



Overview

- South Africa's institutional arrangement for NCA
- Foundational data for ecosystem extent accounts
- Summary of the methodology and analysis
- Summary of results & indicators
- Lessons learned & challenges

Institutional arrangements – core partners for ecosystem accounting in South Africa



stats sa

Department:
Statistics South Africa
REPUBLIC OF SOUTH AFRICA

← National Statistical Office

- Leads Natural Capital Accounting
- Compiles and publishes Central Framework accounts
- **Publishes** ecosystem accounts

SANBI

Biodiversity for Life

South African National Biodiversity Institute



← Government agency under Ministry of Environment

- Mandate includes monitoring & reporting on the state of ecosystems
- **Data owner** for several key data layers for ecosystem accounts
- **Compiles** ecosystem accounts



**forestry, fisheries
& the environment**

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

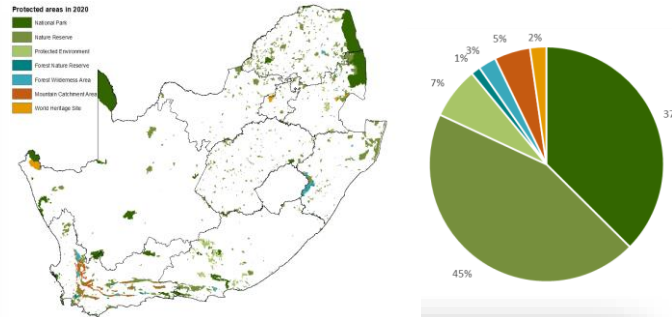
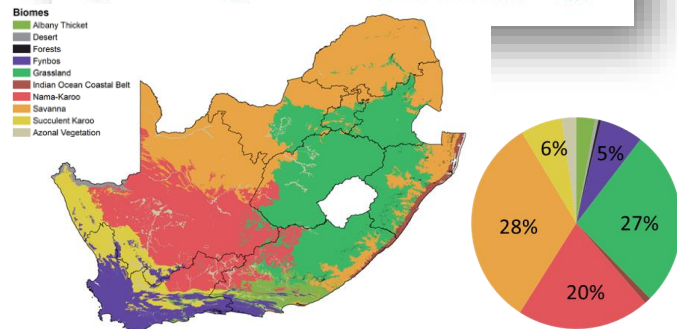
← Ministry of Environment

- Key user of ecosystem accounts
- **Data owner** for some key data layers for ecosystem accounts

Stats SA's *Natural Capital series*, launched in 2020

Which ecosystem types are under pressure from which land uses?

Accounts for Land and Terrestrial Ecosystems (released Dec 2020)



Accounts for Protected Areas (released Oct 2021)

Which ecosystem types are protected by which types of protected areas?



NATURAL CAPITAL 3 Accounts for Strategic Water Source Areas, 1990 to 2020

Forestry, Fisheries and the Environment
Statistics South Africa

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Catchments that feed SA's major dams

Ecological infrastructure assets for water security

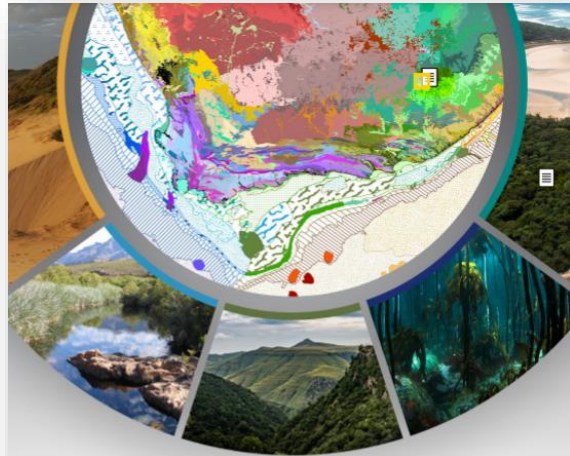
SANBI contributes best available science, spatial data layers, and expertise

