Overview of (ELSA-Relevant) National Datasets

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SANBI Biodiversity for Life
South African National Biodiversity Institute
forestry, fisheries & the environment
Department: Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA
Sida UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA
GORDON AND BETTY MOORE FOUNDATION
Impact Observatory
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Our Priority Policy Commitments for ELSA

To protect nature while improving human well-being through a focus on:

- Ecosystem conservation & restoration
  - Biodiversity (incl. ecosystems and species; fine/coarse filter)
- Water security
- Invasive alien species management
  - Cross-cutting: biodiversity, water & DRR
- Climate change mitigation
  - Carbon
- Climate change adaptation
  - Disaster risk reduction
- Biodiversity Economy
  - Wildlife

National Datasets Available for ELSA mapping: Presentation Overview

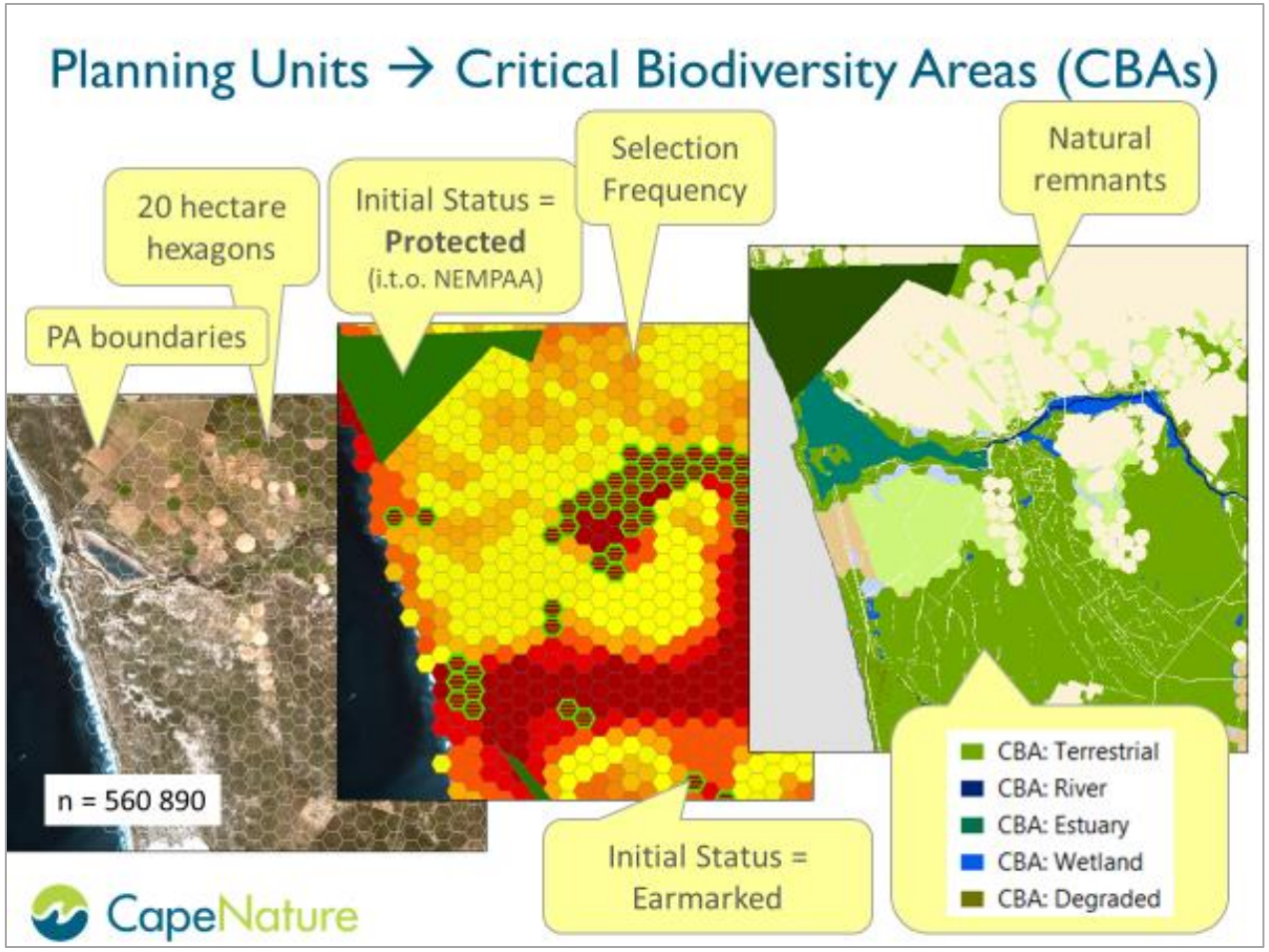
- Planning Units
- Zones / Land constraints / Action (P-M-R) informants
  - Landcover, Protected Areas, Tenure and Use
- Features
  - Biodiversity
  - Highlight: Ecosystem-based Adaptation (EbA) project
  - Water security
  - Invasive alien species
  - CC Mitigation: Carbon
  - CC Adaptation: Disaster Risk Reduction
  - Biodiversity Economy: Wildlife
- Summary

Planning Units

- 1km x 1km grid (100 ha)
  aligned to Stats SA's Basic Spatial Unit
  n=~1 220 000

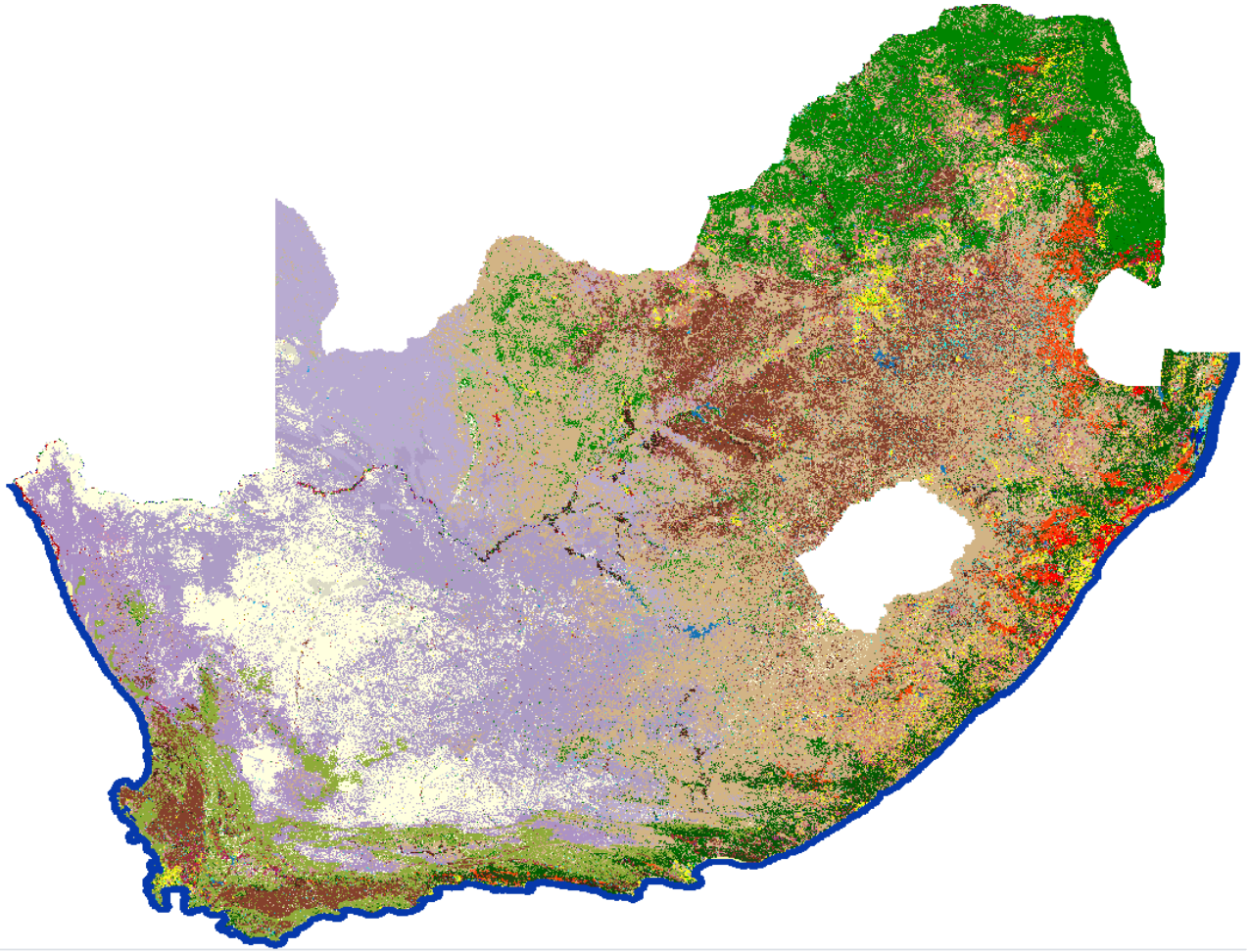
- TBD
  - 500m x 500m grid
  - Hexagon version of grid

- Compare
  - EbA (10 km2 / 1 000 ha)
  - KBA (100 km2 / 10 000 ha), n=13 200
  - NPAES, which includes Provincial SCPs (min = 0.2 km2 / 20 ha)



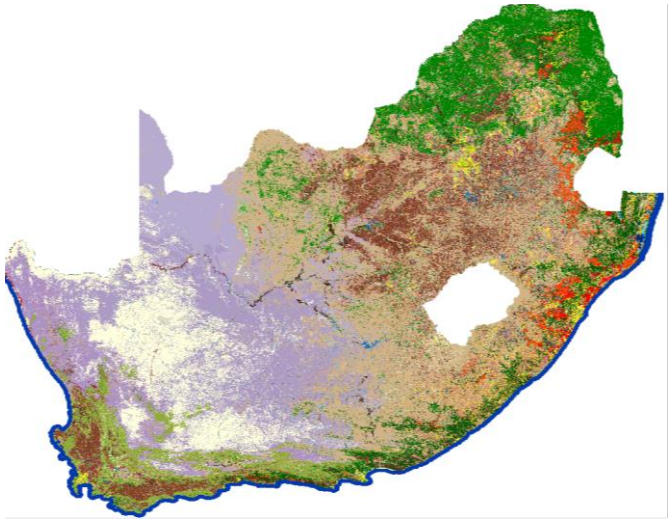
Zones

South African National Land-Cover 2018



South African National Land-Cover 2018

- National coverage, 20m resolution raster format.
- 2018 time-stamp representation.
- Detailed 73 x land-cover / land-use class legend.
- Sentinel-2, 20m imagery only.
- Fully automated, model-based production (repeatable).
- 90.1 % overall mapping accuracy.
- Geographic coordinates & Albers Equal Area projection.



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GEOTERRA IMAGE SA

Legend & Information Content

- 73 x land-cover / land-use classes.
- Comparable to NLC's 1990 and 2013/14 legend content.
- Based on new, gazetted SA Land-Cover Legend Standard*
- Hierarchical structure & content provides different levels of landscape detail…

*South African Land Cover Classes and Definitions (SDI Act No. 54 of 2003)

Hierarchical Legend Content

Row	Color	SALCC_1	SALCC_2	Class_Names
1		Forested Land	Natural Wooded Land	contiguous (indigenous) forest
2		Forested land	Natural Wooded Land	contiguous low forest & thicket
3		Forested land	Natural Wooded Land	dense forest & woodland
4		Forested land	Natural Wooded Land	open woodland
5		Forested land	Planted Forest	contiguous & dense plantation forest
6		Forested land	Planted Forest	open & sparse plantation forest
7		Forested land	Planted Forest	temporary unplanted (clear-felled) plantation forest
8		Shrubland	Shrubs	low shrubland (other)
9		Shrubland	Karoo & Fynbos Shubland	low shrubland (fynbos)
10		Shrubland	Karoo & Fynbos Shubland	low shrubland (succulent karoo)
11		Shrubland	Karoo & Fynbos Shubland	low shrubland (nama karoo)
12		Grassland	Natural Grassland	sparsely wooded grassland
13		Grassland	Natural Grassland	natural grassland
14		Waterbodies	Natural Waterbodies	natural rivers
15		Waterbodies	Natural Waterbodies	natural estuaries & lagoons
16		Waterbodies	Natural Waterbodies	natural ocean & coastal
17		Waterbodies	Natural Waterbodies	natural lakes
18		Waterbodies	Natural Waterbodies	natural pans (flooded @ observation times)
19		Waterbodies	Artificial Waterbodies	artificial dams (including canals)
20		Waterbodies	Artificial Waterbodies	artificial sewage ponds
21		Waterbodies	Artificial Waterbodies	artificial flooded mine pits
22		Wetlands	Herbaceous Wetlands	herbaceous wetlands (currently mapped)
23		Wetlands	Herbaceous Wetlands	herbaceous wetlands (previously mapped)
24		Wetlands	Woody Wetlands	mangrove wetlands
25		Barren Land	Consolidated	natural rock surfaces
26		Barren Land	Consolidated	dry pans
27		Barren Land	Unconsolidated	eroded lands
28		Barren Land	Unconsolidated	sand dunes (terrestrial)
29		Barren Land	Unconsolidated	coastal sand & dunes
30		Barren Land	Unconsolidated	bare riverbed material
31		Barren Land	Unconsolidated	other bare

From the new gazetted legend structure & content:

SALCC-1:
SA Land-cover Classification Level 1

SALCC-2:
SA Land-cover Classification Level 2

Class_Names:
Full 73 x legend Content.

Full 73 x Class Legend Content

SANLC assist* with mapping:

- Biodiversity
- Water security
- Biod

*** in conjunction with other datasets**

Row	Color	Class_Names
1		contiguous (indigenous) forest
2		contiguous low forest & thicket
3		dense forest & woodland
4		open woodland
5		contiguous & dense plantation forest
6		open & sparse plantation forest
7		temporary unplanted (clear-felled) plantation forest
8		low shrubland (other)
9		low shrubland (fynbos)
10		low shrubland (succulent karoo)
11		low shrubland (nama karoo)
12		sparsely wooded grassland
13		natural grassland
14		natural rivers
15		natural estuaries & lagoons
16		natural ocean & coastal
17		natural lakes
18		natural pans (flooded @ observation times)
19		artificial dams (including canals)
20		artificial sewage ponds
21		artificial flooded mine pits
22		herbaceous wetlands (currently mapped)
23		herbaceous wetlands (previously mapped)
24		mangrove wetlands
25		natural rock surfaces
26		dry pans
27		eroded lands
28		sand dunes (terrestrial)
29		coastal sand & dunes
30		bare riverbed material
31		other bare
32		cultivated commercial permanent orchards
33		cultivated commercial permanent vines
34		cultivated commercial sugarcane pivot irrigated
35		cultivated commercial permanent pineapples
36		cultivated commercial sugarcane non-pivot
37		cultivated emerging farmer sugarcane non-pivot
38		commercial annual crops pivot irrigated

Row	Color	Class_Names
40		commercial annual crops rain-fed / dryland
41		subsistence / small-scale annual crops
42		fallow land & old fields (trees)
43		fallow land & old fields (bush)
44		fallow land & old fields (grass)
45		fallow land & old fields (bare)
46		fallow land & old fields (low shrub)
47		residential formal (tree)
48		residential formal (bush)
49		residential formal (low veg / grass)
50		residential formal (bare)
51		residential informal (tree)
52		residential informal (bush)
53		residential informal (low veg / grass)
54		residential informal (bare)
55		village scattered (bare & low veg/ grss combo)
56		village dense (bare & low veg / grss combo)
57		smallholdings (tree)
58		smallholdings (bush)
59		smallholdings (low veg / grass)
60		smallholdings (bare)
61		urban recreational fields (tree)
62		urban recreational fields (bush)
63		urban recreational fields (grass)
64		urban recreational fields (bare)
65		commercial
66		industrial
67		roads & rails (major linear)
68		mines: surface infrastructure
69		mines: extraction pits, quarries
70		mines: salt mines
71		mine: tailings and resource dumps
72		land-fills
73		fallow land & old fields (wetlands)

National Landcover derivations

- Fine-tuning of SANLC for specific needs
- For example:
  habitat modification, loss & revegetation
  - Hab-Mod: Skowno et al., 2021
    https://doi.org/10.17159/sajs.2021/8182
  - Includes ‘secondary natural’ class
    - Considers historical transformation
      (old /topo fields, previous NLC)
    - Provincial & metro data screened & brought in to inform natural versus recovering areas = secondary natural
  - Brings in wetlands & dams from other data sources to be more comprehensive
  - Improves coastline (Harris et al., 2019)

