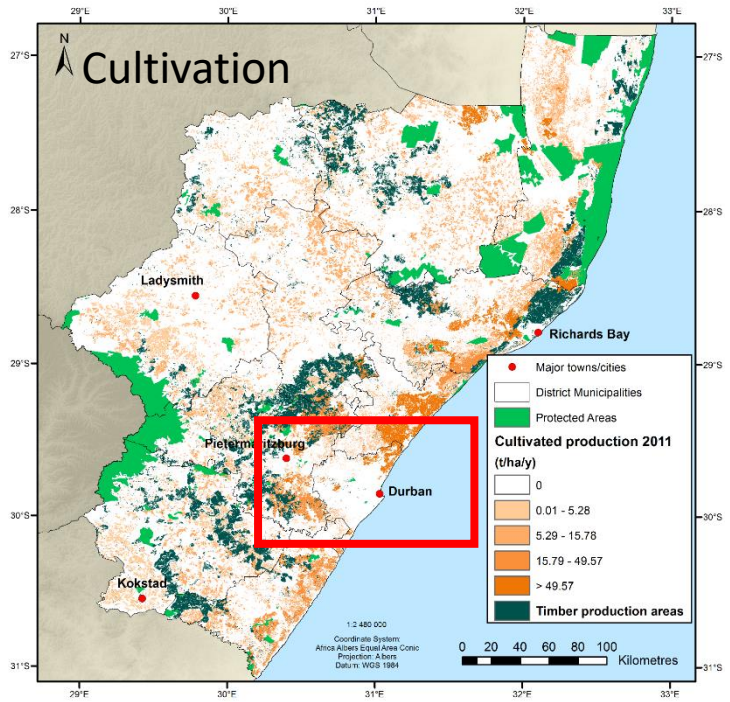
ANCHOR environmental research & monitoring

Some initial results…









EI4WS project: Catchment-level water resource accounts

- **Using WA+ framework**
- **Hydrological modelling approach**
- **Strong land cover/use focus**
  - Hierarchy of land cover/use classes, 1ha BSU grid

Led by David Clark

Centre for Water Resources Research

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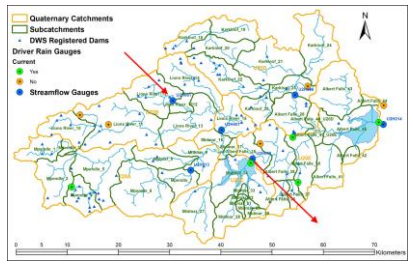
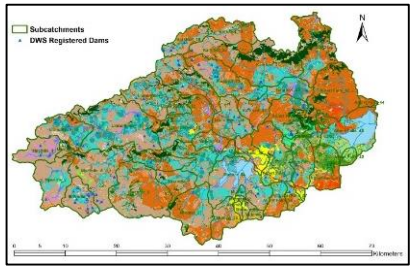
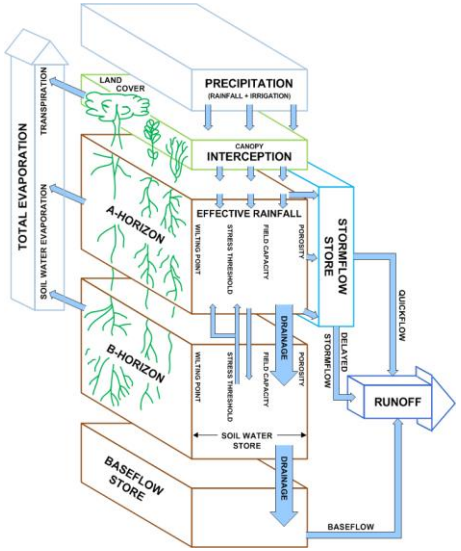
Data