Foundational data layers for ecosystem extent accounts

Two spatial data layers used for terrestrial ecosystem extent account

- National Vegetation Map provides spatial data on natural ecosystem types (natural biomes)
- National Land Cover provides spatial data on anthropogenic ecosystem types (intensive land use biome)

SA National Ecosystem Classification System

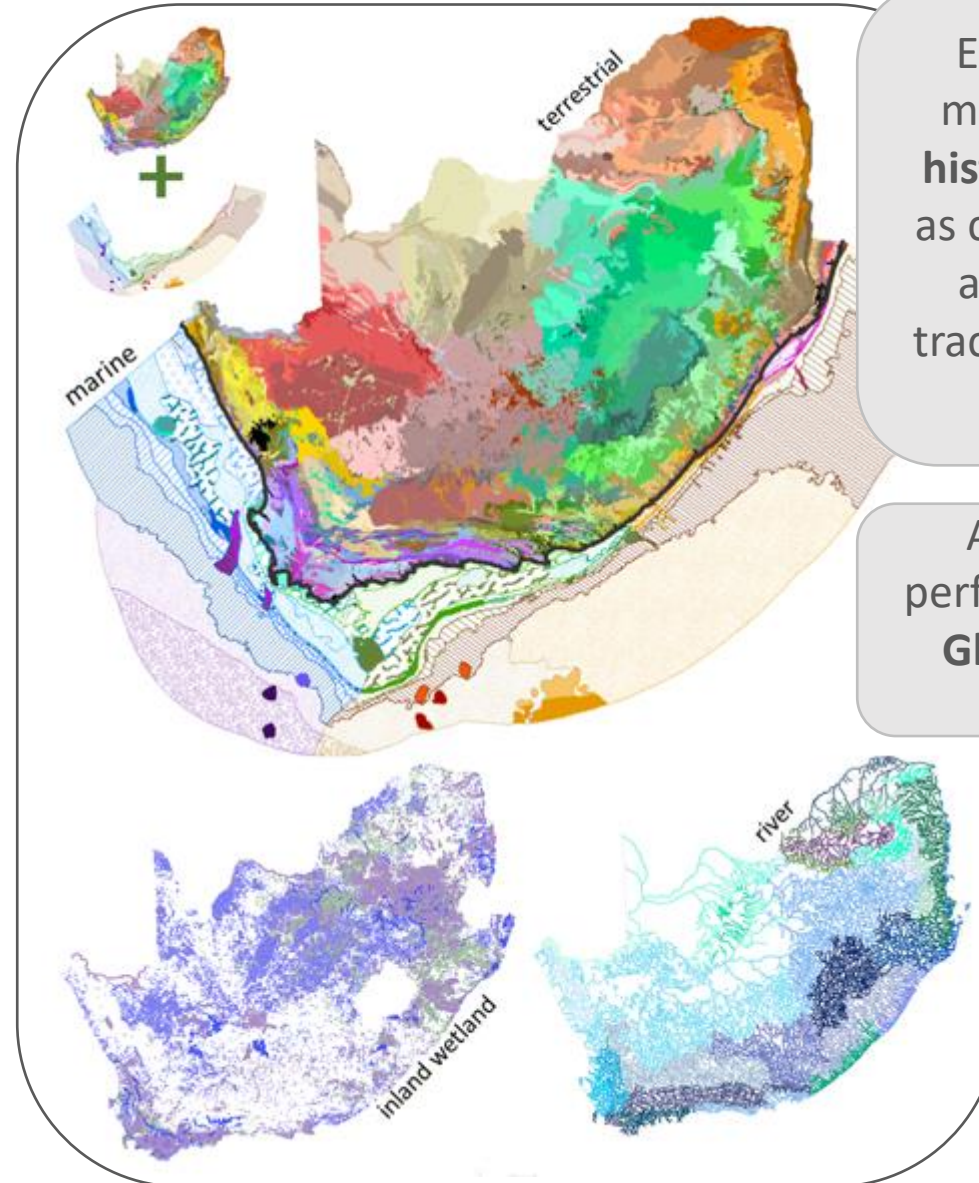


South African
National Ecosystem
Classification System
Handbook

SANBI
Biodiversity for Life
South African National Biodiversity Institute

Classification & mapping of **ecosystem types**:
Nested hierarchical classification across **all realms**, with maps and descriptions of ecosystem types

