Background

SANBI
Biodiversity for Life
South African National Biodiversity Institute

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

- SANBI – government agency under Ministry of Environmental Affairs

- SANBI's mandate includes:
  - monitoring & reporting on the state of ecosystems
  - providing science-based policy advice

United Nations Statistics Division

- SA one of 7 pilot countries in Advancing Natural Capital Accounting (ANCA) (2014-2015)

STATS SA
STATISTICS SOUTH AFRICA

- Partnership between SANBI & Statistics South Africa to develop ecosystem accounts, initiated 2013

What questions do ecosystem accounts answer?

- Identifying problems
  - Which ecosystem assets are in most rapid decline?
  - How are ecosystem services affected?
- Understanding the problem
  - What/who is driving the decline?
- Helping to target interventions and allocate resources to most important areas

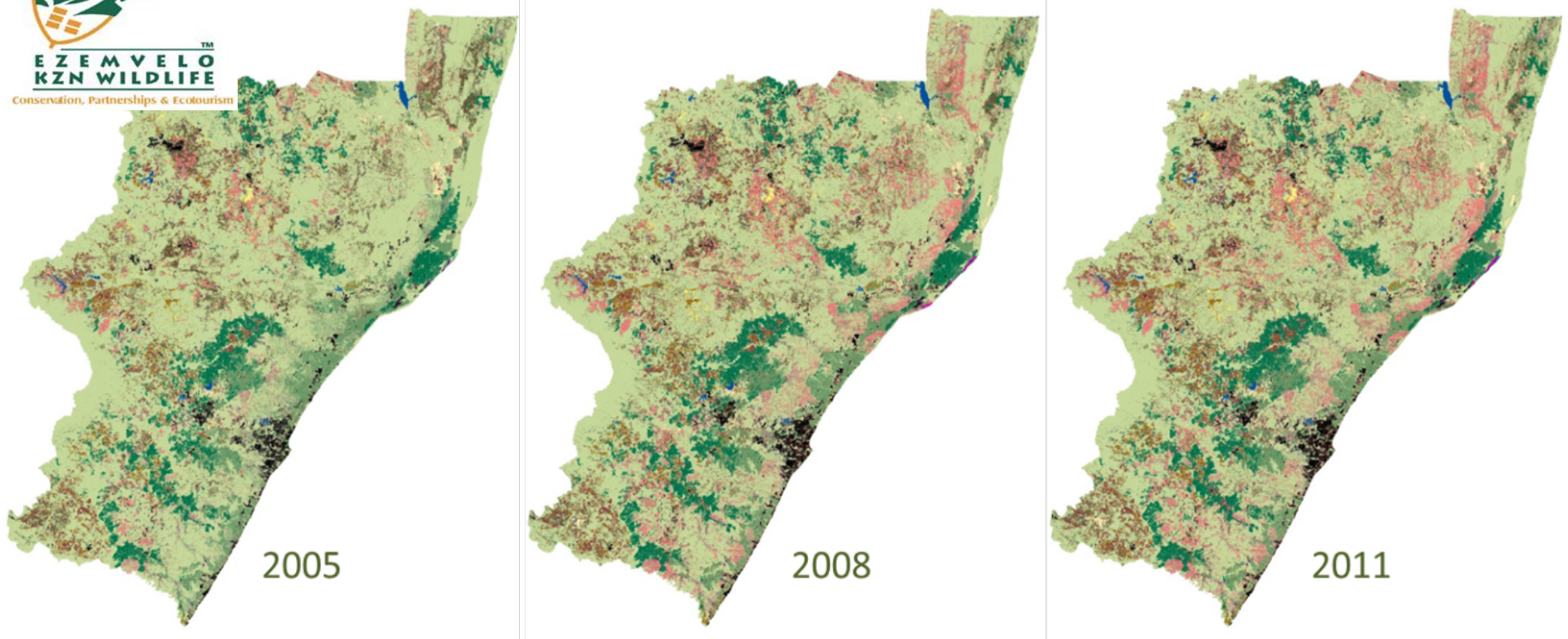# Pilot: Land and ecosystem accounts for KZN

KwaZulu-Natal (KZN)
- 11 million people
- 16% of GDP
- Durban metro, major port, coal mining, steel production, sugar cane, fruit farming, crops, stock farming, timber plantations, ecotourism
- Large rural population, high poverty and unemployment levels