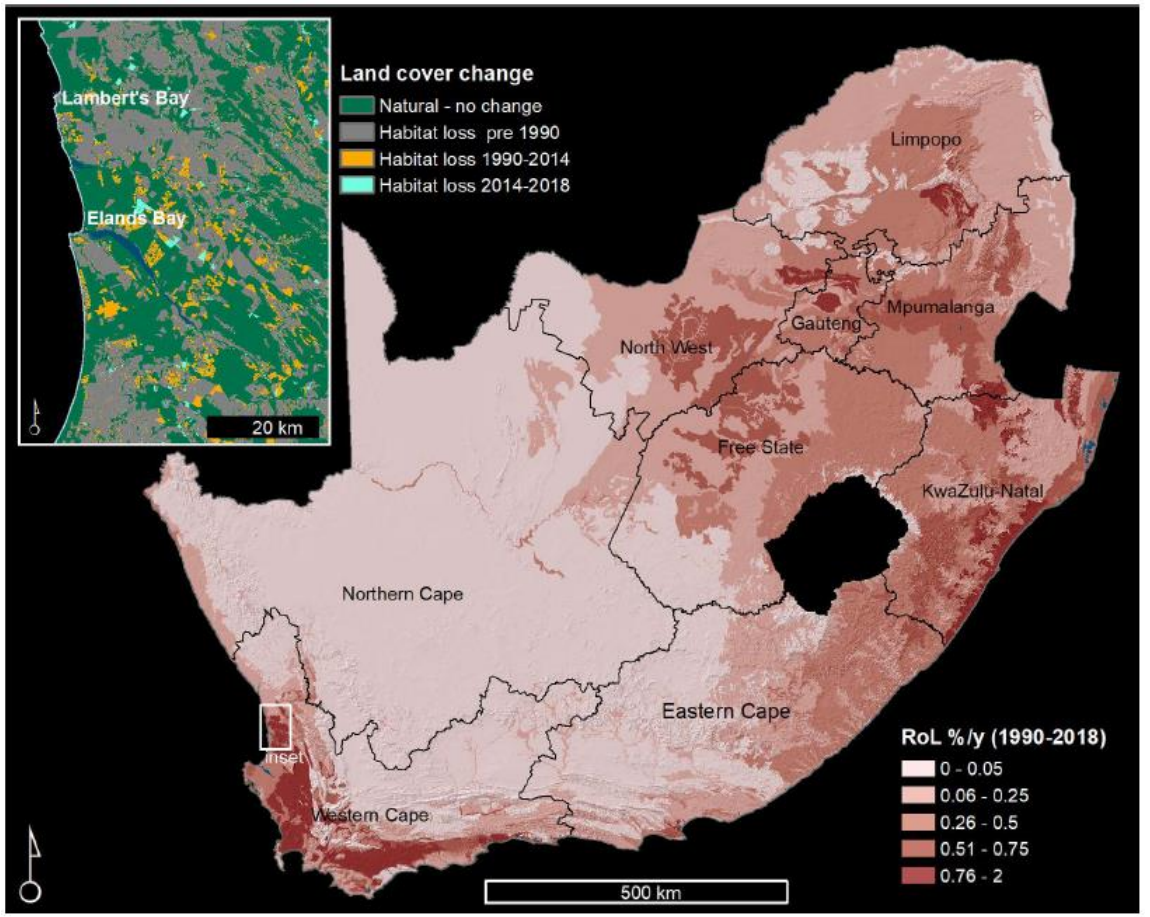


Figure 2: Rate of habitat loss indicator (RoL) for the period 1990–2018, calculated per terrestrial ecosystem type (vegetation types as defined by Mucina and Rutherford[13]). The Cape lowlands, Mpumalanga Highveld grasslands and KwaZulu-Natal coast and adjacent interior had the highest rates of habitat loss between 1990 and 2018, with expanding croplands and human settlements being the key drivers. The inset map shows the land-cover change for a coastal portion of the Western Cape (known as the ‘Sandveld’) where cropland expansion has occurred during each time period.

(Skowno et al., 2021)

Zones: Private, communal & reform lands (for wildlife)

Land tenure

- Cadastral data
  - Other?

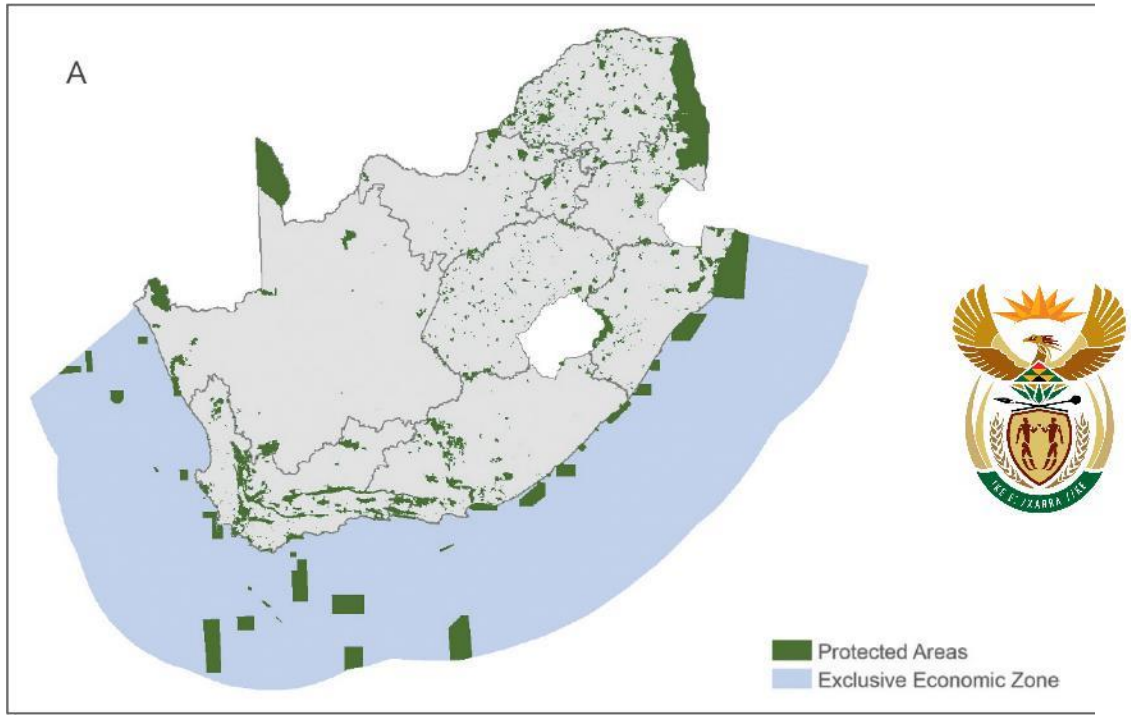
Land use

- Game permit data
- Game ranches
- Department of Agriculture livestock data
- Land capability
- Grazing capacity

Zones: Protected Areas

SAPAD and SACAD (aka PACA) maintained by DFFE is the basis for all Protected Areas and Conservation Area data – it is a comprehensive registry but contains overlapping features.

These are “flattened” and prepared for use in GIS



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Zones: Agro-biodiversity

- KZN Agro-Biodiversity Zone example
  - Compatible areas mapped:
    No conflict where biodiversity is on steep slopes, shallow or rocky soils, and in low water access areas; also wetlands, watercourses, estuaries, coastal dunes; and existing croplands where in current use they still provide forage areas for threatened spp.

  - What are lessons learned from spatial perspective?
  - What are lessons learned from social process and policy development?

KZN VERSUS SANBI ZONES

Table below shows how the KZN suggested zones fit with the SANBI zones discussed in the SANBI land use guideline (SANBI, 2019). See section **National Land Use Scheme Guideline** for more details on this SANBI guideline.

Suggested KZN zone	SANBI Zone	Biodiversity feature
Statutory Protected Area 1	Open Space I	Nature Reserve, World Heritage Site, Wilderness Area
Statutory Protected Area 2	Open Space I	Protected Environment
Agro-Biodiversity Zone	Open Space II	Agricultural land which can be used for both agriculture and conservation of CBAs & ESAs
Environmental Management 1	Open Space II	Land which has low agricultural potential but important for protection of biodiversity network
Environmental Management 2	Open Space II	Agricultural land with high crop or afforestation potential but which is also important for protection of biodiversity network
River or estuarine reserve	Open Space II	Land within estuarine functional zone, buffering of river, flood risk area.
Conservation areas	Open Space II	Community Conservation Areas, Admiralty Reserve, Private conservation area, Biodiversity offset, natural heritage area, Biodiversity Agreement area (stewardship).
Passive open space	Open Space III	Parks, natural riverine areas
Active open space	Open Space III	Sports fields, recreational areas

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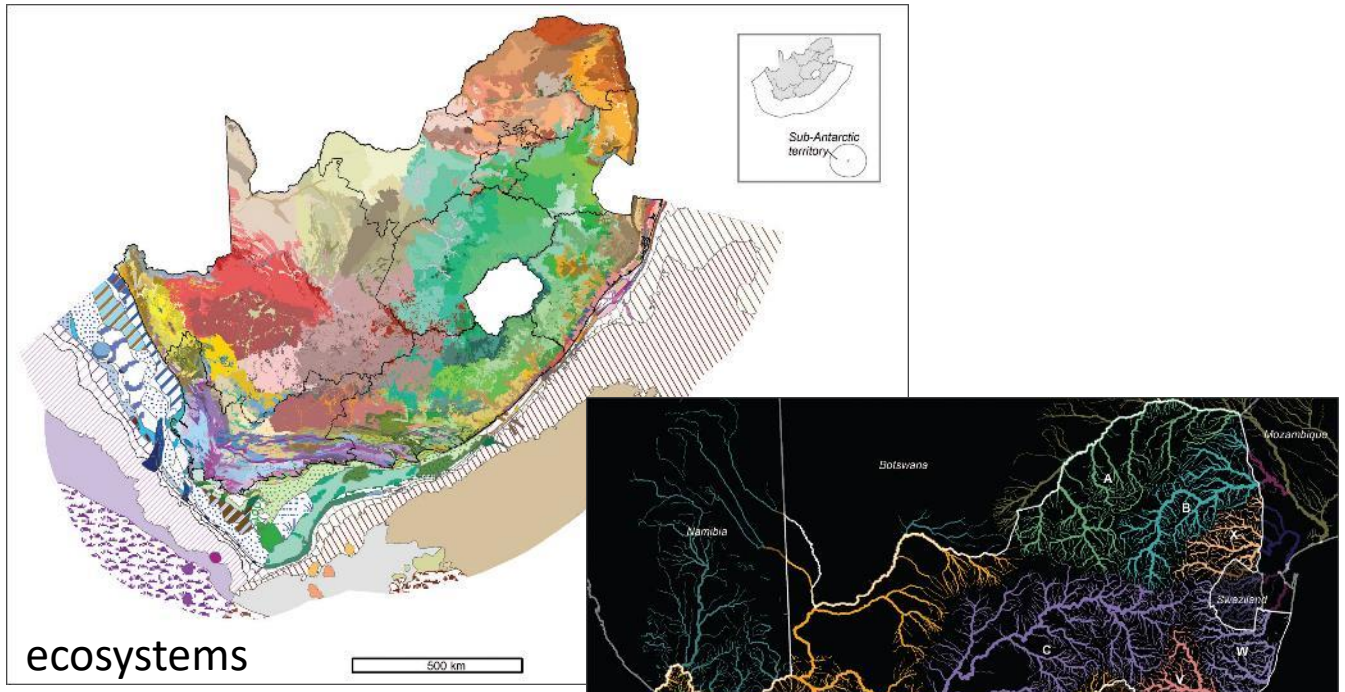
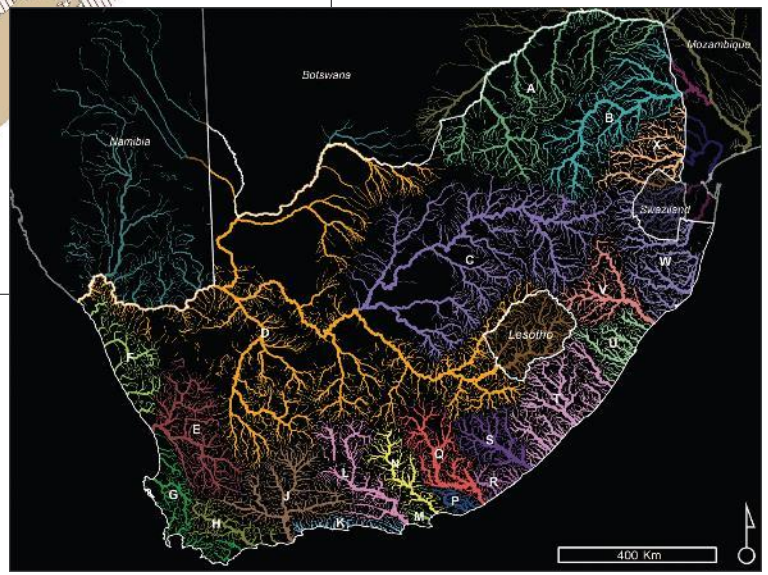
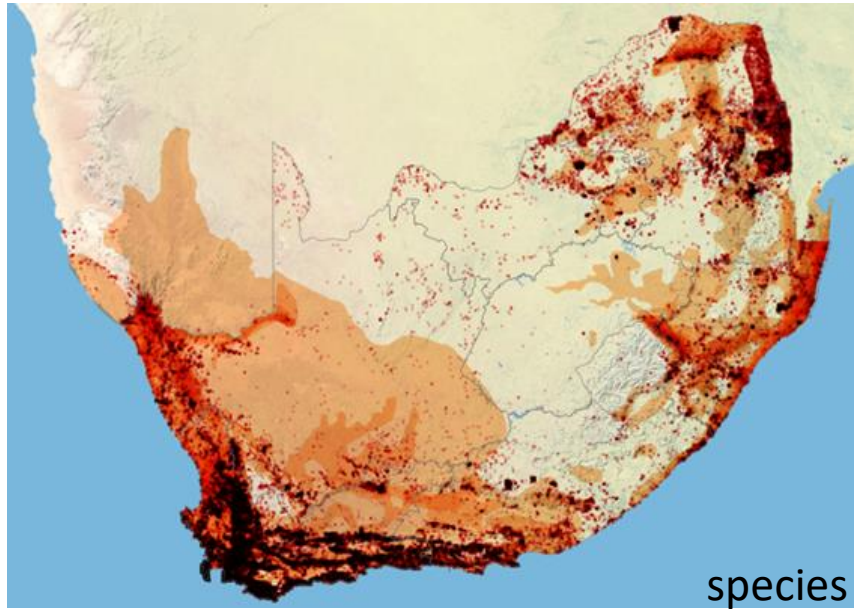
Biodiversity
Features