- SA-NECS adopted by Stats SA as a statistical standard in 2021
- Freely available online
- Governed by Ecosystem Classification Committees for each realm



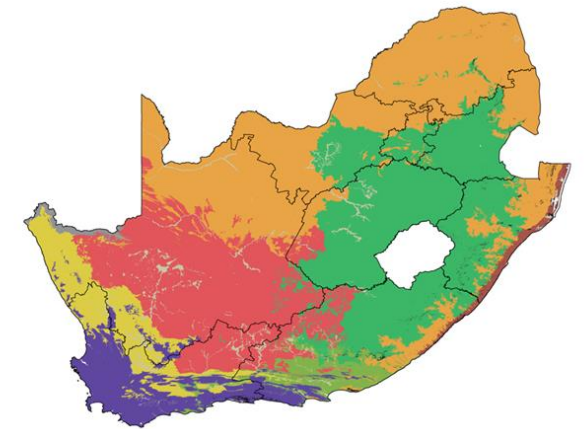
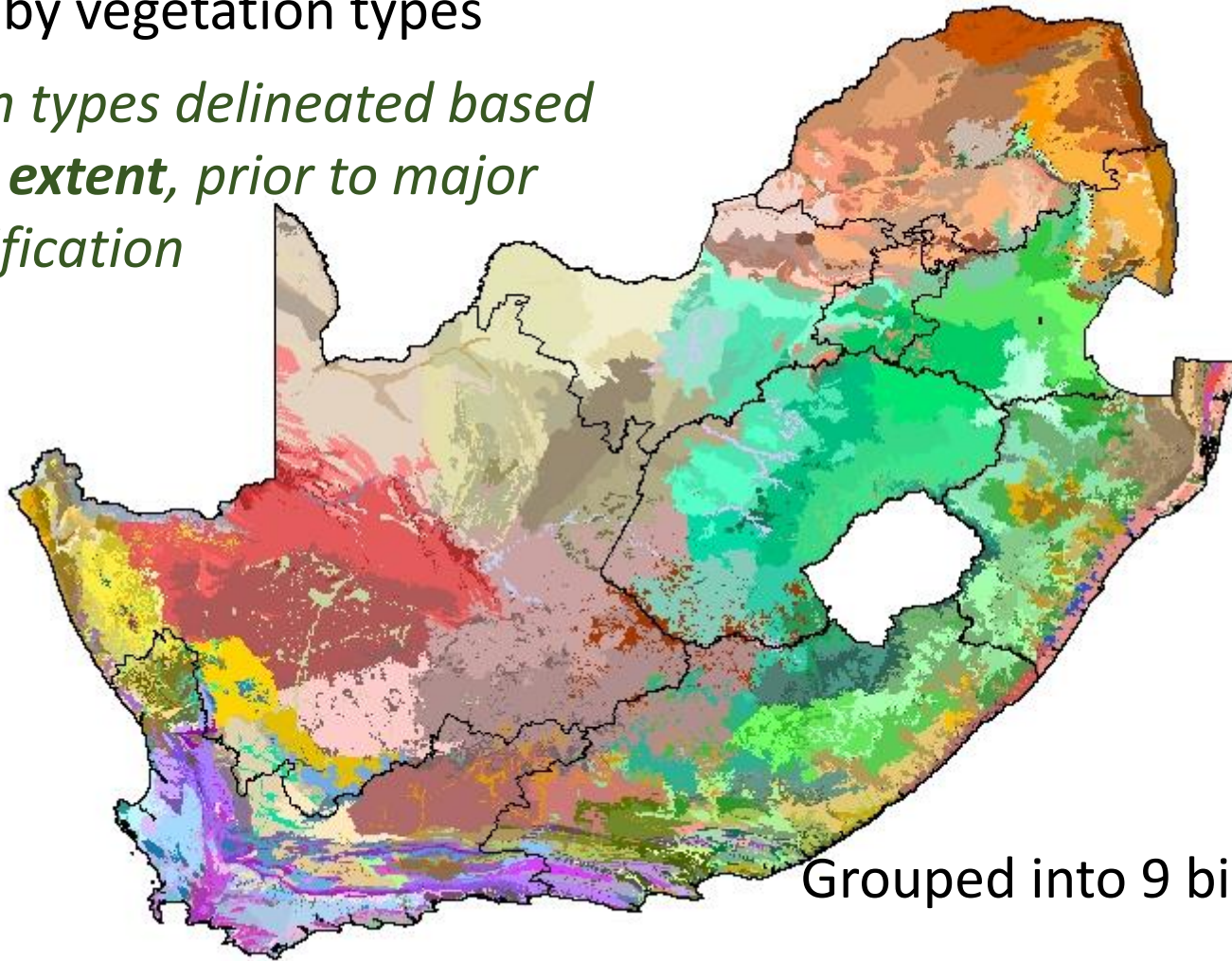
Ecosystem types mapped based on **historical extent** (or as close as possible), as a baseline for tracking change over time