Partnership with provincial conservation agency – Ezemvelo KZN Wildlife

Time series land cover datasets – excellent data

Legend:
- Built up areas
- Dams
- Degraded
- Dryland cultivation
- Fallow lands
- Irrigated cultivation
- Low density settlement
- Mines
- Natural
- Rehabilitated mines
- Severe erosion
- Subsistence agriculture
- Sugarcane
- Timber plantations
- Transport network
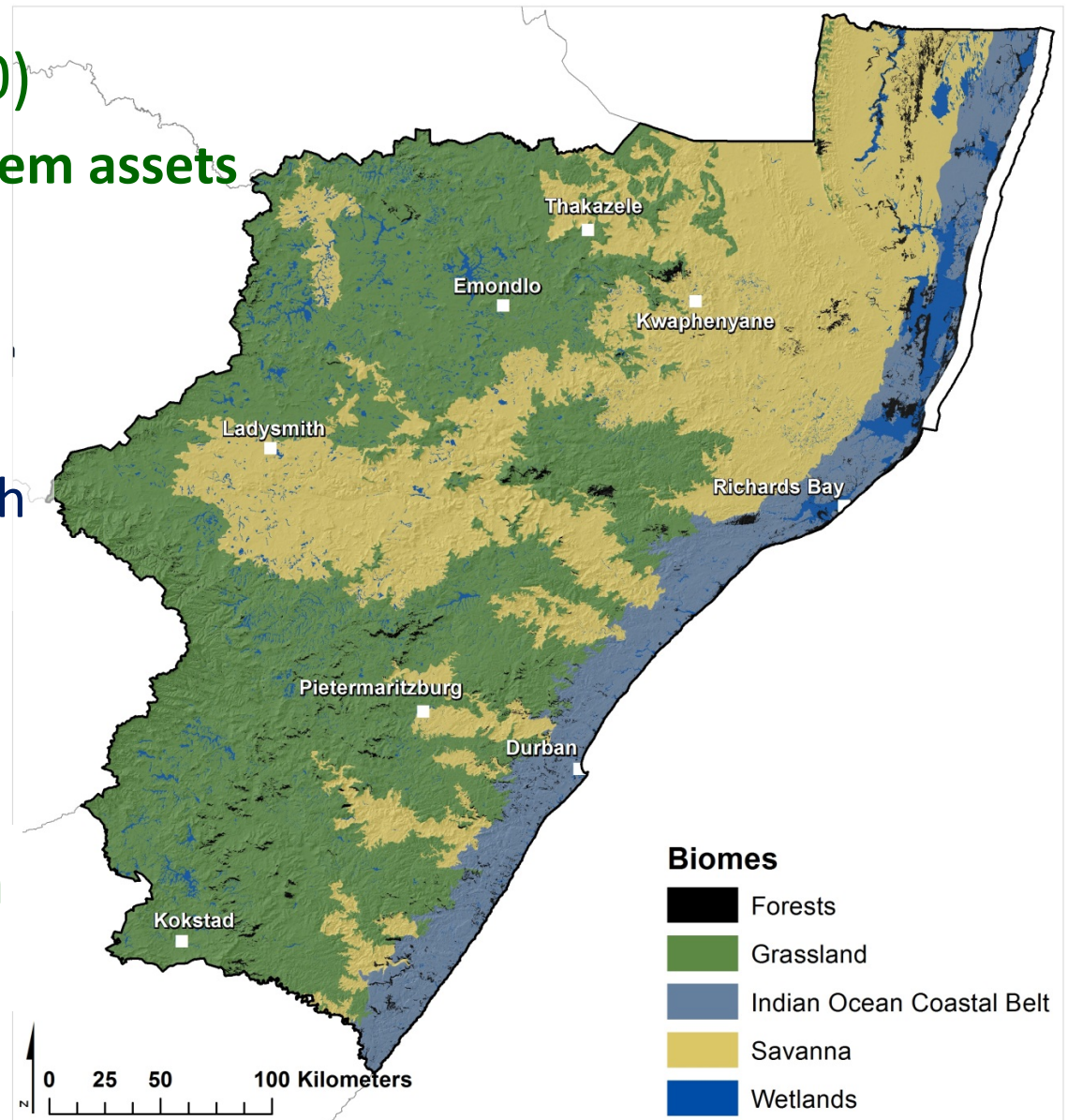- Turfed recreation areas

(47 detailed classes summarised to 16 classes for the accounts)