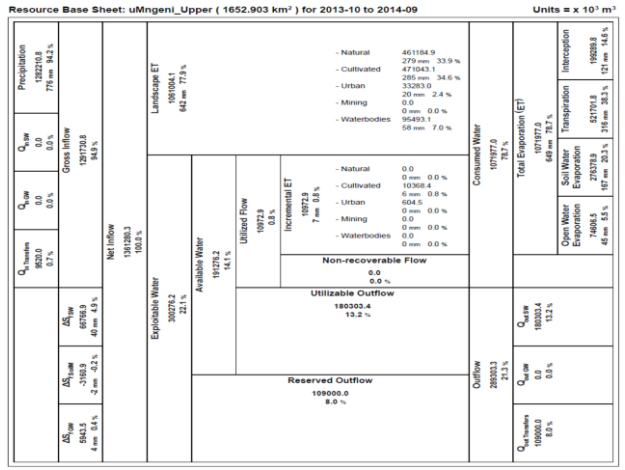




Modelling

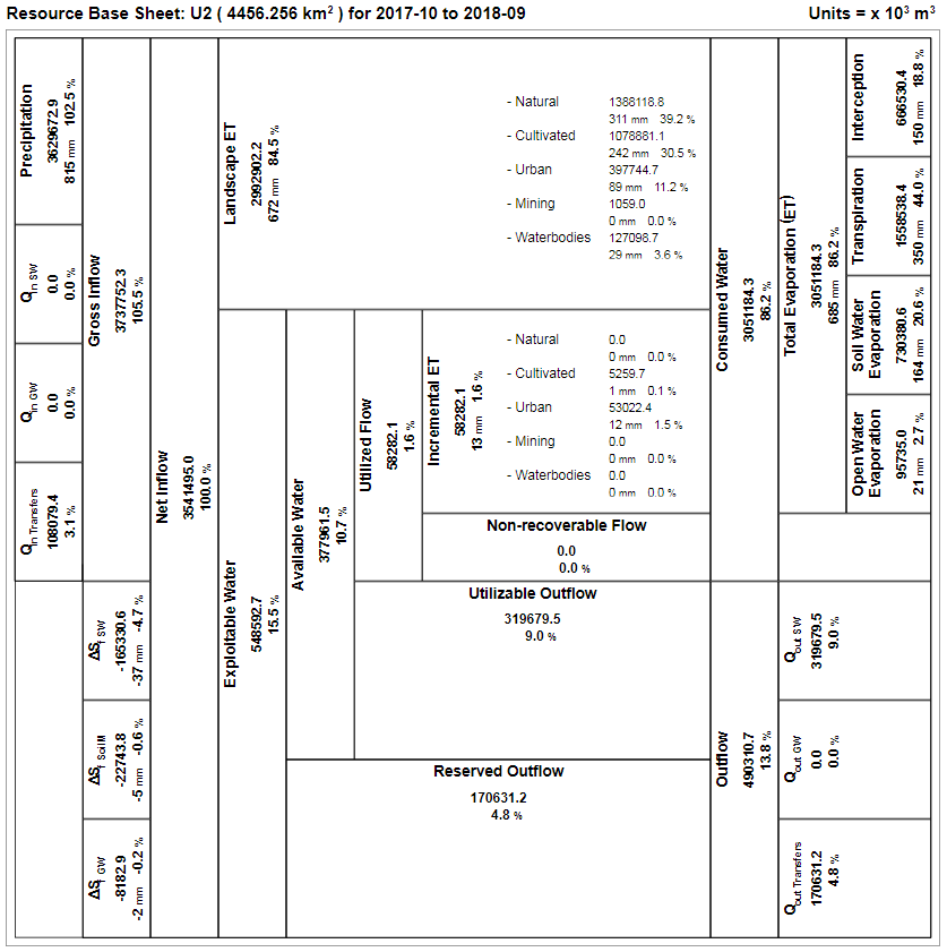


Accounts