Aligns well (not perfectly) with IUCN's **Global Ecosystem Typology**

Foundational data for *natural terrestrial ecosystems*: National Vegetation Map

458 terrestrial ecosystem types,
represented by vegetation types

→ *Ecosystem types delineated based
on **historical extent**, prior to major
human modification*



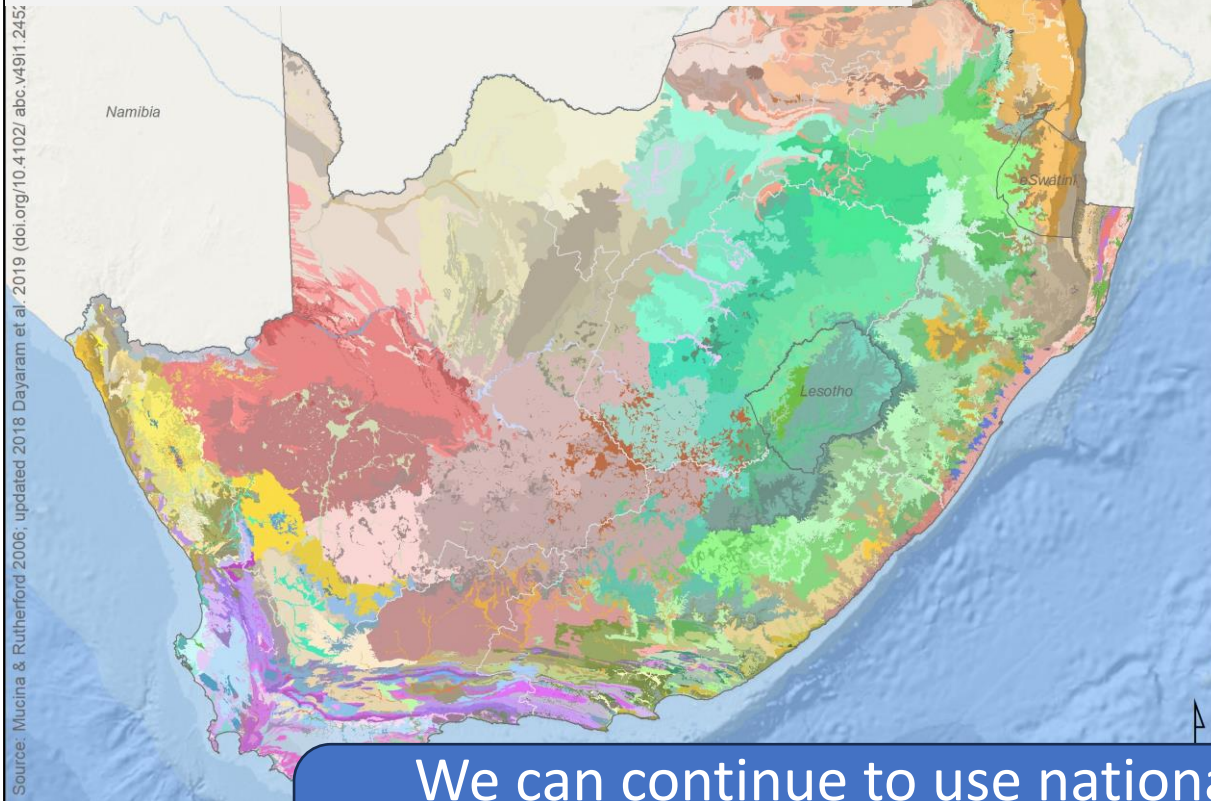
Biomes

- Albany Thicket
- Desert
- Forests
- Fynbos
- Grassland
- Indian Ocean Coastal Belt
- Nama-Karoo
- Savanna
- Succulent Karoo
- Azonal Vegetation
- Provincial boundary

Grouped into 9 biomes →

Cross-walk of national ecosystem types to Global Ecosystem Typology Level 3 ecosystem functional groups

SA national ecosystem types
(458, equivalent to GET Level 6)...