Ecosystem assets – classified and mapped

Vegetation types (~100)
– good proxies for **ecosystem assets**

Veg types link to **ecosystem services** through functional characteristics

... nested within biomes →
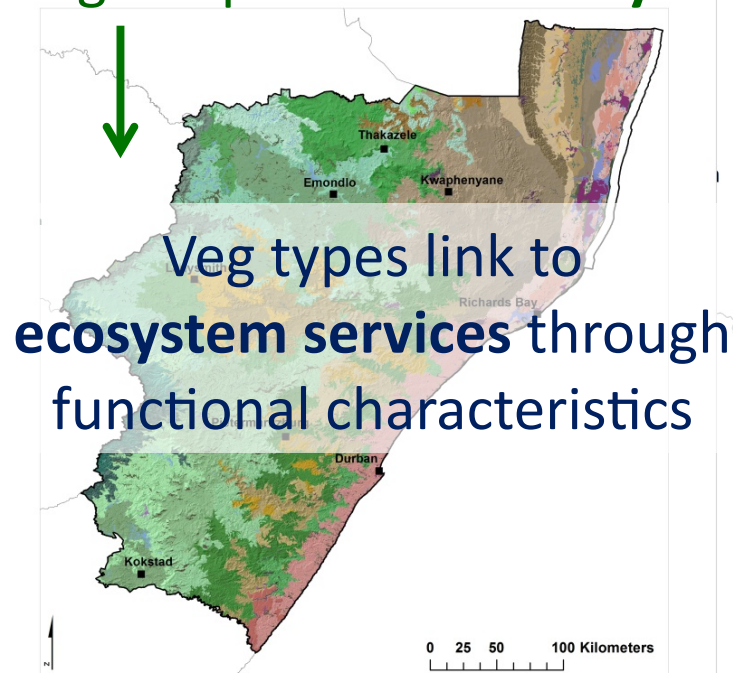
Biomes
- Forests
- Grassland
- Indian Ocean Coastal Belt
- Savanna
- Wetlands