NBA: Ecosystem & species data



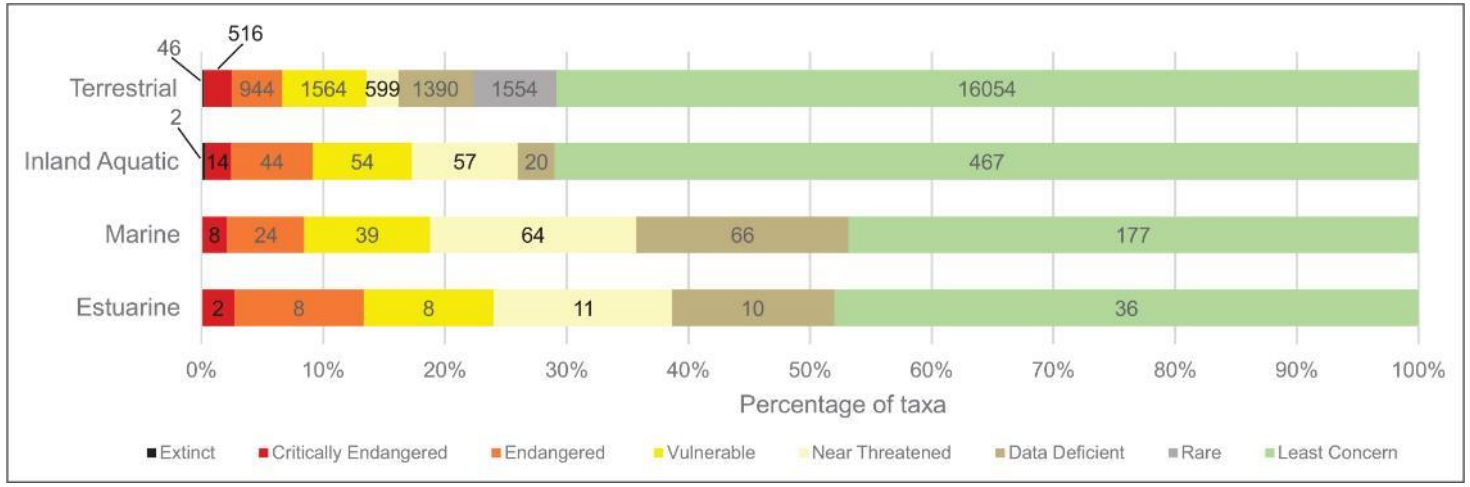
ecosystems

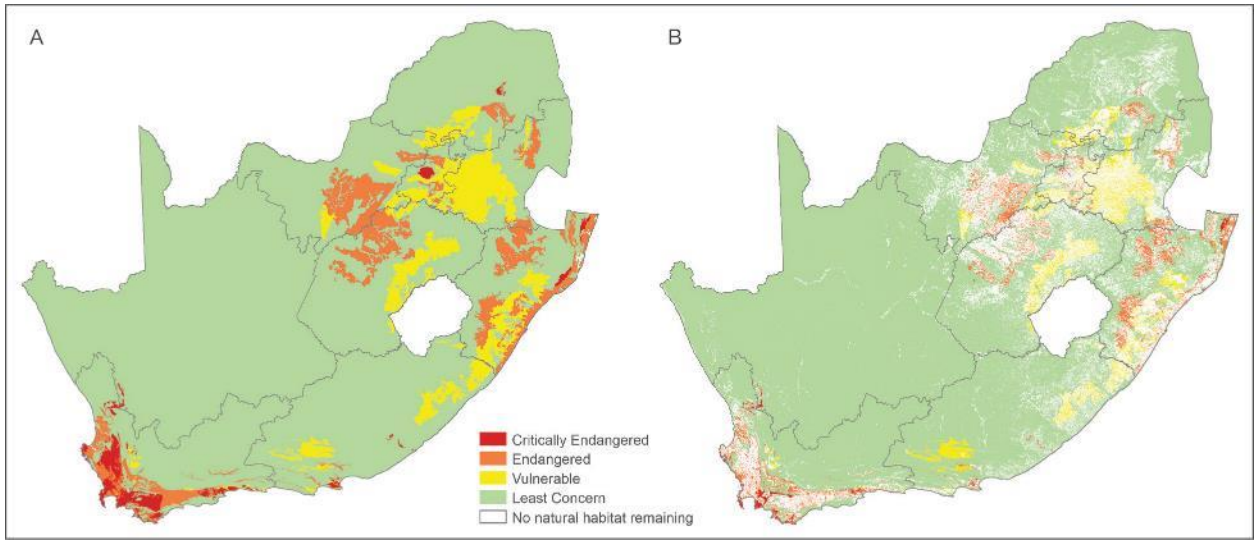


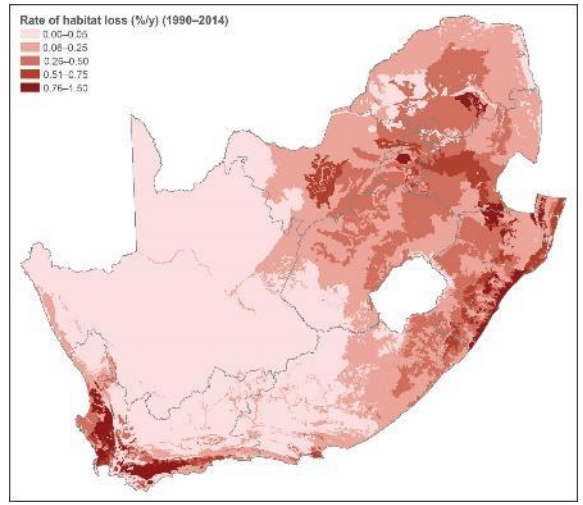


species

NBA: Threat Status (Red List) & Protection Level

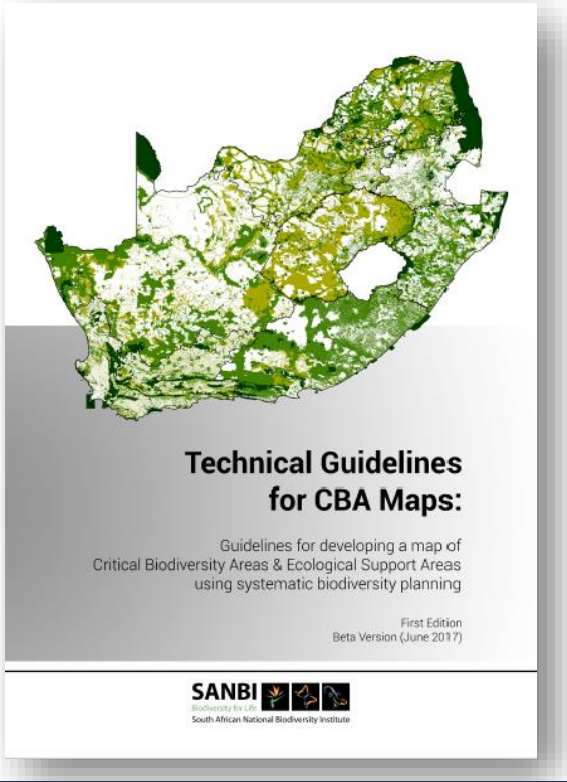


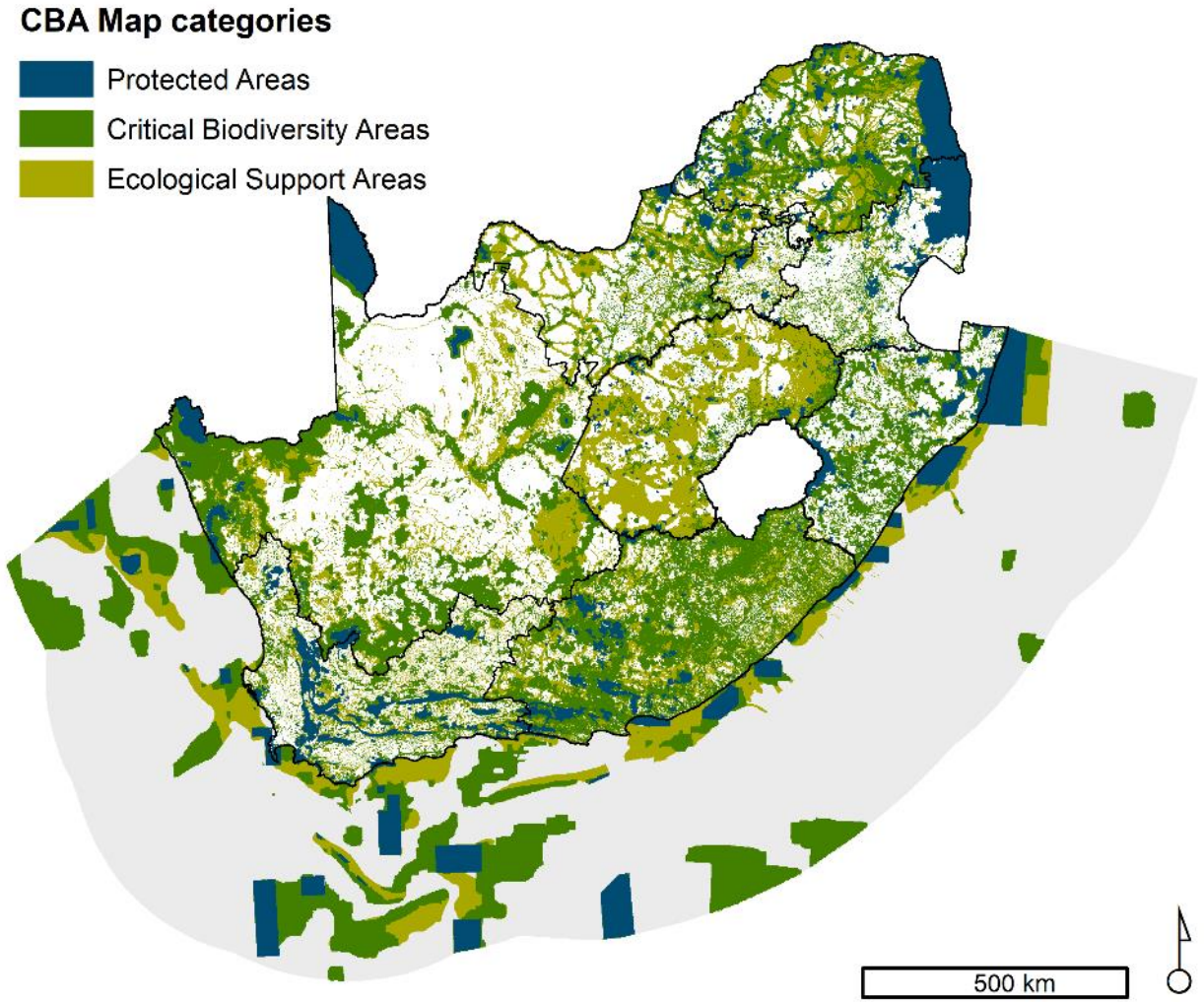




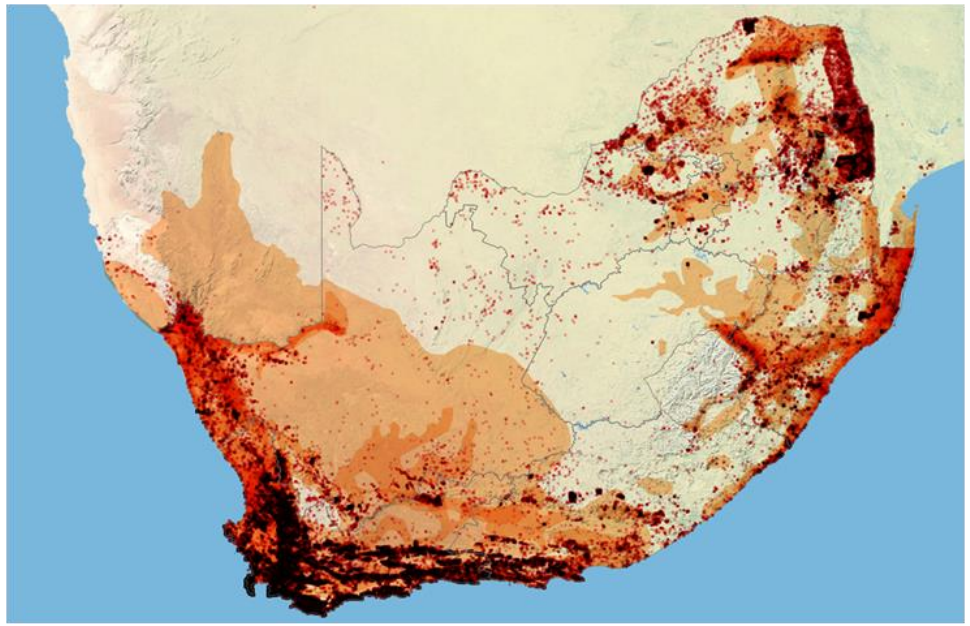
Provincial & Metro Systematic Conservation Plans (SCPs) & Critical Biodiversity Area (CBA) Maps

- Provincial biodiversity plans & Metro plans together cover all of South Africa



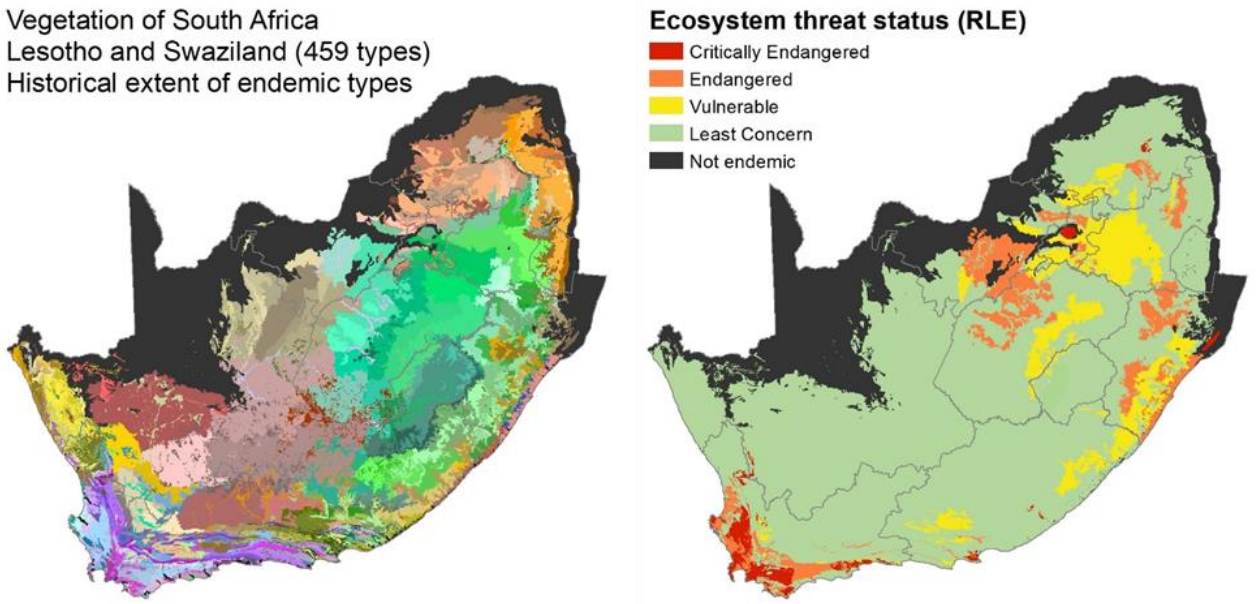


Key Biodiversity Areas (KBAs)



Species

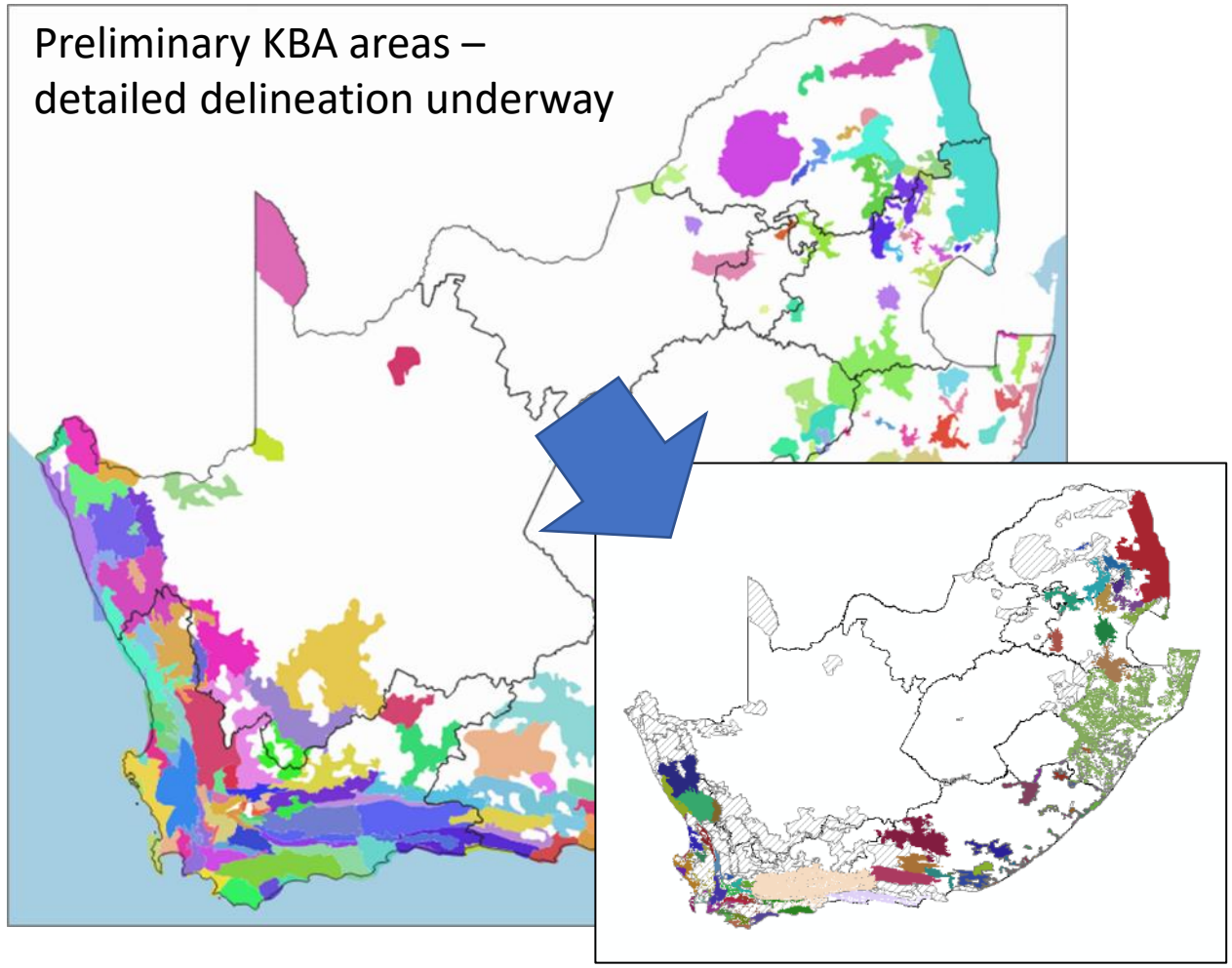
Mammals, birds, amphibians, reptiles, plants, freshwater fish, butterflies, dragonflies, selected other invertebrates