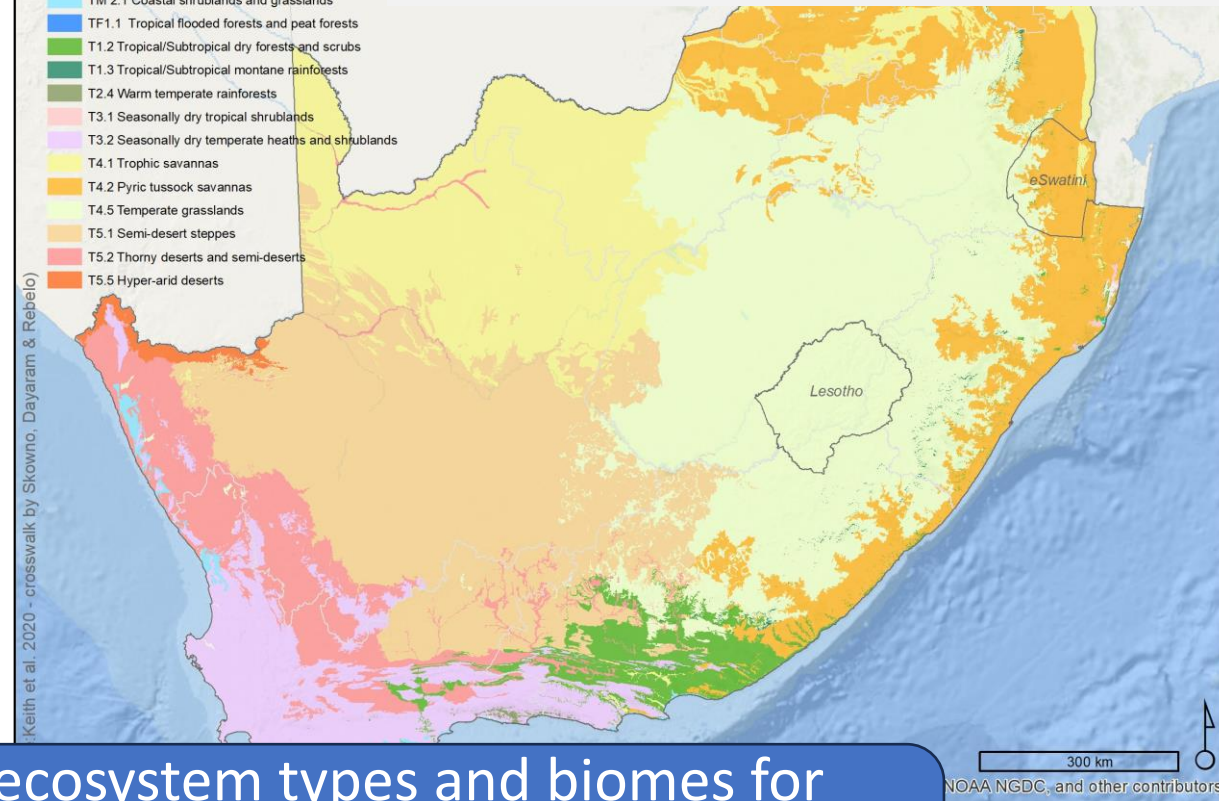


Terrestrial Ecosystems - South Africa
Potential / historical distribution

IUCN GET_L3_FVG

- MFT1.2 Intertidal forests and shrublands
- TM 2.1 Coastal shrublands and grasslands
- TF1.1 Tropical flooded forests and peat forests
- T1.2 Tropical/Subtropical dry forests and scrubs
- T1.3 Tropical/Subtropical montane rainforests
- T2.4 Warm temperate rainforests
- T3.1 Seasonally dry tropical shrublands