Physical account for land cover in KZN

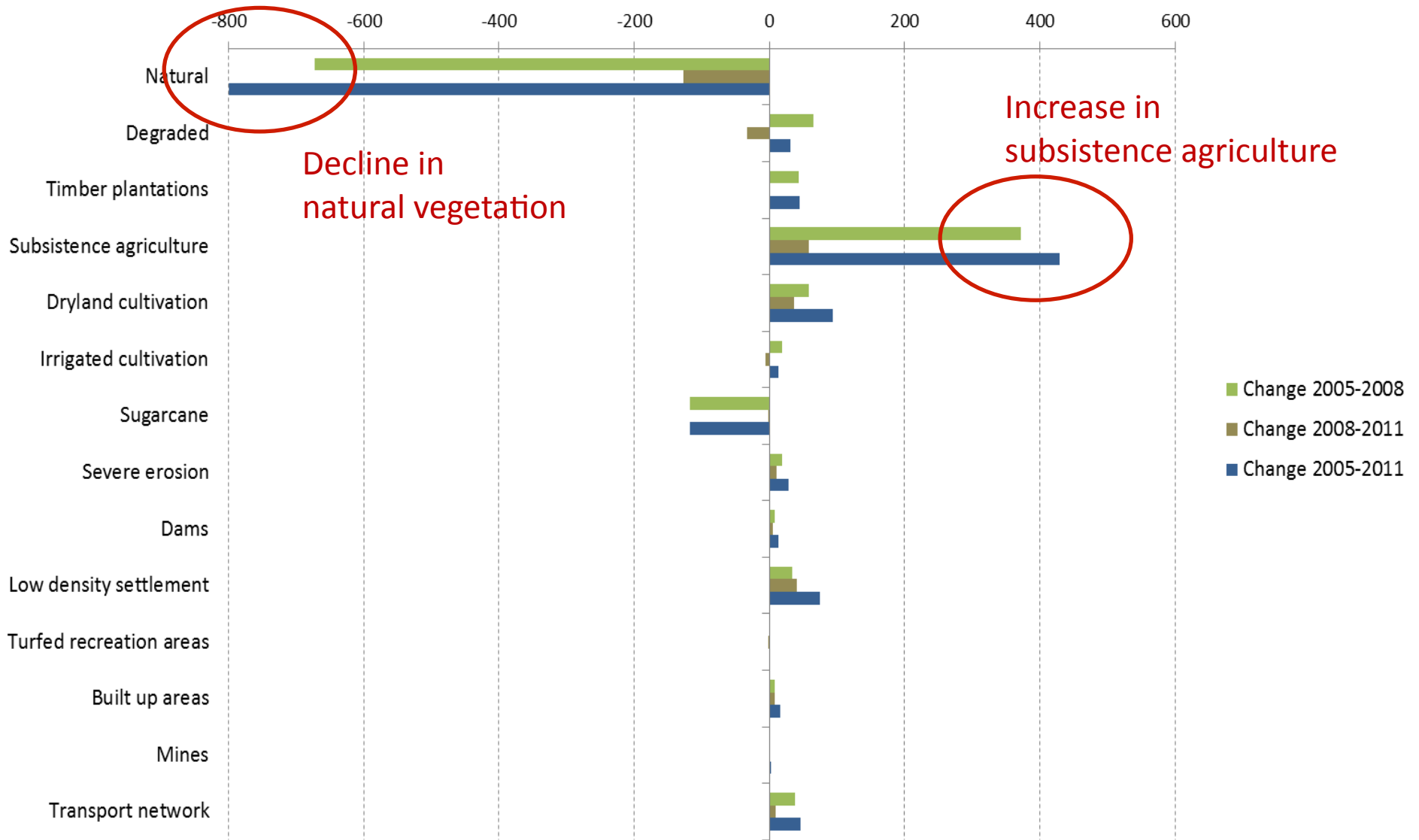| hectares	Natural	Degraded	Fallow lands	Timber plantations	Subsistence agriculture	Dryland cultivation	Irrigated cultivation
Land cover 2005	6284888.4	641270.5	43114.2	694125.8	240491.5	251002.6	119379.9
Total additions to stock	0.0	176067.0	26288.9	66319.4	398723.8	67897.8	23290.0
Total reductions in stock	672172.8	110937.4	3742.8	23070.3	26965.0	10026.0	4162.5
Net additions (additions - reductions)	-672172.8	65129.6	22546.1	43249.1	371758.8	57871.9	19127.5
Net additions as % of opening land cover	-10.7	10.2	52.3	6.2	154.6	23.1	16.0
Total turnover (reductions + additions)	672172.8	287004.5	30031.7	89389.8	425688.9	77923.8	27452.6
Total turnover as a % of opening land cover	10.7	44.8	69.7	12.9	177.0	31.0	23.0
No land cover change	5612715.6	530333.0	39371.4	671055.5	213526.5	240976.6	115217.4
No land cover change as a % of opening LC	89.3	82.7	91.3	96.7	88.8	96.0	96.5
Land cover 2008	5612715.6	706400.1	65660.3	737374.9			
Total additions to stock	105.0	8002.8	2381.6	5449.0			
Total reductions in stock	126981.4	41473.8	3386.8	4595.7			
Net additions (additions - reductions)	-126876.4	-33471.1	-1005.2	853.3			
Net additions as % of opening land cover	-2.3	-4.7	-1.5	0.1			
Total turnover (reductions + additions)	127086.4	49476.6	5768.4	10044.8			
Total turnover as a % of opening land cover	2.3	7.0	8.8	1.4			
No land cover change	5485734.2	664926.2	62273.5	732779.2			
No land cover change as a % of opening LC	97.7	94.1	94.8	99.4			
Land cover 2011	5485839.2	672929.0	64655.2	738228.2			

Key elements:
- Opening stock
- Additions to stock
- Reductions in stock
- Closing stock

Sugarcane	Rehabilitated mines	Severe erosion	Dams						No Data	Total
503759.8	0.0	66184.6							6833.64	9438276.0
52252.4	3035.9	27493.7							98888.68	
169944.7	0.0	8622.1							126.24	
-117692.4	3035.9	18871.6	7879.9	33416.1	1134.3	8347.6	1511.8	37222.5	98762.4	
-23.4	--	28.5	15.0	12.9	36.5	4.3	33.4	48.7	1445.2	
222197.1	3035.9	36115.8	10295.4	75875.2	1884.3	46765.8	2212.4	49915.9	99014.9	2156976.7
44.1	--	54.6	19.6	29.3	60.6	24.4	48.9	65.3	1448.9	22.9
333815.1	0.0	57562.4	51259.1	237484.0	2733.5	172728.2	4173.2	70128.8	6707.4	8359787.6
66.3	--	87.0	97.7	91.8	87.9	90.0	92.3	91.7	98.2	88.6
386067.5	3035.9	85056.1	60346.8	292129.7	4242.8	200284.9	6035.3	113698.0	105596.1	9438276.0
3633.7	288.4	11233.6	5354.0	47300.7	137.6	8075.44	1145.76	9084.48	16.92	
3758.5	1584.4	1149.3	343.0	6493.1	485.9	449.96	331.92	21.16	0	
-124.8	-1296.0	10084.3	5011.0	40807.6	-348.3	7625.5	813.8	9063.3	16.9	
0.0	-42.7	11.9	8.3	14.0	-8.2	3.8	13.5	8.0	0.0	
7392.2	1872.8	12383.0	5697.0	53793.8	623.5	8525.4	1477.7	9105.6	16.9	448616.4
1.9	61.7	14.6	9.4	18.4	14.7	4.3	24.5	8.0	0.0	4.8
382309.0	1451.5	83906.8	60003.8	285636.6	3756.9	199834.9	5703.4	113676.8	105596.1	9213967.8
99.0	47.8	98.6	99.4	97.8	88.5	99.8	94.5	100.0	100.0	97.6
385942.7	1739.9	95140.4	65357.8	332937.3	3894.5	207910.4	6849.2	122761.3	105613.0	9438276.0