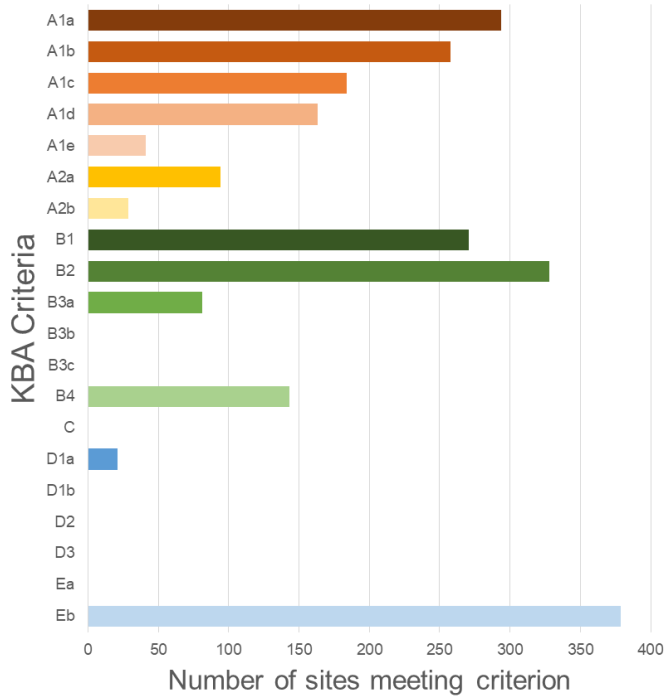


Ecosystems

385 endemic ecosystems (34 CR, 34 EN, 28 VU)

Key Biodiversity Areas (KBAs)



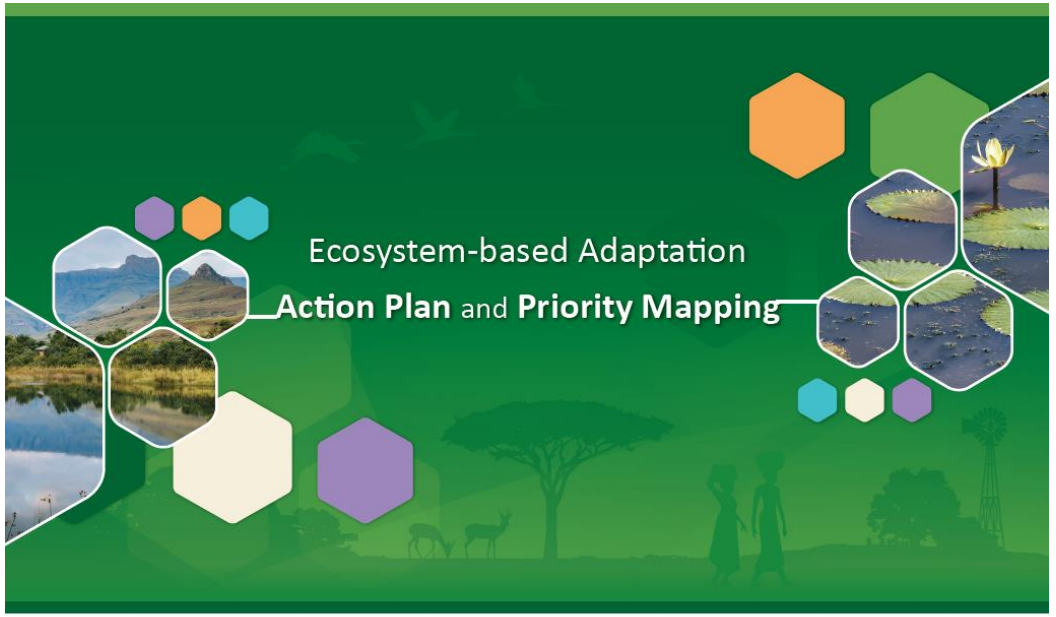


Ecosystem-based Adaptation

Action Plan & Priority Mapping

Ecosystem-based Adaptation (EbA)

- Fantastic resource
  - Nexus approach, logic model & spatial data
  - Lessons learned
- & comparative opportunity:
  - Scale
    - Input rasters: 100x100m (1 ha)
    - Prioritization analysis: 10x10km grid (1 000 ha)
  - Updated source data now available
  - Different purpose & methodologies
    - Multiple criteria vs SCP



LINK:
https://www.sanbi.org/wp-content/uploads/2020/10/Action-Plan-Priority-Maps-Full-Report-Digital-High-res.pdf

Citation:

Department of Environment, Forestry and Fisheries (DEFF), 2019. Ecosystem based adaptation Action Plan and Priority Areas Mapping report. Pretoria, South Africa.

Ecosystem-based Adaptation (EbA): DEFF, 2019

1. Ecological Infrastructure extent:
   - a. Water EI
   - b. Nature-based Tourism EI
   - c. Rangeland EI
   - d. Biodiversity Resilience EI
   - e. Carbon EI
2. EI condition for each EI model
3. Social demand for EI
4. Risk of EI being lost to human development
5. Biodiversity importance
6. Climate change vulnerability of ecosystems
7. Existing EbA projects

ECOSYSTEM SERVICE CATEGORIES			DATA SOURCE			
Ecosystem service level 1	Ecosystem service level 2	EbA thematic area	DEA 2015a	Biodiversity Planning Forum	Turpie *et al.* 2017	Grand total
Air quality	Amelioration of local air	HEALTH and WELLBEING		1	1	2
Biodiversity	Biological control	HEALTH and WELLBEING		3		3
	Control of pests and pathogens	FOOD SECURITY			1	1
	Future genetic potential	HEALTH and WELLBEING	2	2		4
	Medicinal/muthi plants					
	Pollination services					
	Species harvested commercial					
	Species harvested recreation					
	Species harvested subsistence					
Carbon stored in plants and soil	Carbon fixing					
	Carbon retention					
Coastal ecosystems	Control of erosion and sedimentation					
	Sea-level rise/Coastal storm protection					
Crop agriculture	Dryland agriculture					
	Irrigation agriculture					
	Niche agriculture					
	Plantation forestry					
Cultural and religious value	Amenity values					
	Existence and bequest values					
	Heritage					
	Nature/ndalo/ithlathi					

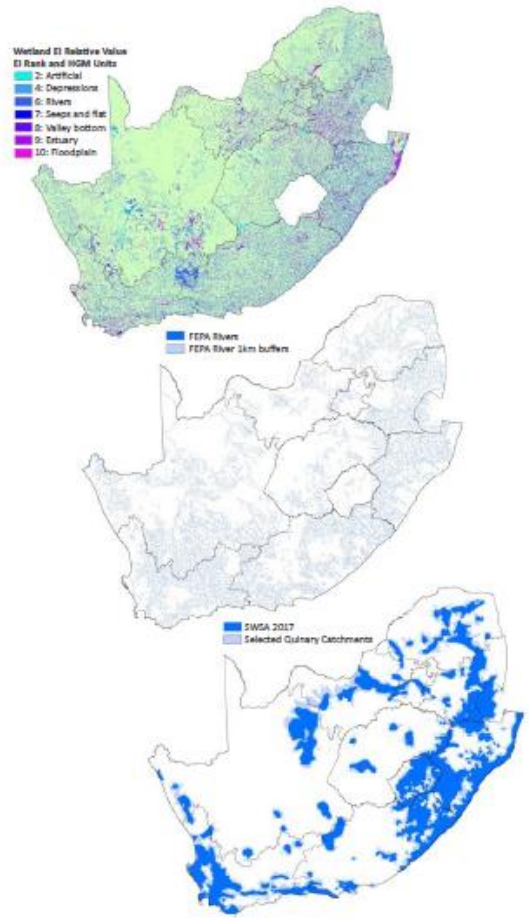
ECOSYSTEM SERVICE CATEGORIES			DATA SOURCE			
Ecosystem service level 1	Ecosystem service level 2	EbA thematic area	DEA 2015a	Biodiversity Planning Forum	Turpie *et al.* 2017	Grand total
Cultural and religious value	Quality of life	HEALTH and WELLBEING		1		1
	Scientific and educational value	HEALTH and WELLBEING			1	1
	Sense of place	HEALTH and WELLBEING		1		1
	Species used for culture	HEALTH and WELLBEING	1			1
Biodiversity resilience	Areas supporting climate change resilience	DISASTER RISK REDUCTION		1		1
	Critical habitats/refugia	DISASTER RISK REDUCTION			1	1
	Landscape connectivity	DISASTER RISK REDUCTION		1		1
Freshwater ecosystems	Flood attenuation	DISASTER RISK REDUCTION		1		1
	Flow regulation	DISASTER RISK REDUCTION			1	1
Nature-based tourism	Natural land/seascapes	NATURE-BASED ECONOMY	7	2		9
Non-tree products	Genetic resources	NATURE-BASED ECONOMY			1	1
	Harvested renewable resources	NATURE-BASED ECONOMY			1	1
	Honey	NATURE-BASED ECONOMY				
	Horticulture	NATURE-BASED ECONOMY	1	1		2
Rangeland resilience						

ECOSYSTEM SERVICE CATEGORIES			DATA SOURCE			
Ecosystem service level 1	Ecosystem service level 2	EbA thematic area	DEA 2015a	Biodiversity Planning Forum	Turpie *et al.* 2017	Grand total
Terrestrial ecosystems	Fire management	DISASTER RISK REDUCTION		1		1
	Landslide reduction	DISASTER RISK REDUCTION		1		1
	Rangeland productivity	DISASTER RISK REDUCTION		1		1
	Regulation of local climate	DISASTER RISK REDUCTION		1	1	2
Tree products	Fuelwood	NATURE-BASED ECONOMY	4	1		5
	Harvested renewable resources	NATURE-BASED ECONOMY			1	1
	Timber	NATURE-BASED ECONOMY	2	1		3
Water provision and regulation	Water delivery	WATER SECURITY	3	2		5
	Water quality	WATER SECURITY		3	1	4
	Water source	WATER SECURITY	1	3		4
Wildlife economy	Game production	NATURE-BASED ECONOMY	1			1
	Genetic resources	NATURE-BASED ECONOMY		1		1
	Tourism and hunting	NATURE-BASED ECONOMY	3			3
Grand Total			51	44	19	114

Table 4: Summary of input datasets sourced or developed for this project.

	Name	Source	Date	Notes
1	Gullies	ARC	2011	Agricultural Research Council (ARC) mapped dongas and gullies (Mararakanye and Le Roux 2011)
2	National Invasive Alien Plant Survey	ARC	2010	
3	Predicted soil loss	ARC	2007	Modelled soil erosion (ARC-ISCW, 2004)
4	Water erosion	ARC	2008	
5	Wind erosion	ARC	2008	
6	Important Bird Areas	BirdLife	2015	
7	Rainfall (Mean Annual Precipitation) ★	CCWR	2007	Computer Centre for Water Research (CCWR) South African Climate Atlas (Schulze 2007)
8	Strategic Water Source Areas (SWSAs) ★	CSIR	2017	Le Maitre *et al.* (2018). Based on Mean Annual Precipitation data from Schulze (2007)
9	Long-term grazing capacity	DAFF	1993	Department of Agriculture, Forestry and Fisheries (DAFF) data released in 2018 based on 1993 large stock unit (LSU) estimates
10	National Protected Area Expansion Strategy (NPAES)	DEA	2016	Protected area expansion focus areas (DEA 2016)
11	South African national carbon stock surfaces ★	DEA	2015	Modelled carbon stocks (DEA 2015b)
12	Spot building count	ESKOM	2015	Point vector, 2006–2015 time series
13	Elevation	JAXA	2018	Japan Aerospace Exploration Agency (JAXA) Advanced Land Observing Satellite (ALOS) Global Digital Surface Model – 30m (AW3D30 Version 2.1)
14	Wetland probability	Nacelle Collins , DEA	2018	National Biodiversity Assessment (NBA) 2018 (SANBI 2019)

	Name	Source	Date	Notes
15	Bush encroachment	SAEON	2018	Derived from National Land Cover 2013/14 by the South African Environmental Observation Network (SAEON) (DEA 2015c)
16	Coastline	SANBI	2018	South African vegetation map used to set standard coastline
17	Land cover	SANBI	2018	NBA 2018: Landcover_SANBI_NBA
18	Land cover change	SANBI	2018	NBA 2018: HabModv51_AEA_withDocs
19	Protected areas	SANBI	2018	NBA 2018: NBA2018_PA_working
20	Provincial Critical Biodiversity Area (CBA) maps (11)	SANBI+	2018	BGIS (bgis.sanbi.org) as well as from provincial conservation planners
21	South African vegetation types	SANBI	2018	NBA 2018: Veg18_v6b_Coastal_ALS_20180820_ddw
22	Wetlands mapped	SANBI	2018	NBA 2018: Wetlands_NBA_SAIIAE_v2_20181106
23	Population census	Stats SA	2011	Statistics South Africa (Stats SA) Small place data
24	Air pollution NO_2	This project	2018	500m, Google Earth Engine (GEE) Sentinel5, July to December 2018
25	Bare ground	This project	2018	30m, from GEE Landsat and Moderate Resolution Spectroradiometer (MODIS)
26	Fire frequency	This project	2018	500m, from GEE Landsat and MODIS, 17-year timeseries
27	Normalised Difference Vegetation Index (NDVI) trend	Venter *et al.*	2018	30m, from GEE Landsat and MODIS, 33-year timeseries (Venter *et al.* in prep)
28	Woody cover	This project	2018	30m, from GEE Landsat and MODIS
29	Woody trend	This project	2018	30m, from GEE Landsat and MODIS, 33-year timeseries
30	Global Terrestrial Human Footprint (GTHF)	Venter *et al.*	2016	GTHF maps for 1993 and 2009 from the Dryad data repository (Venter *et al.* 2016)
31	Ecosystem-based Adaptation area	Stephen Holness	2011	Data layer as used in the NBA 2011 (SANBI 2011)
32	Humic soils	DEA	2018	Soil carbon (DEA. 2019)
33	CSIR Green Book	CSIR	2019	Socio-economic and physical vulnerabilities at the local municipality scale (CSIR 2019)



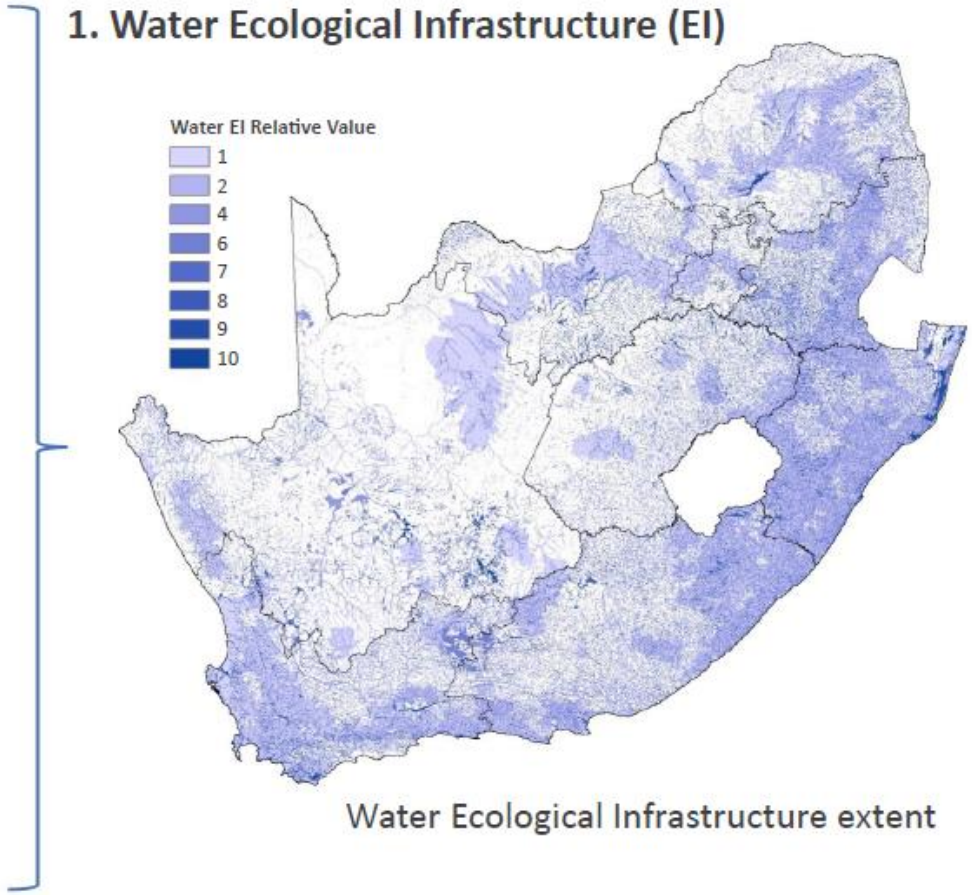


Figure 7: The extent of Water Ecological Infrastructure (EI) based on the extent of wetlands and wetland buffers, Freshwater Ecosystem Priority Areas (FEPA), rivers and river buffers, and Strategic Water Source Areas (SWSAs) for surface water and groundwater.