- T3.2 Seasonally dry temperate heaths and shrublands
- T4.1 Trophic savannas
- T4.2 Pyric tussock savannas
- T4.5 Temperate grasslands
- T5.1 Semi-desert steppes
- T5.2 Thorny deserts and semi-deserts
- T5.5 Hyper-arid deserts

... aggregated to 14 ecosystem
functional groups

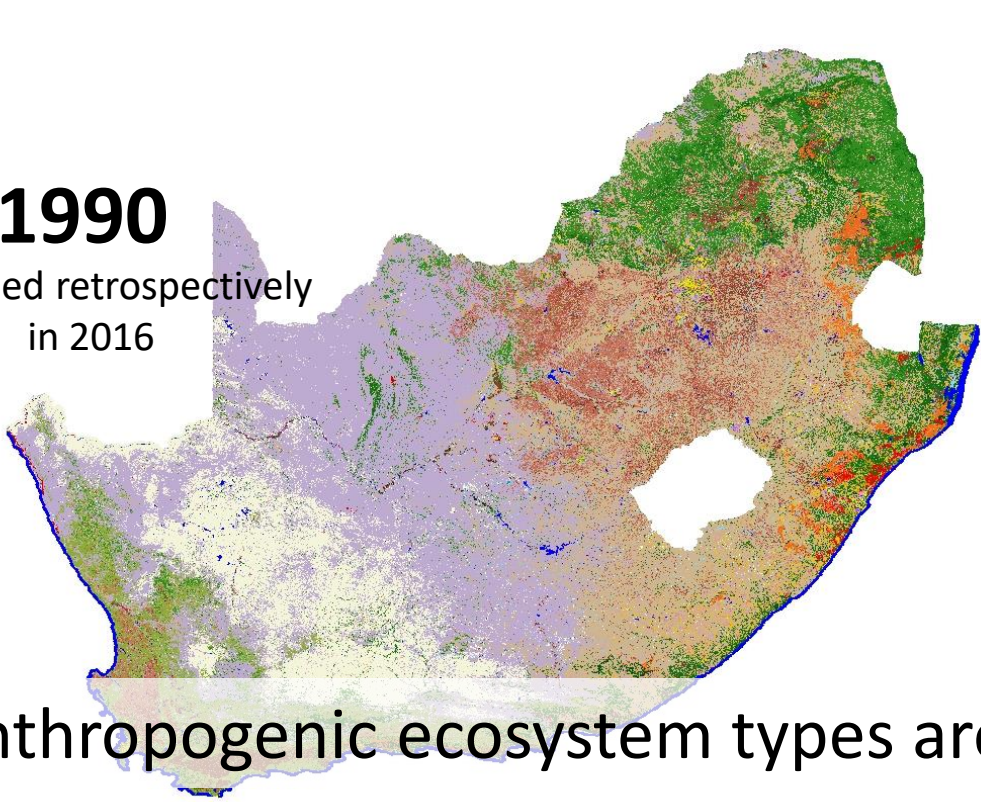


We can continue to use national ecosystem types and biomes for national policy and implementation, while also summarising to GET Level 3 for global comparison and reporting