What key changes are taking place in the landscape?

Decline in natural vegetation

Increase in subsistence agriculture

Legend:
- Change 2005-2008
- Change 2008-2011
- Change 2005-2011

Categories (top to bottom):
Natural, Degraded, Timber plantations, Subsistence agriculture, Dryland cultivation, Irrigated cultivation, Sugarcane, Severe erosion, Dams, Low density settlement, Turfed recreation areas, Built up areas, Mines, Transport network

Axis: -800, -600, -400, -200, 0, 200, 400, 600

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Subsistence agriculture

Photo: John Craigie, Ezemvelo KZN Wildllife
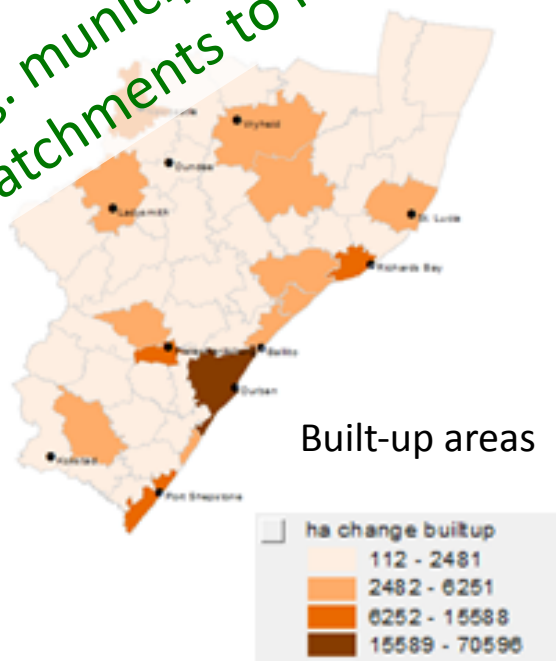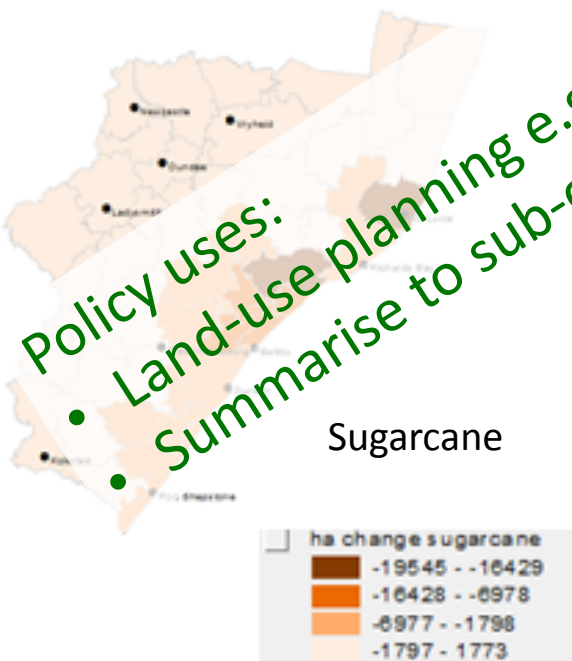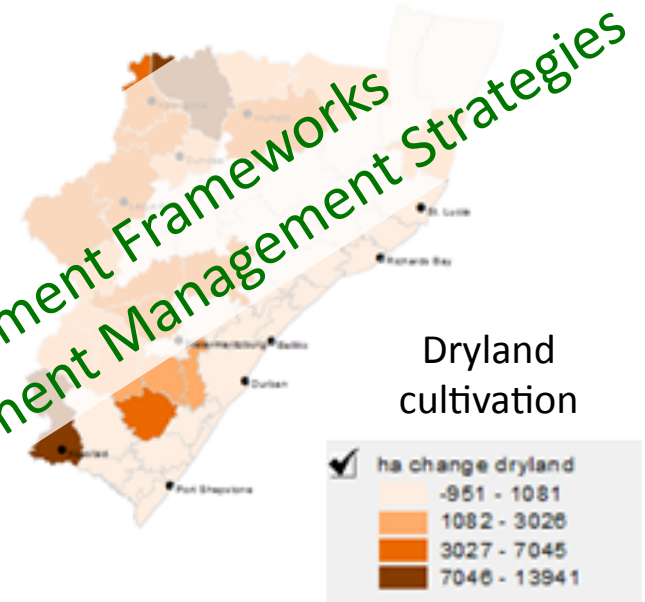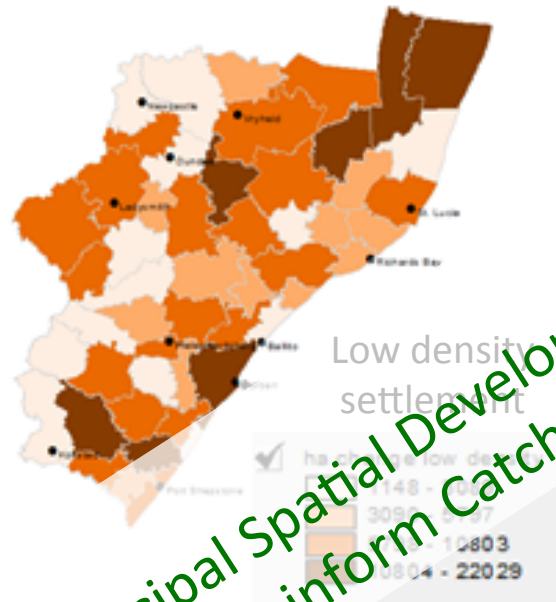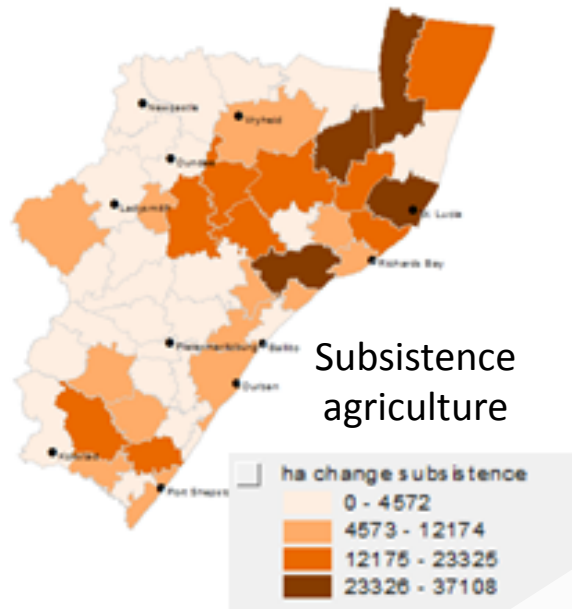
Which biomes are most at risk?