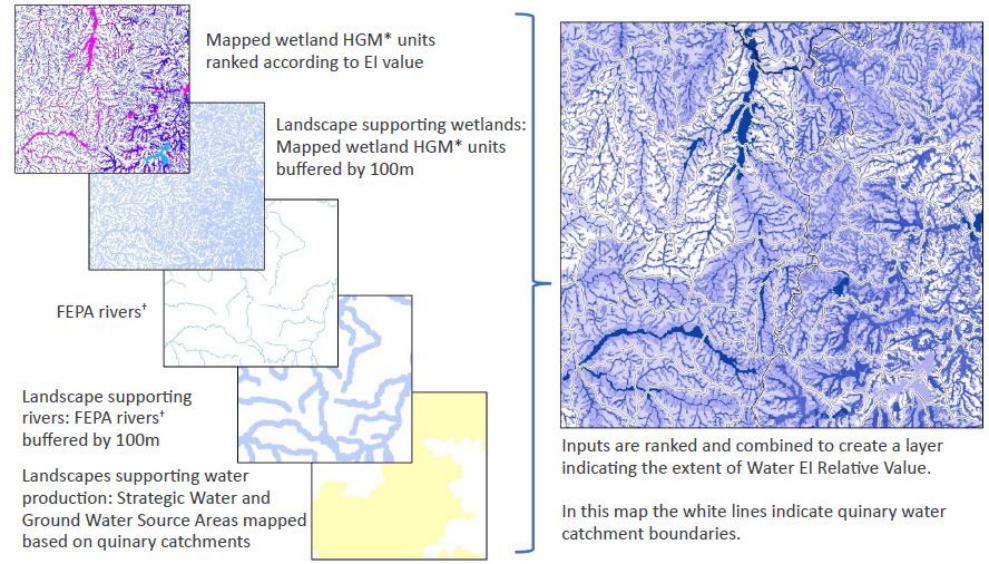


Figure 8: A close-up example of what the Water Ecological Infrastructure (EI) map looks like in terms of the raw input datasets and final EI model. (*Hydrogeomorphic, †Freshwater Ecosystem Priority Area)

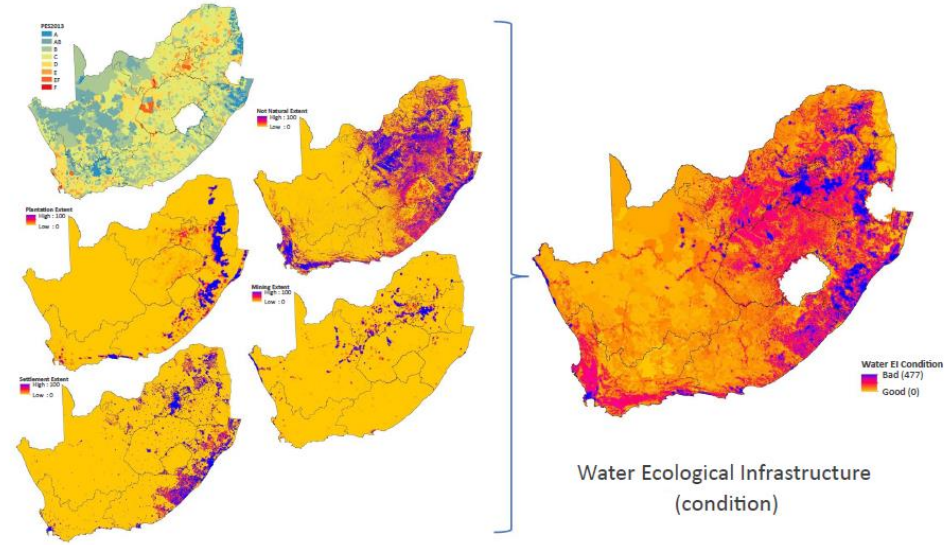


Figure 9: The map of Water Ecological Infrastructure (EI) condition based on sub-quaternary catchment Present Ecological State (PES) 2013 scores and neighbourhood extent of natural vegetation, plantations, mining and settlements

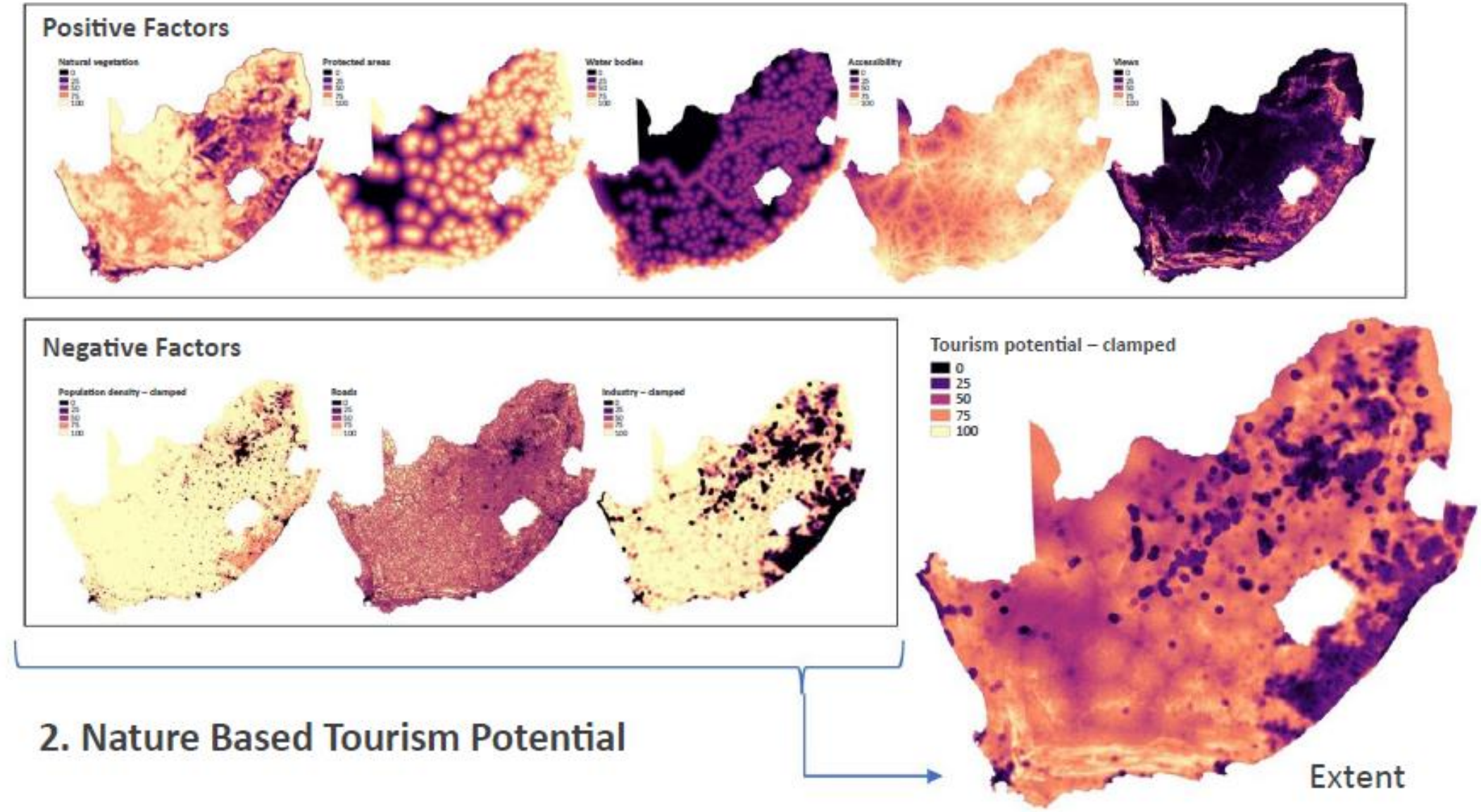


Figure 10: The extent of Nature-based Tourism Ecological Infrastructure (EI) based on a combination of positive factors (natural vegetation, protected areas, water bodies, accessibility and views) and negative factors (population density, roads and land use). No model was produced for Nature-based Tourism EI condition.

3. Rangeland Ecological Infrastructure

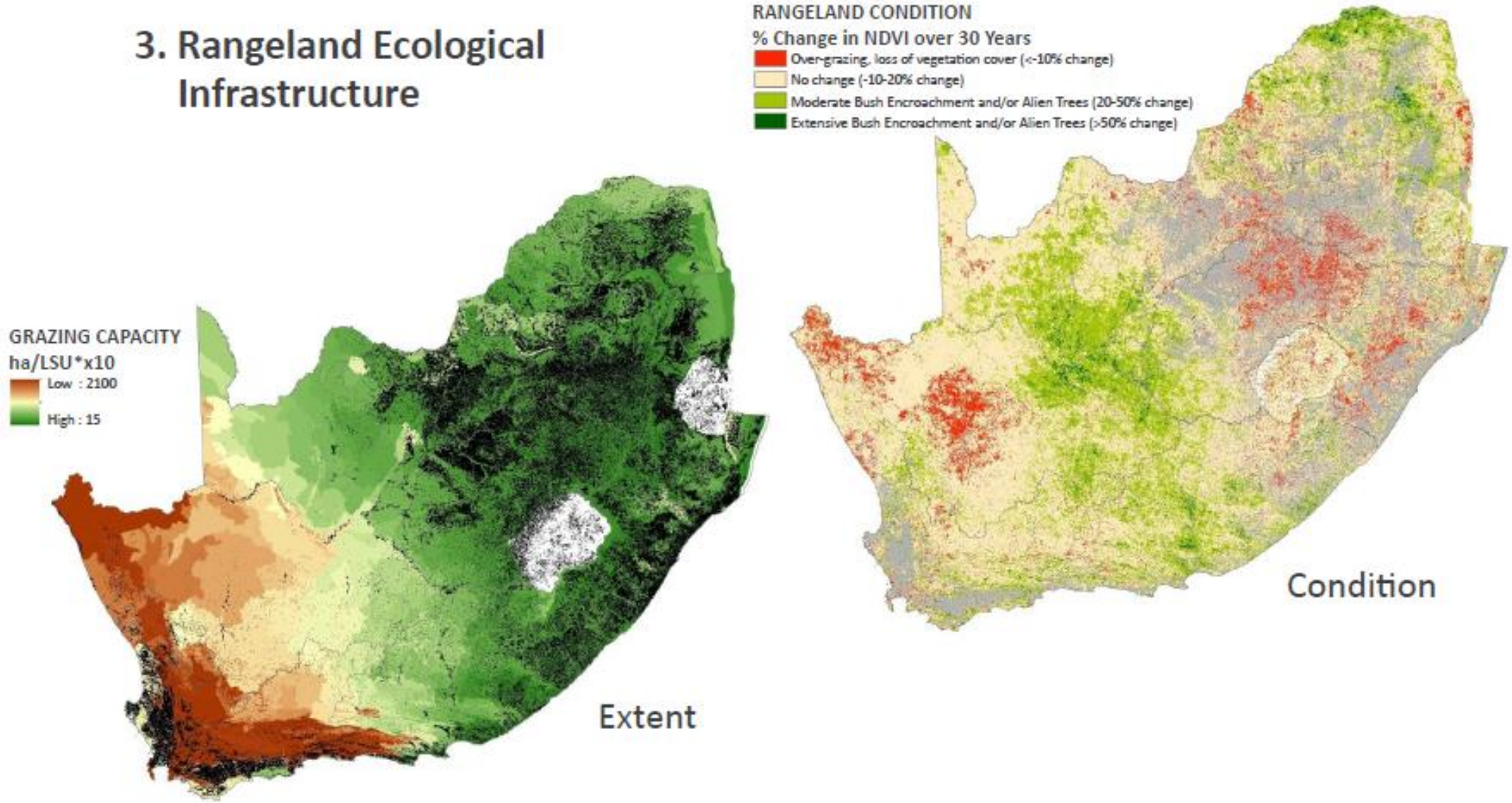


Figure 11: The extent of Rangeland Ecological Infrastructure (EI) based on livestock carrying capacity maps less not-natural areas, and Rangeland EI condition based on the trend in rangeland Normalised Difference Vegetation Index (NDVI) over the last 30 years. (*Large stock unit)

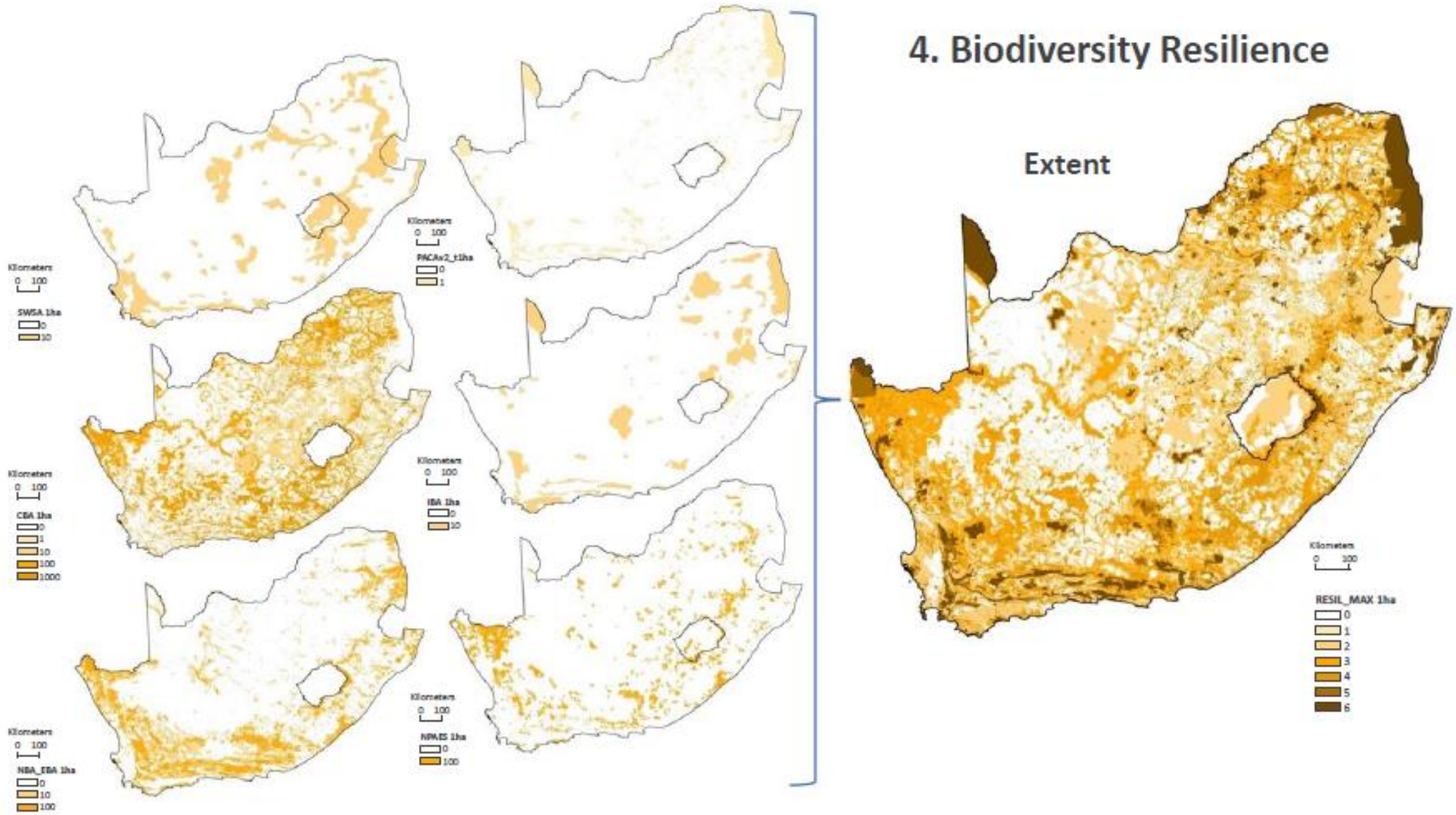


Figure 12: Extent of Biodiversity Resilience Ecological Infrastructure (EI) (right) based on the sum of spatial biodiversity planning tools. This represents the minimum amount of landscape required to maintain biodiversity patterns and processes. The inputs (left) include Strategic Water Supply Areas, (SWSAs), protected areas, Critical Biodiversity Area (CBA) maps, Important Bird Areas, climate change resilience areas, and National Protected Areas Expansion Strategy (NPAES) areas. The categories in the final map (right hand side)represent CBA map equivalents: 6=Protected Areas (high resilience), 5 = Conservation Areas, 4 = CBA1, 3 = CBA2, 2 = Ecological Support Areas 1, 1 = Ecological Support Areas 2 and 0 = No Natural Habitat Remaining (low resilience). This map also represents areas important for biodiversity climate change adaptation.