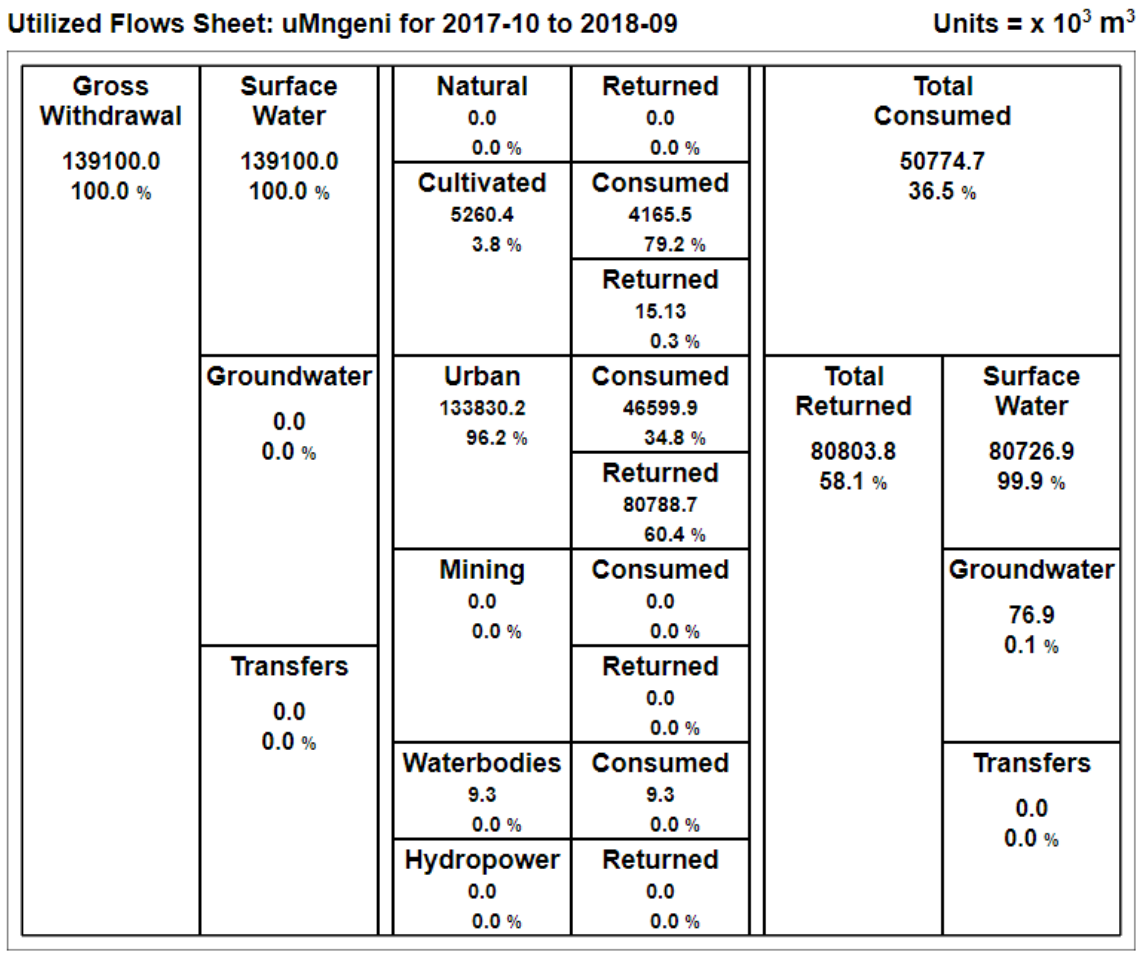


Water resource accounting outputs

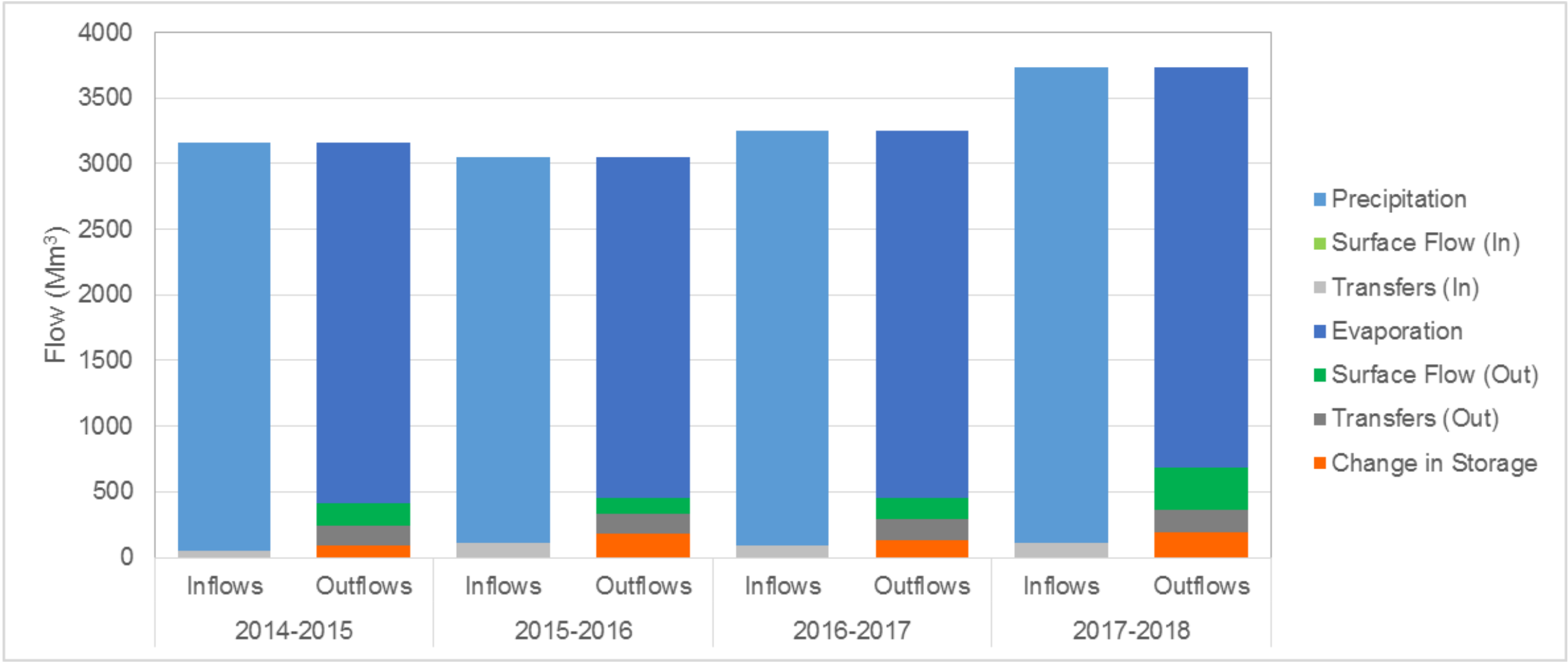
Resource base sheet