- **Largest absolute decline in extent – Grassland biome (important role in water provision)**
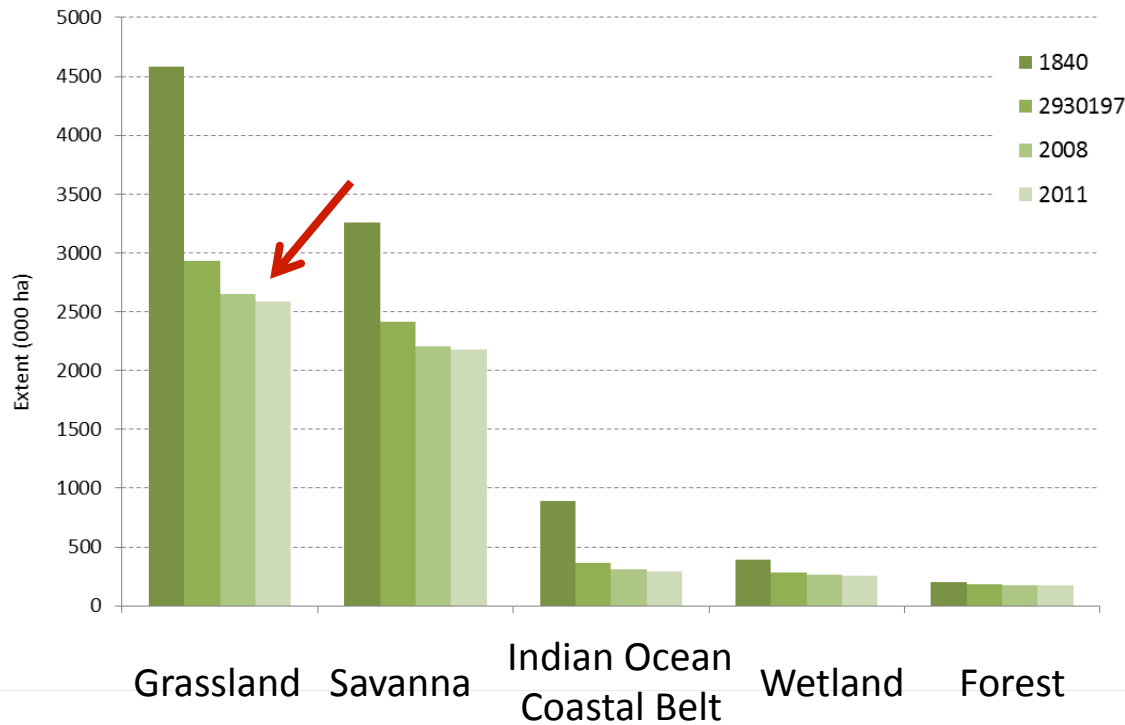
- **Largest proportional decline in extent – Indian Ocean Coastal Belt**