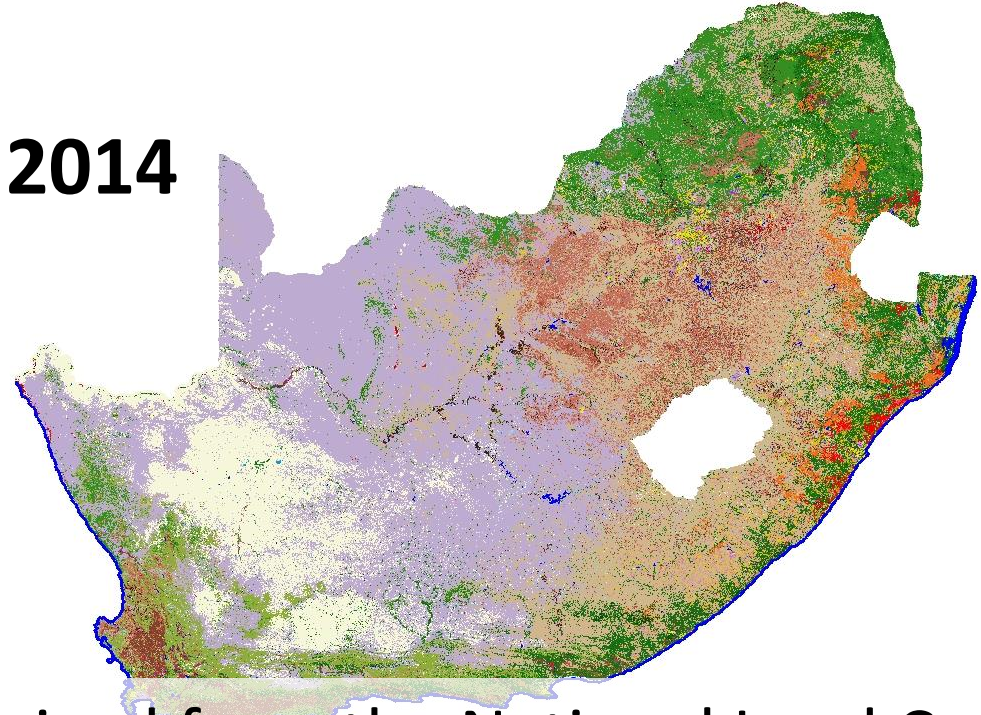
Foundational data layer for anthropogenic ecosystem types: National Land Cover

1990

Developed retrospectively
in 2016



2014



Anthropogenic ecosystem types are derived from the National Land Cover



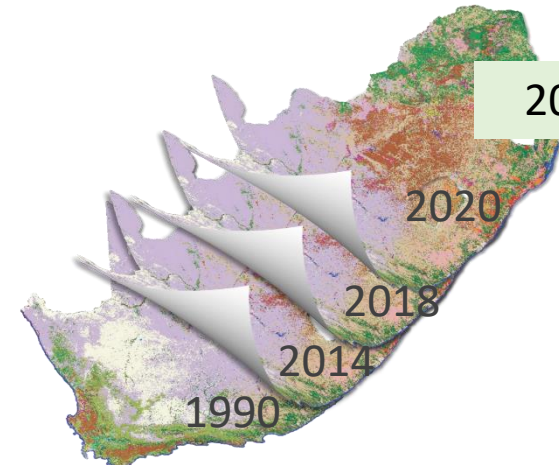
environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