5. Carbon El

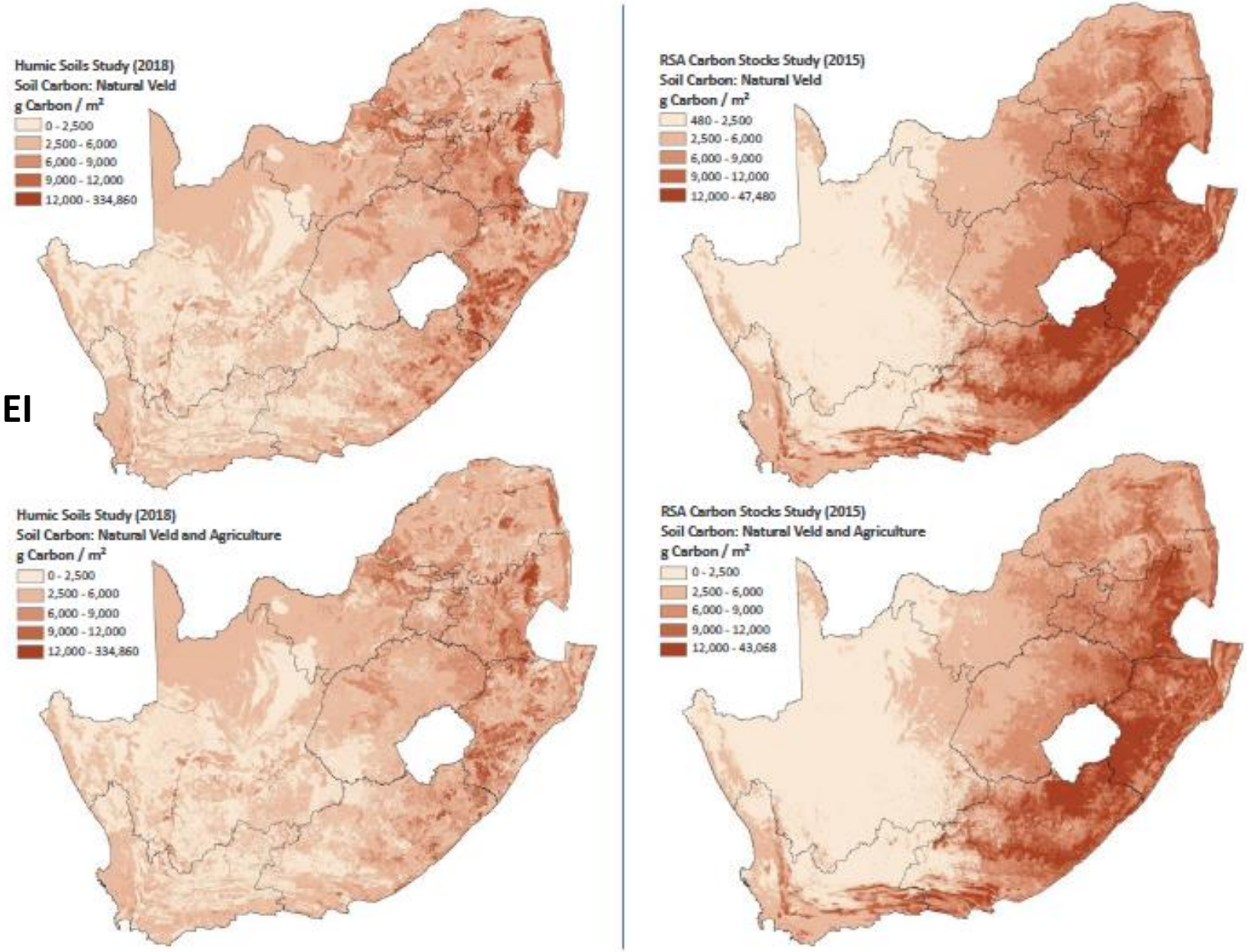


Figure 14: Comparison of different potential soil carbon datasets – Humic soils study (DEA 2019, left) and the South African carbon stocks study (DEA 2015b, right) under baseline conditions (top) and considering agriculture (bottom).

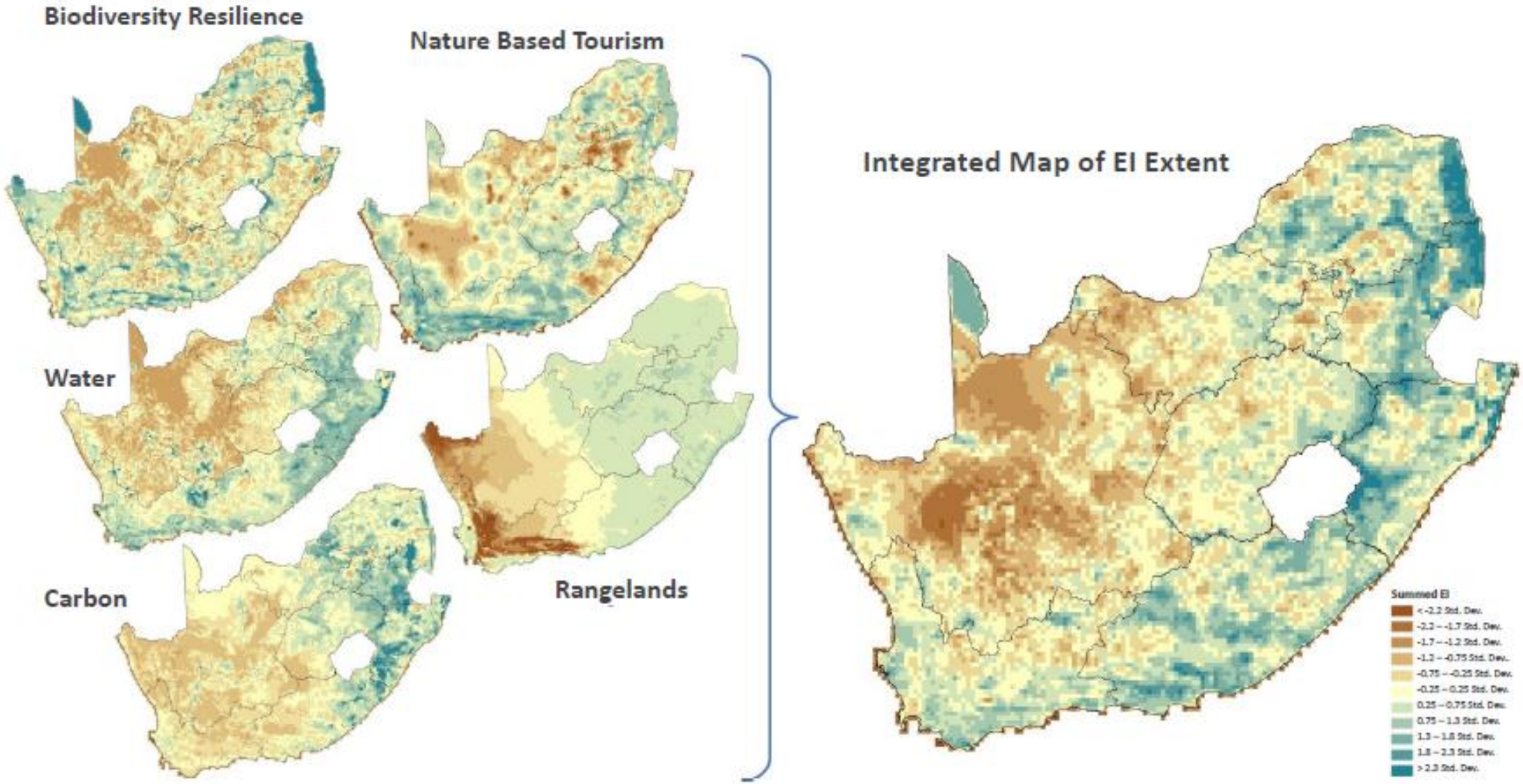


Figure 16: The integrated map of Ecological Infrastructure (EI) extent based on the sum of the five individual EI extent models. Values in the EI extent maps are relative and have no units.

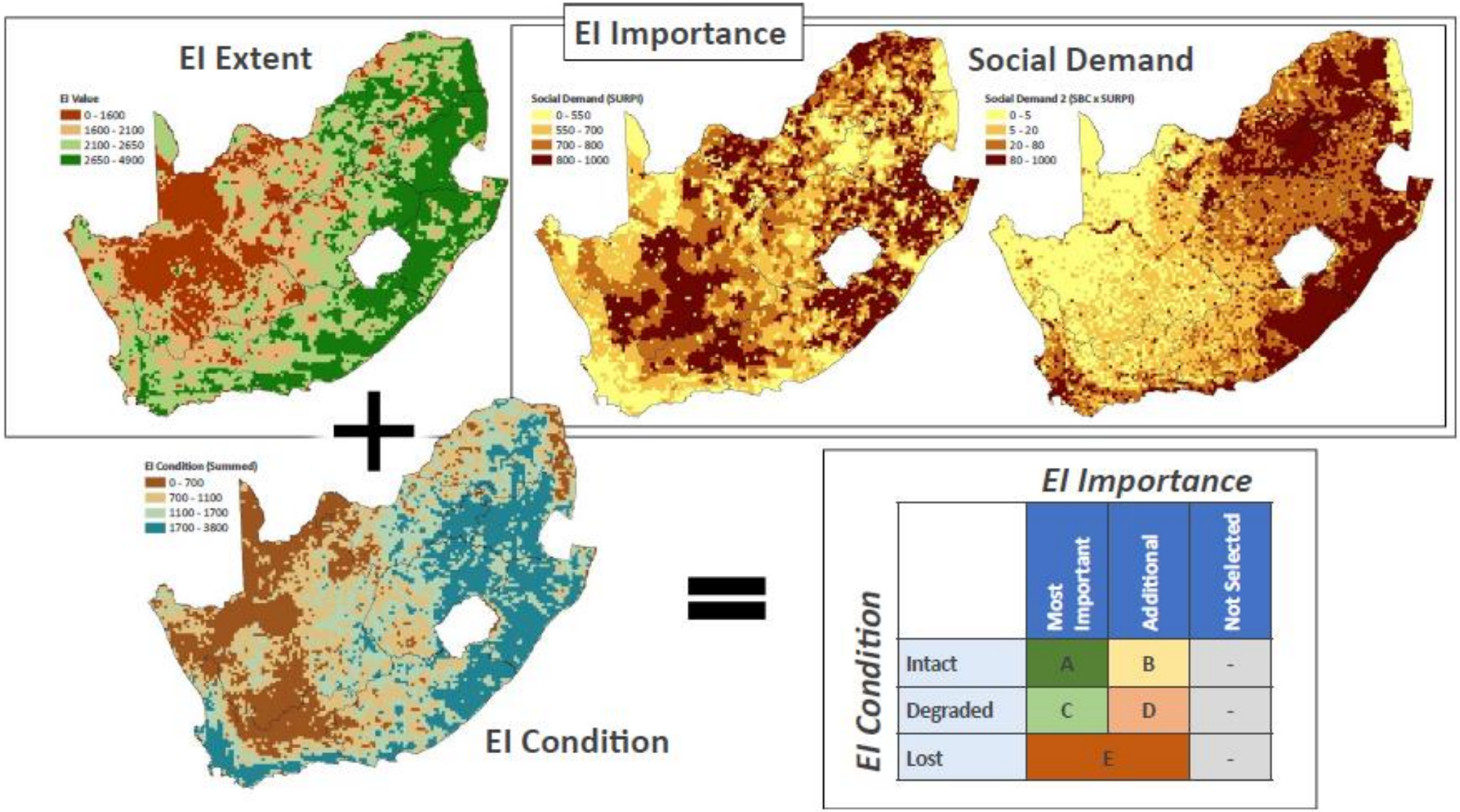


Figure 24: The final model outputs (EI importance, Social Demand and EI condition) and their integration to identify national-level and biome-level spatial priorities for the EbA action in terms of the four response categories (A, B, C and D). Two versions of social demand are considered (SURPI and population weighted SURPI). Figure 25 on the following page depicts the response matrix spatially.

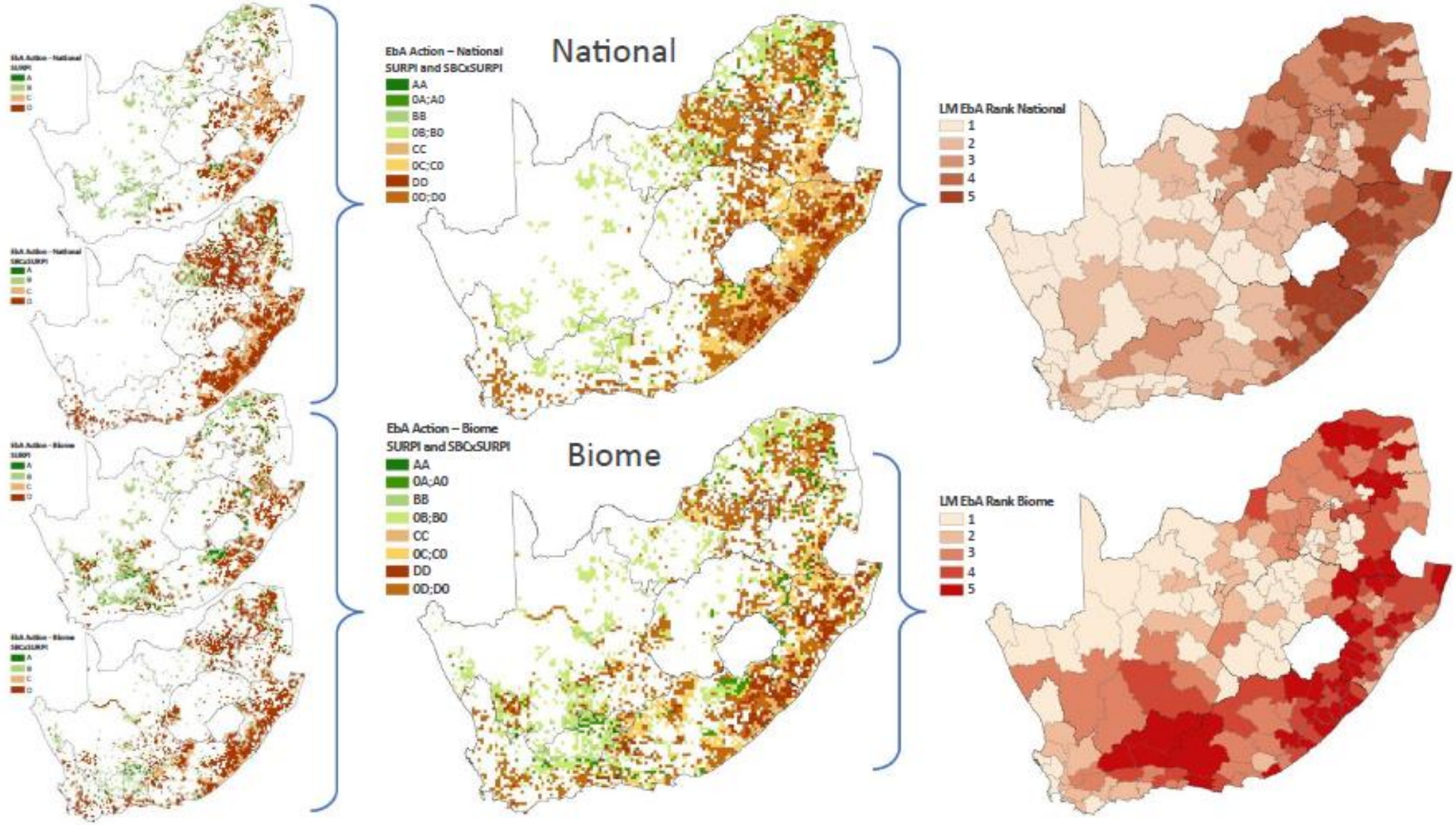


Figure 25: EbA priorities (response matrix categories) for the national-level and biome-level analyses, and for the two social demand models. On the right the EbA priorities are aggregated to the local municipality level to depict those local municipalities with the greatest EbA action potential. In Figure 26 on the following page the national and biome local municipality priority maps are integrated into a single map.