Utilised flows sheet

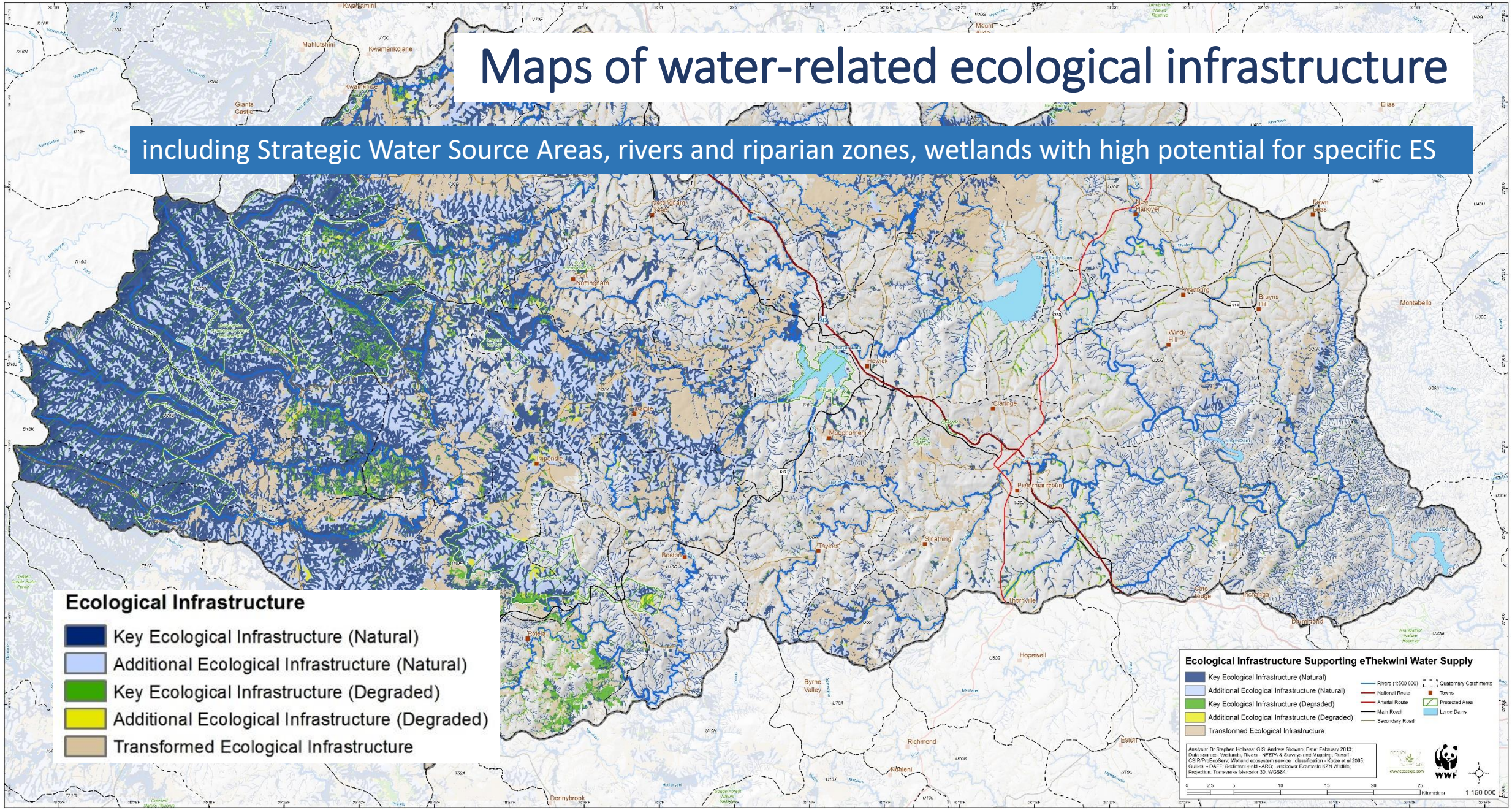


Time series water resource accounts: Example for the uMngeni catchment