Subsistence agriculture

ha change subsistence
0 - 4572
4573 - 12174
12175 - 23325
23326 - 37108

Low density settlement

ha change low density
1148 - 3097
3098 - 6707
6708 - 10803
10804 - 22029

Dryland cultivation

ha change dryland
-951 - 1081
1082 - 3026
3027 - 7045
7046 - 13941

Sugarcane

ha change sugarcane
-19545 - -16429
-16428 - -6978
-6977 - -1798
-1797 - 1773

Built-up areas

ha change builtup
112 - 2481
2482 - 6251
6252 - 15588
15589 - 70596

Transport network

ha change transport
-2951
-2950 - 0
1544 - 2176
2177 - 2955
2956 - 4554
4555 - 8697

Policy uses:
- Land-use planning e.g. municipal Spatial Development Frameworks
- Summarise to sub-catchments to inform Catchment Management Strategies
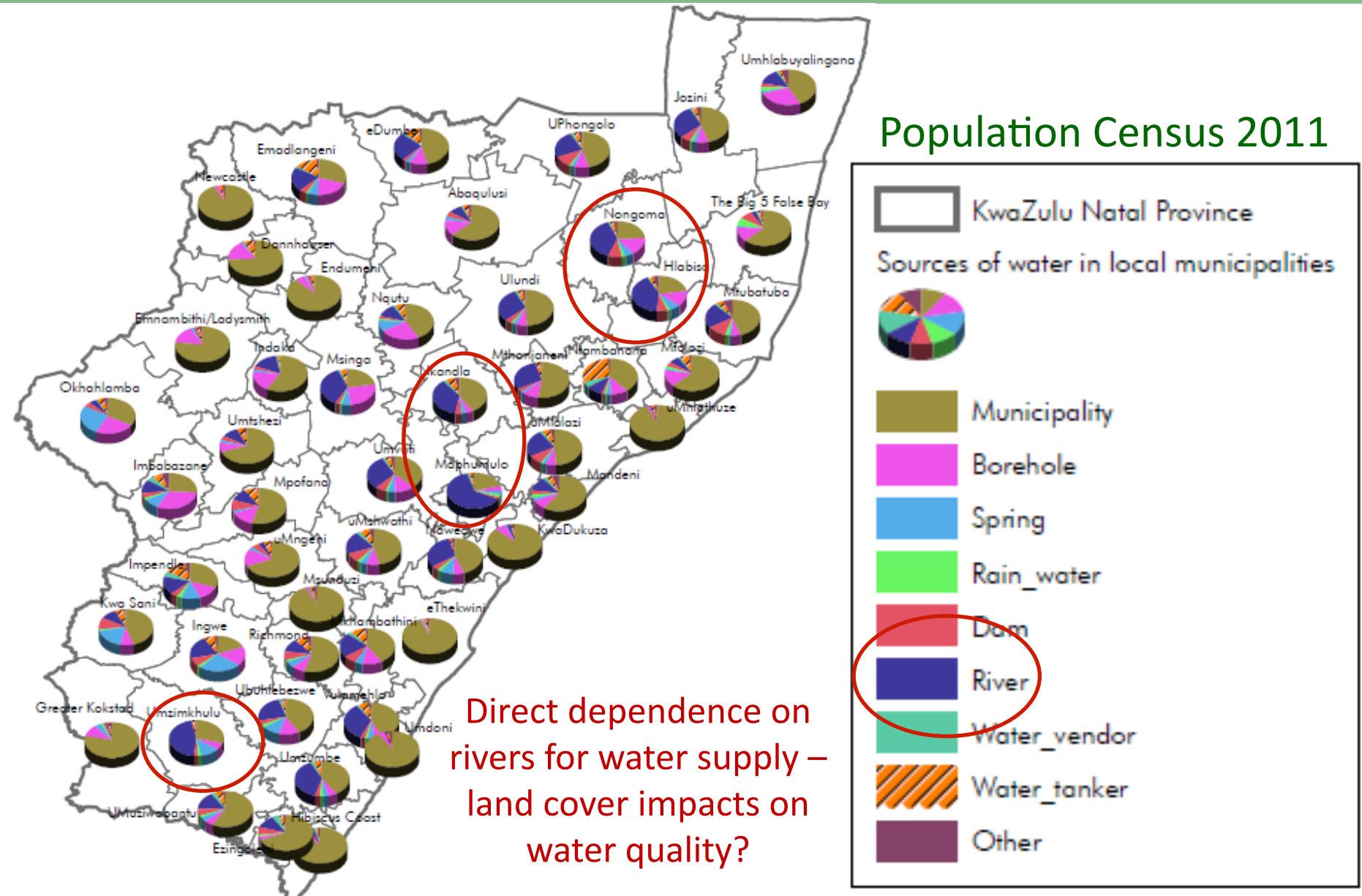
Which ecosystem assets are most at risk?