Water Security Features

Downscaled Mean Annual Precipitation

(Lötter & Le Maitre, 2021)

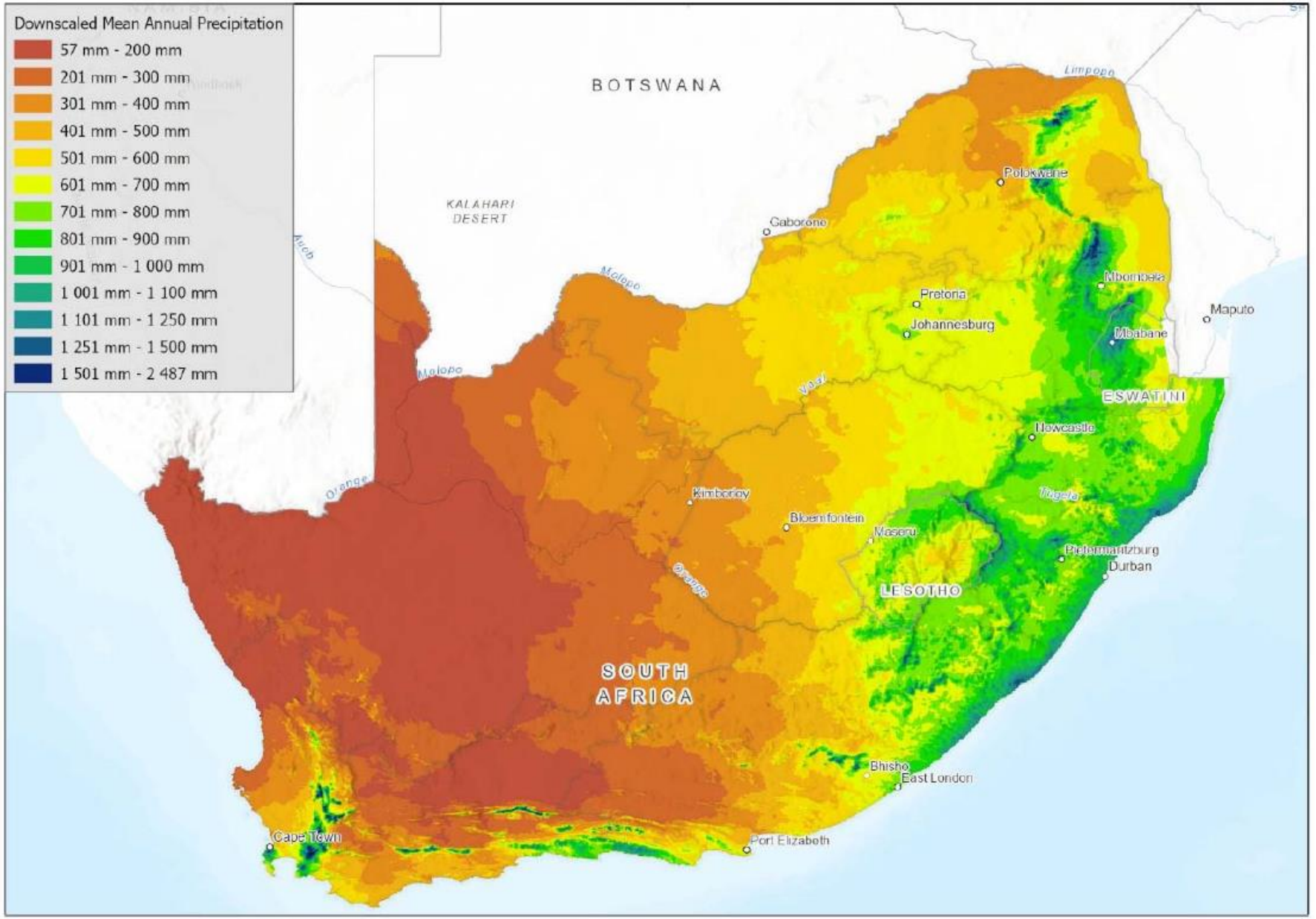


Figure 12: Downscaled precipitation surface used to inform the fine-scale delineation of SWSAs.

Full Citation:
Lötter, M.C. & Le Maitre, D. (2021) Fine-scale delineation of Strategic Water Source Areas for surface water in South Africa using Empirical Bayesian Kriging Regression Prediction: Technical report. Prepared for the South African National Biodiversity Institute (SANBI), Pretoria. 33 pages.

Downscaled Mean Annual Precipitation

(Lötter & Le Maitre, 2021)

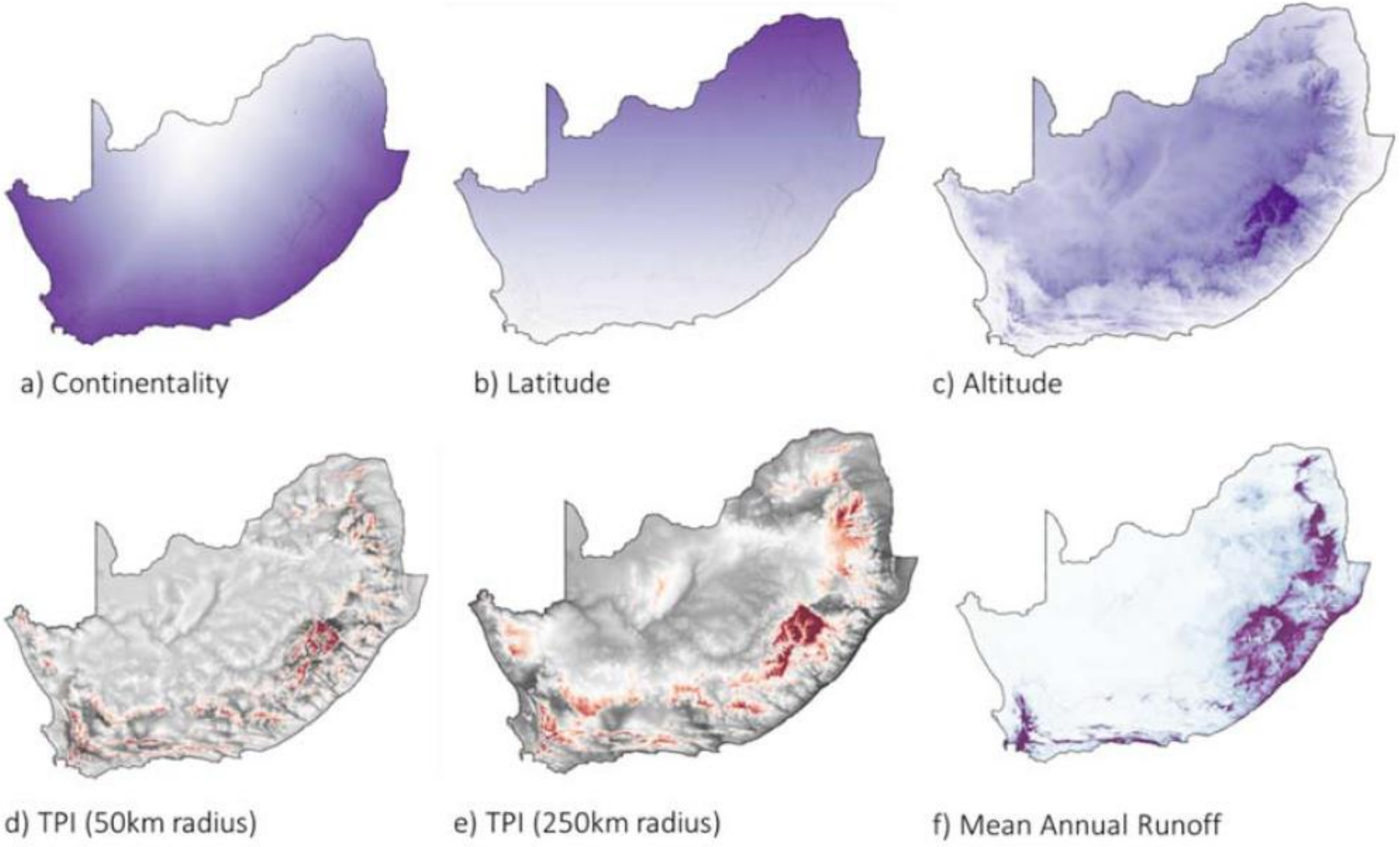
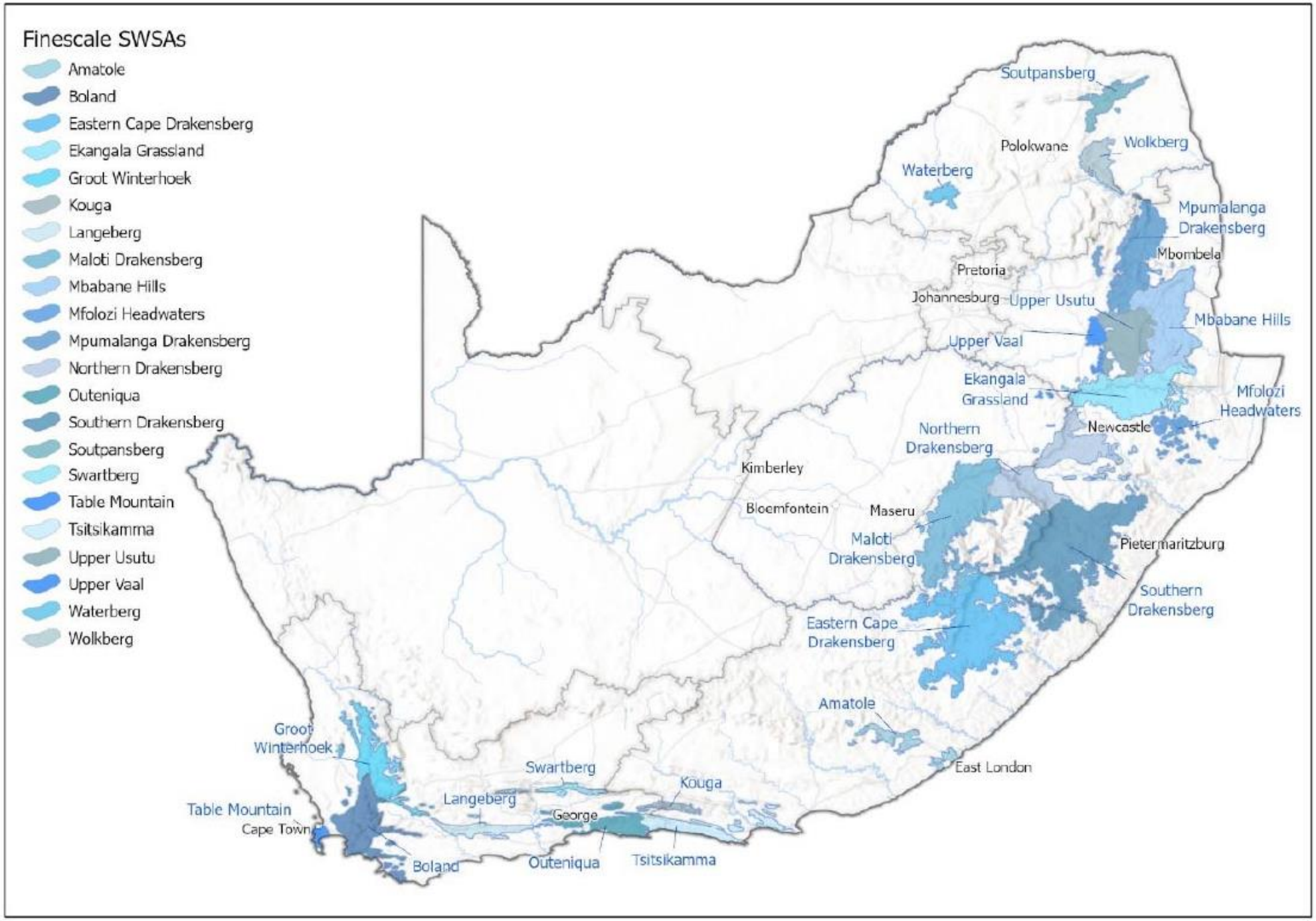


Figure 4: Explanatory variables included in the EBK Regression Prediction to predict precipitation at local scales.

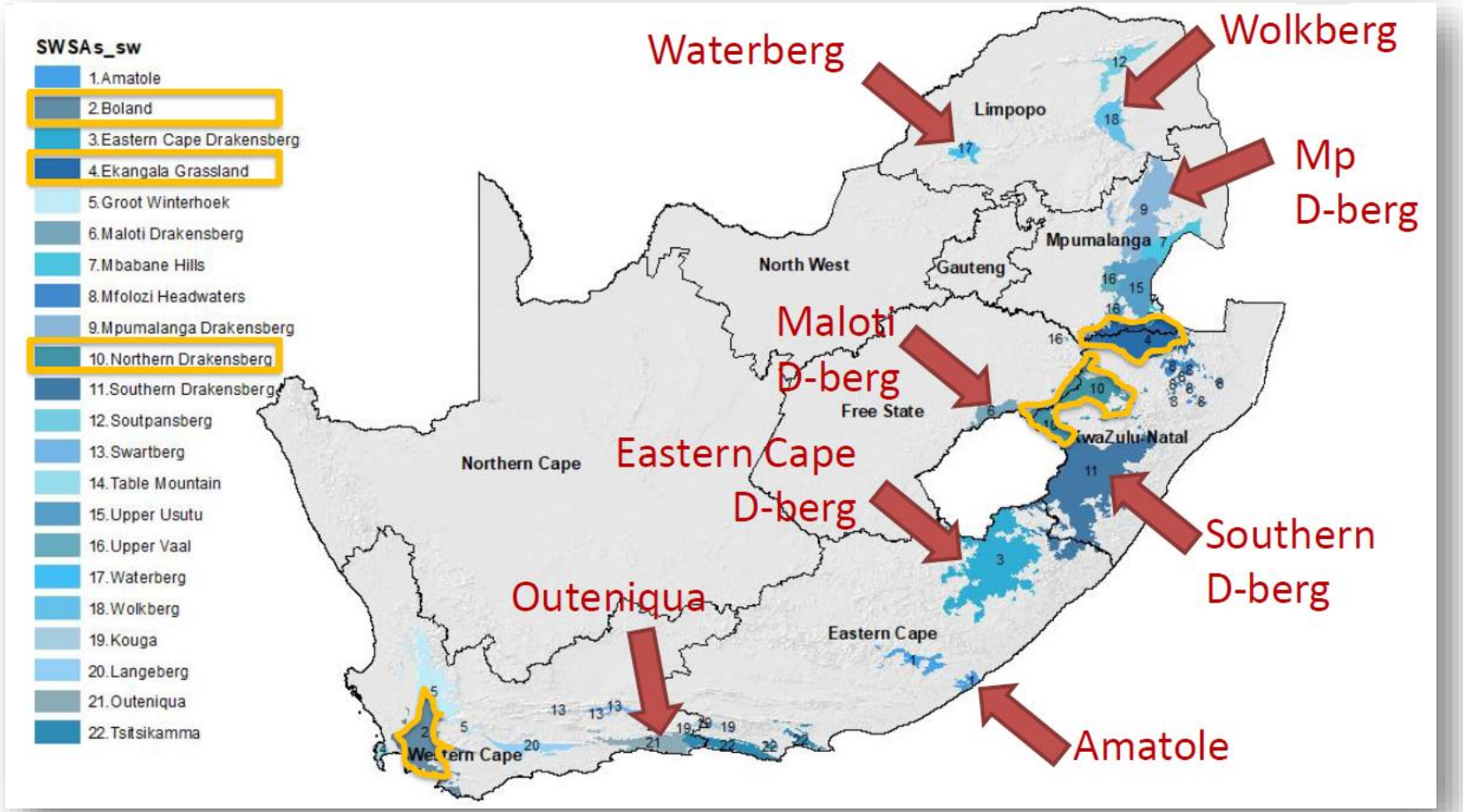
SAWS Rainfall Districts

Strategic Water Source Areas (n=22)



Prioritized SWSAs (11 of 22 = MTSF target)

(SANBI, 2021)



Other water supply data (surface & groundwater)

- Recharge Areas (NFEPA, 2011)
- Groundwater Strategic Water Source Areas (WRC, CSIR & Delta-H, 2018)
- Water supply systems & downstream dependence (DWA, 2013; Nel et al., 2017)