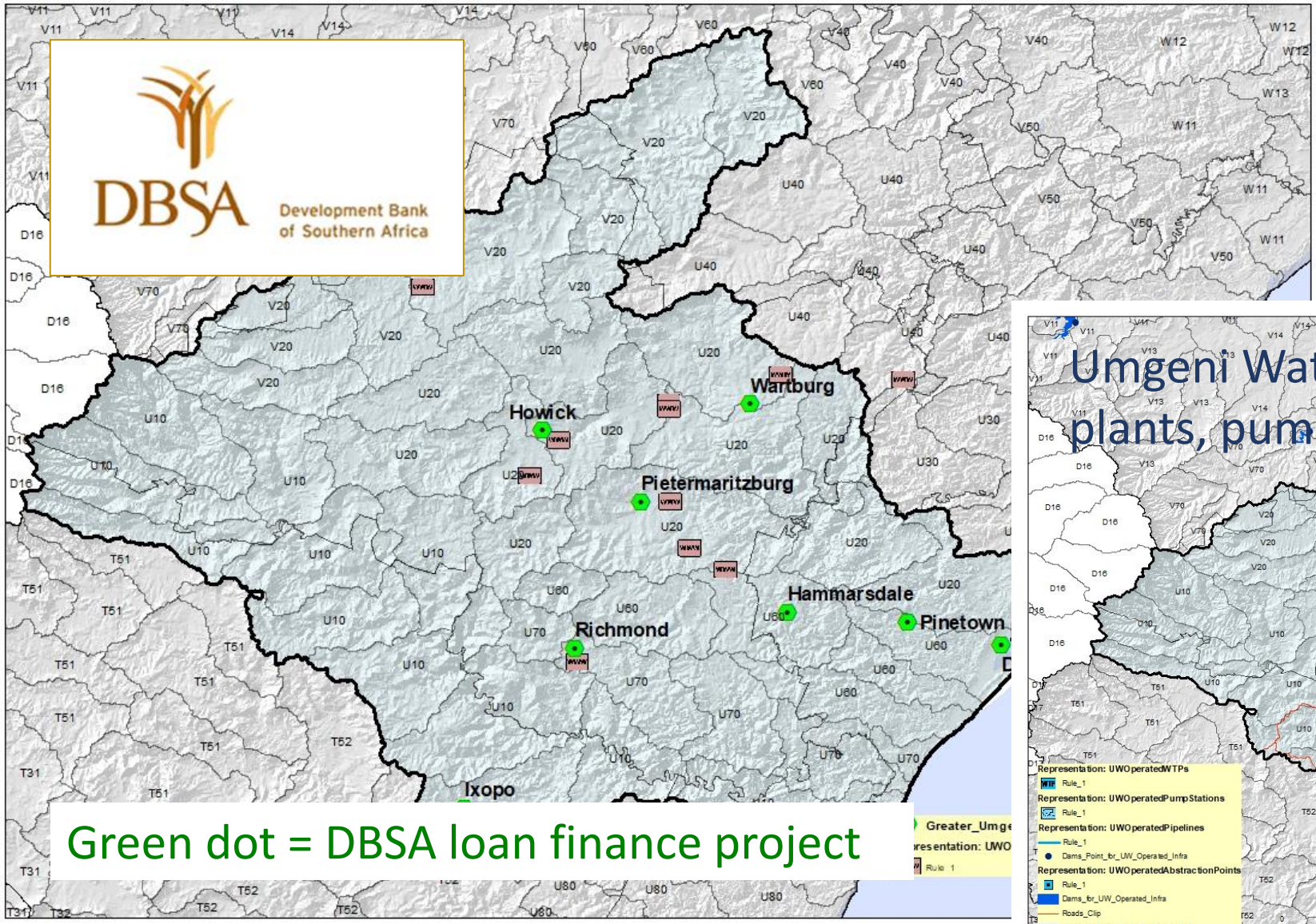


Maps of water-related ecological infrastructure

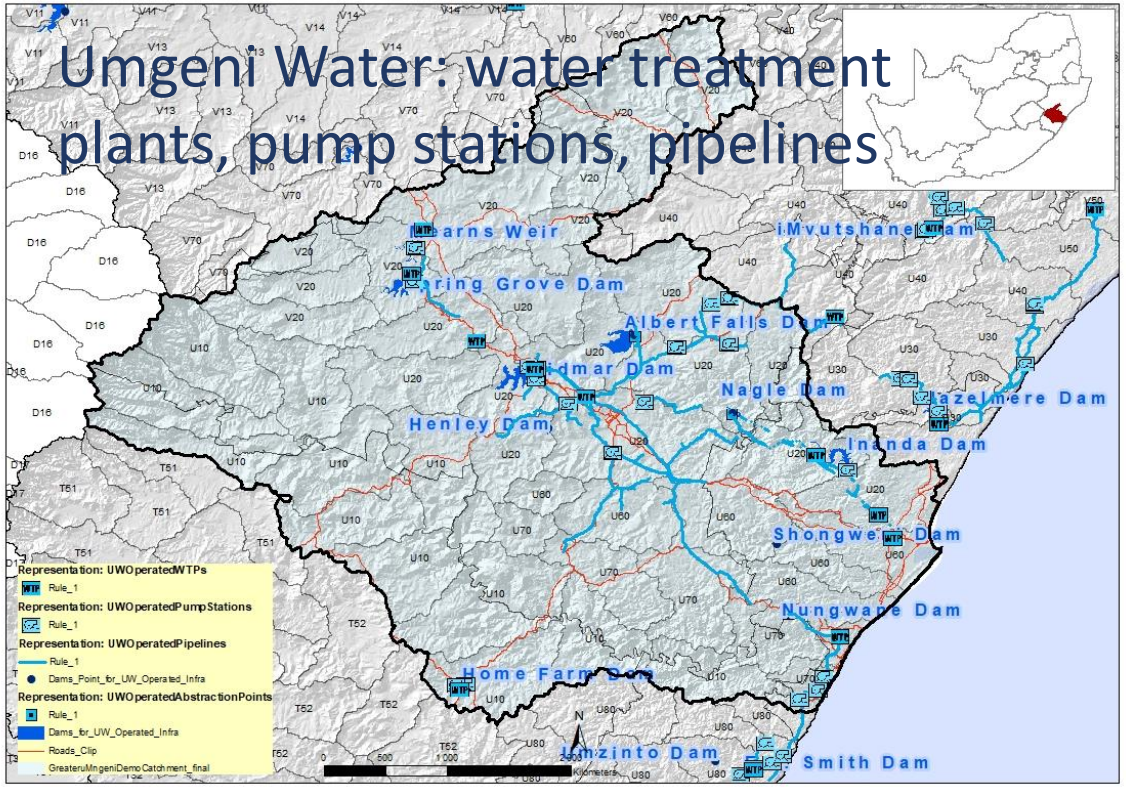
including Strategic Water Source Areas, rivers and riparian zones, wetlands with high potential for specific ES



Gathering spatial data on built infrastructure investments



Green dot = DBSA loan finance project



What next?