A few examples – clear links to ecosystem services

Hectares		Increases (positive numbers) and decreases (negative numbers) from other land cover classes within each vegetation type													
Vegetation type	**Biome**	Natural	Degraded	Fallow lands	Plantation	Subsistence agriculture	Dryland agriculture	Irrigated agriculture	Sugarcane	Rehabilitated mines	Severe erosion	Dams	Low density settlement	Turfed recreation areas	Built-up areas
Freshwater Wetlands	Wetland	-8336	1039	563	313	2331	548	-1102	-193	-1873	2500	521	-596	59
Alluvial Wetlands	Wetland	-18363	-344		209	2066	5045	680	-2710	-1961	-7854	11512	1967	-683	86
Southern Drakensberg Highland Grassland	Grassland	-1053	805	0		1	30	0	0	0	-32	35	37	1
Northern Drakensberg Highland Grassland	Grassland	-1746	1685	0	-13	-27	1	0	0	-68	64	-274	350	-28	4
Subtropical Dune Thicket	IOCB	-285	293	0	1	1	0	0	-11	0	0	-2	3	-7

Policy uses: Priorities for strengthening regulation of land-use decisions Targeting management interventions e.g. restoration

- Conversion of **alluvial wetlands** (floodplains) and **freshwater wetlands** to subsistence agriculture, dryland cultivation and dams → Water quality impacts? Flood risk?

- Degradation of **Subtropical Dune Thicket** → Coastal storm risk?

- Degradation of **Highveld Grassland** → Major water source area for Durban

Links to socio-economic data

Population Census 2011

Direct dependence on rivers for water supply – land cover impacts on water quality?

KwaZulu Natal Province

Sources of water in local municipalities

- Municipality
- Borehole
- Spring
- Rain_water
- Dam
- River
- Water_vendor
- Water_tanker
- Other

Challenges for uptake of accounts

- Initial pilots provided proof of concept
- Lots of interest from potential users...
- ... Need further interpretation, communication and mainstreaming
- AND regular accounts

Challenges in building accounts

- Consistent time series data

- Building a technical team, including:
  - GIS and spatial analysis skills
  - Ecological understanding and interpretation
  - Mainstreaming and communications expertise

Next steps

- UNSD-led EU-funded project on NCA (2017 – 2019)
  - SA one of five pilot countries
- National GEF6 project on biodiversity & water security (2017-2021)
  - includes NCA component
- Development and implementation of national programme of work for ecosystem accounts
- Continued Stats SA - SANBI partnership

Pilot ecosystem accounting reports available at SANBI's Biodiversity Advisor website http://biodiversityadvisor.sanbi.org (under "Planning and Assessment" section)

Policy uses of ecosystem accounts

- Land-use planning
  - e.g. municipal Spatial Development Frameworks

- Natural resource management
  - e.g. priorities for restoration

- Strategic development planning
  - e.g. understanding broader trade-offs

- Headline indicators
  - e.g. percentage turnover in land cover

Traditionally we use maps of biodiversity priority areas, but accounts have potential to reach a wider audience