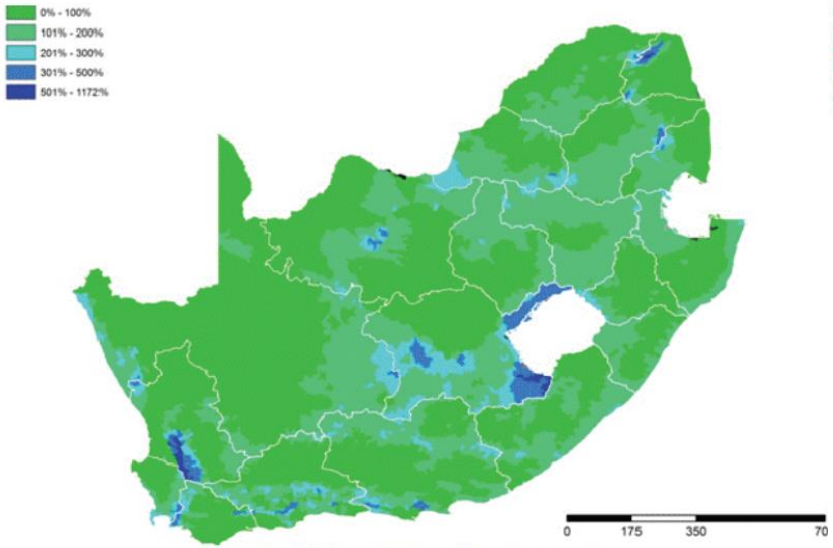
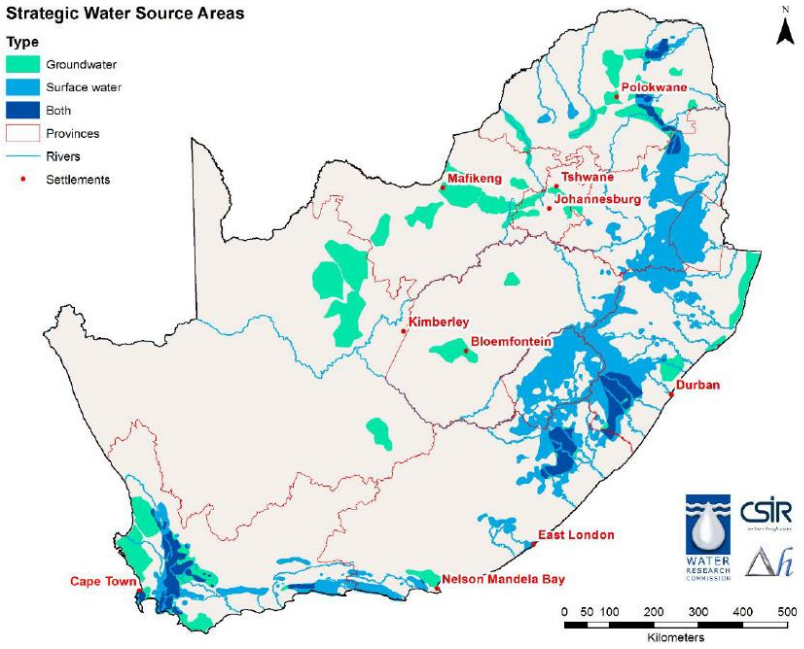


Figure 3.20: High groundwater recharge areas
High groundwater recharge areas are sub-quaternary catchments where groundwater recharge is at least three times more than that of the primary catchment (shown on the map as > 300%).



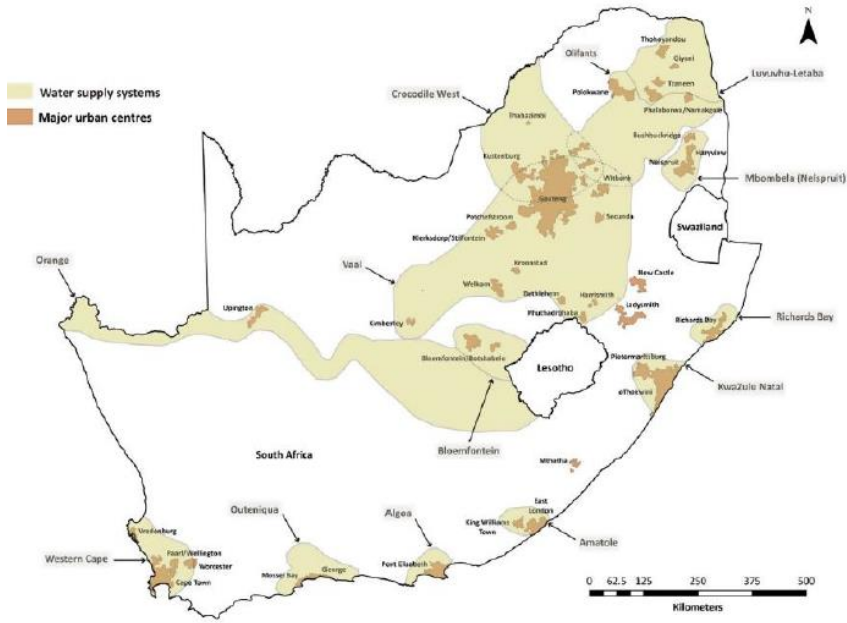


Fig. 2. Large water supply systems and major urban centres of South Africa (after DWA, 2013).

Invasive Alien Species

Features

Features: Invasive alien species data

- National Invasive Alien Plant Survey (ARC/Kotze et al., 2010)
- NBA 2018 / Red List species assessments:
  - Number of species threatened by invasive alien species per veg type

CC Mitigation: Carbon

Features

Features: Soil Carbon (Venter et al., 2021)

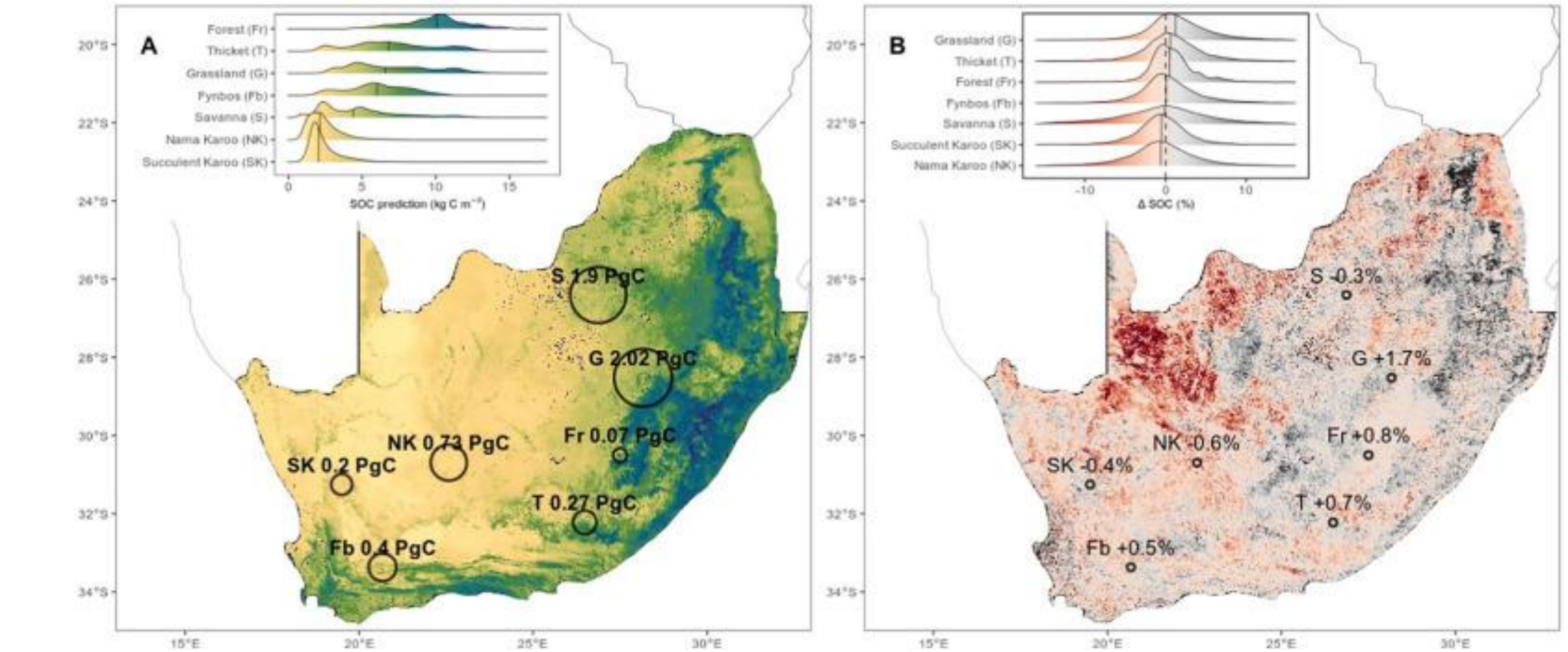


Fig. 2. Predicted long-term average SOC (A) and changes (B) between 1984 and 2019. Change is expressed as a percentage of the long-term average for each pixel. Inset plots in A and B show the density distribution of data values for each biome. White circles and text on the map in A indicate total SOC amounts within each biome in petagrams (10^{12} kg). Black text on the map in B indicates biome average changes in percent. *From Venter et al., 2021*

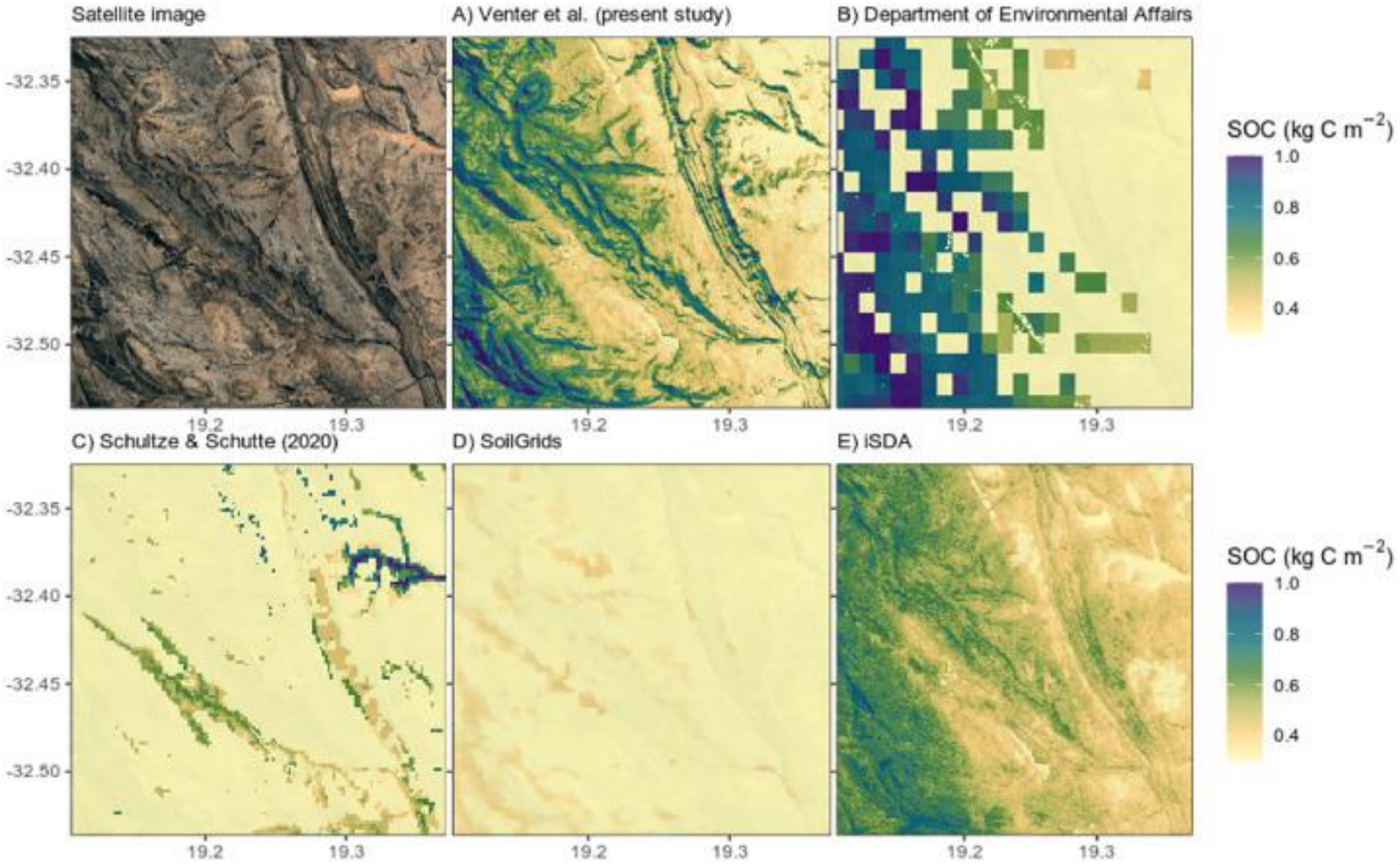


Fig.7. Landscape-scale maps of long-term average SOC as predicted by the model in the present study (A) and four other data sources (B–E).

A very high-resolution satellite image is shown on the top-left for reference.

From Venter et al., 2021

Features: CC Mitigation: Carbon

- Note other carbon data sources
  - Highlighted in EbA project above (biomass and NDVI)
- South African Carbon Sinks Atlas (environment.gov.za)

CC Adaptation: Disaster Risk Reduction

Features

Features: CC Adaptation: Disaster Risk Reduction

- Coastal risk (sea level rise, storm surge)
  - Coastal risk zones per province (W.Cape)
  - Fill others from Coastal Atlas?
- Wildfire/fire risk
  - Layer generated in EbA Project
- Erosion
  - Steep slopes, DEM, JAXA elevation
  - Dongas & gullies (ARC, 2011)
  - ARC water & wind erosion, predicted soil loss
- Flooding
  - Floodlines

- Potential source: University of Stellenbosch RADAR Research Alliance for Disasters and Risk Reduction

Biodiversity Economy: Wildlife

Features

Features: Biodiversity Economy / Wildlife

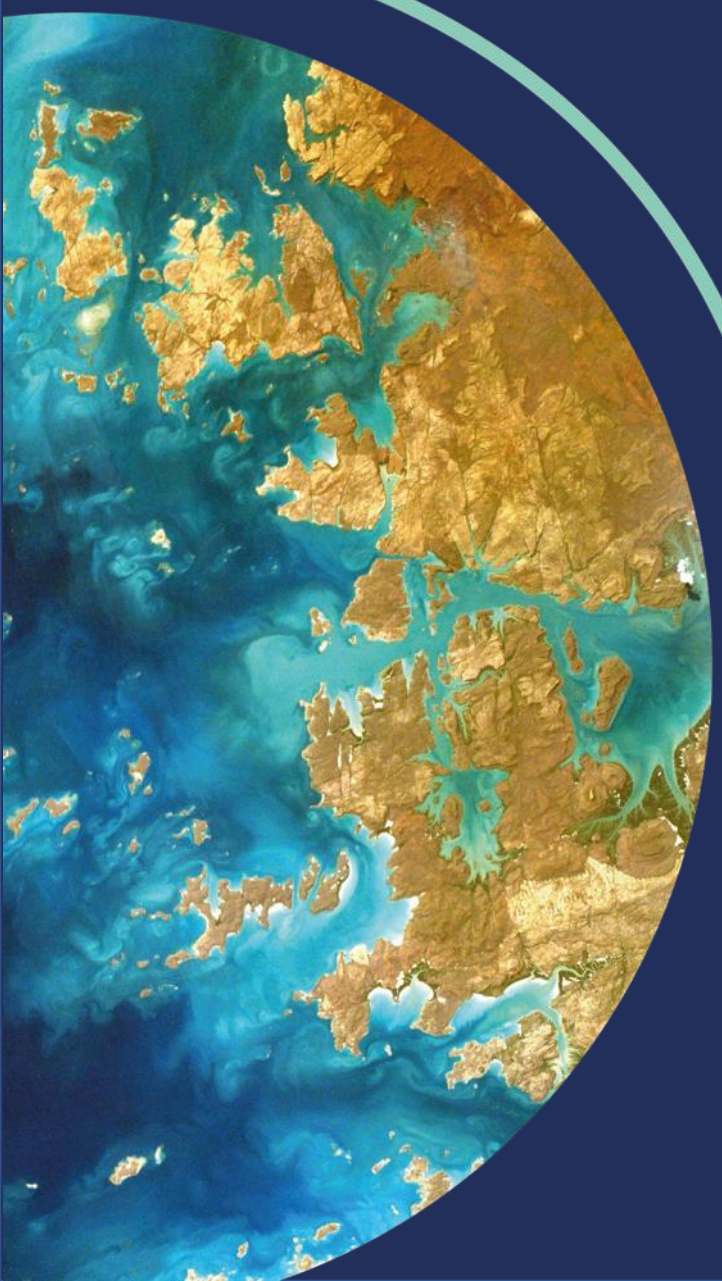
- Land capability: Soil capability + climate capability + terrain capability
- Extensive grazing / rangelands
- Livestock & stocking rates
- Biodiversity Economy Nodes / Wildlife Economy Nodes
- Game farms
- Game permits
- Protected agricultural areas
- Priority agricultural areas

Summary of South Africa's Datasphere

- Data rich =
  - Biodiversity
  - Water Security
  - Carbon

- Data uncertain =
  - Disaster Risk Reduction
  - Wildlife economy

- Data gaps =
  - Invasive alien species / invasive alien plants



Thank you!

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