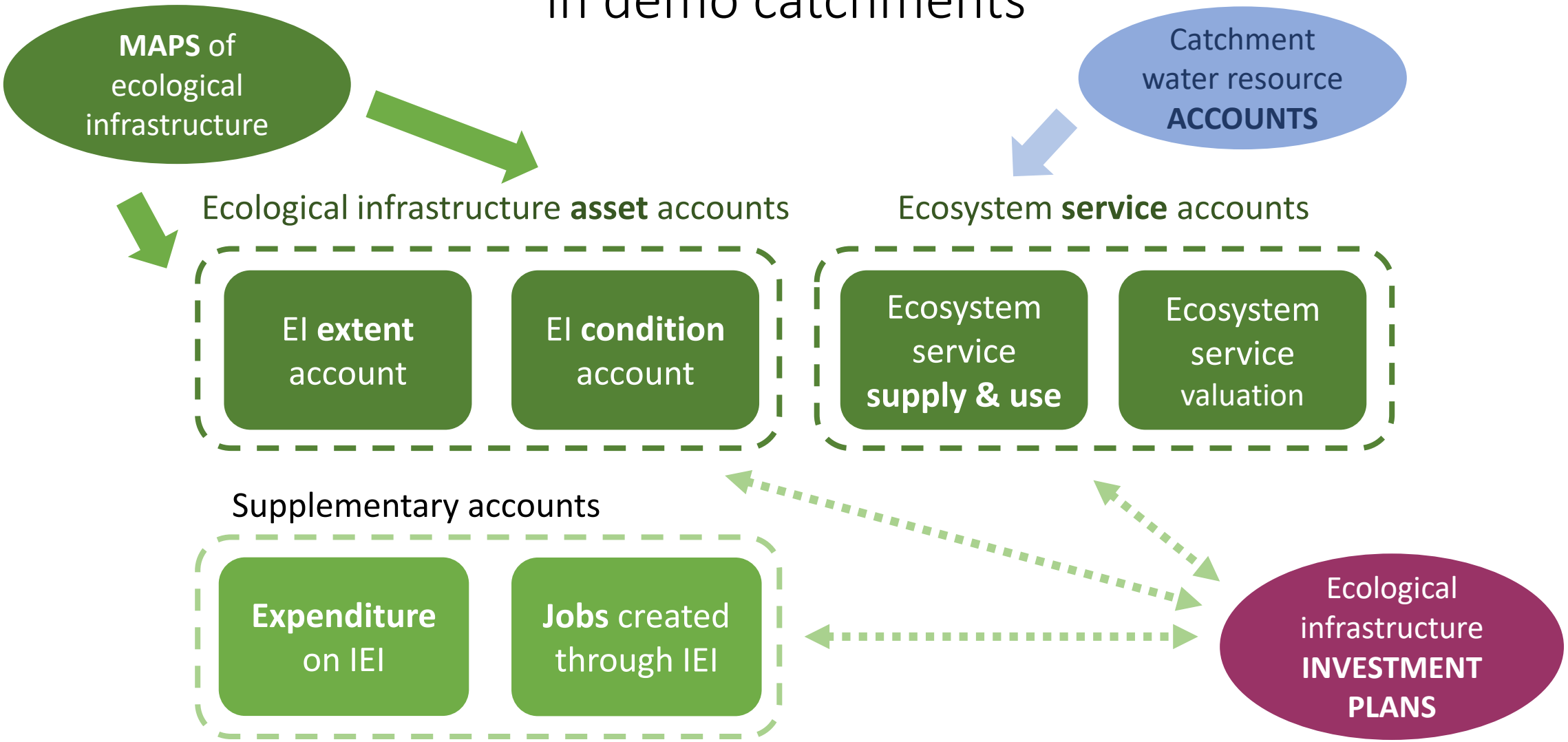
- The challenge is not lack of data or even lack of natural capital accounts
- The challenge is to synthesise the various accounts and interpret them to create meaningful products for end users

→ We are using “accounting for ecological infrastructure” at the catchment scale as an organising framework to bring together:

  - National land accounts
  - National ecosystem asset accounts
  - Provincial ecosystem service accounts
  - Catchment-level water resource accounts
  - Social and economic data

- for application at the landscape level

Accounting for ecological infrastructure in demo catchments



Many envisaged **uses and users** of accounts for ecological infrastructure…

Examples of uses

- Inform **Catchment Management Strategy**
- **Prioritise interventions to maintain and restore** ecosystems (e.g. wetland rehab, removing invasi
- Inform **farming practices** and agricultu programmes
- Inform **water use auth**
- Inform **land**
- Inf **ea expansion**
- **oject appraisal** for built infrastructure i
- **M&E** e.g. of restoration efforts, including expendi socio-economic co-benefits such as jobs
- Calculate **return on investment** in ecological infrastructu
- Influence **municipal grant finance**

Exampl

- anagement Agency
- public works programmes
- Dept of agriculture
- Dept of water and sanitation

tutions

nvestors

?

What **products** will work best for these uses and users?

Will require iterative **co-production** between producers and users of accounts

Five emerging lessons

1. Don’t get stuck in the boundary trap
   - Accounts don’t necessarily have to produced at the landscape scale to be used at the landscape scale
   - Accounts from a range of geographic levels (from national down) can be analysed and packaged for application at the landscape scale

2. Get your national BSU layer in place!

Five emerging lessons

3. Need iterative co-production of accounting outputs/interpreted products for application by managers and practitioners
   - Watch this space….
4. NSOs are not in the business of engaging with stakeholders at the landscape scale

   → Need **boundary organisations** at the accounts-policy-practice interface
5. Ecological infrastructure can be a useful organising concept/frame for bringing together stakeholders AND for bringing together various accounts
   - Including linking ecosystem accounting to socio-economic info at the landscape level