GEOTERRA
IMAGE

2022



Grouping of 72 National Land Cover classes into nested tiers

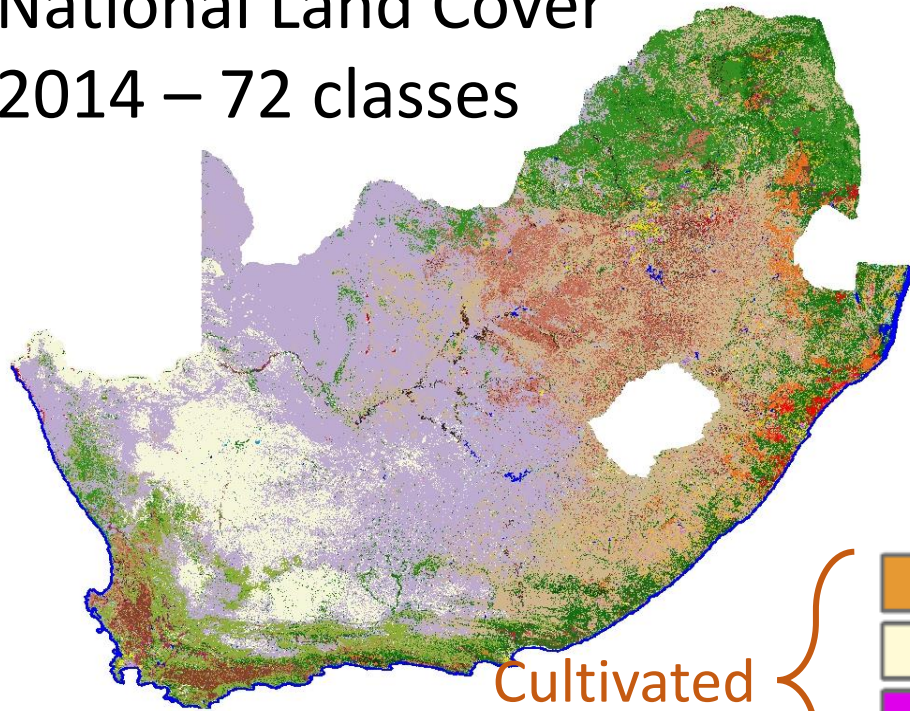
Broad land cover classes <i>Tier 1: 4 classes</i>	Main land cover classes <i>Tier 2: 8 classes</i>	Detailed land cover classes <i>Tier 3: 20 classes</i>	National Land Cover (NLC) classes <i>Tier 4: 72 classes</i>
Natural or semi-natural	Natural or semi-natural	Natural or semi-natural	8 land cover classes
Cultivated	Commercial crops	Cultivated commercial fields	4 land cover classes
		Cultivated commercial pivots	3 land cover classes
		Sugarcane	6 land cover classes
	Subsistence crops	Subsistence crops	3 land cover classes
	Orchards and vines	Orchards	3 land cover classes
		Vines	3 land cover classes
Built-up	Timber plantations	Timber plantations	3 land cover classes
	Urban	Urban parkland	4 land cover classes
		Urban industrial	1 land cover class
		Urban commercial	1 land cover class
		Urban built-up	4 land cover classes
		Urban residential	4 land cover classes
		Urban township	4 land cover classes
		Urban informal	4 land cover classes
		Urban smallholding	4 land cover classes
		Urban village	4 land cover classes
		Urban school and sports ground	1 land cover class
	Mines	Mines	5 land cover classes
Waterbodies	Waterbodies	Waterbodies	3 land cover classes

Land cover classes that represent anthropogenic ecosystems:

Cultivated areas

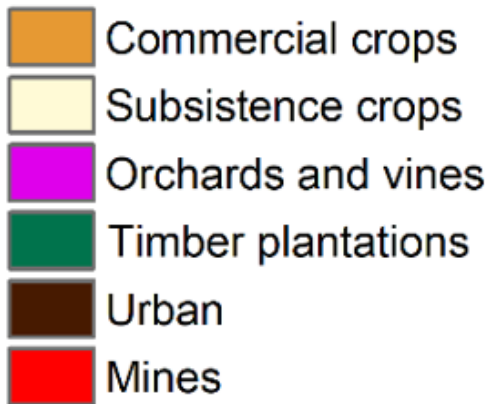
Built-up areas

National Land Cover 2014 – 72 classes

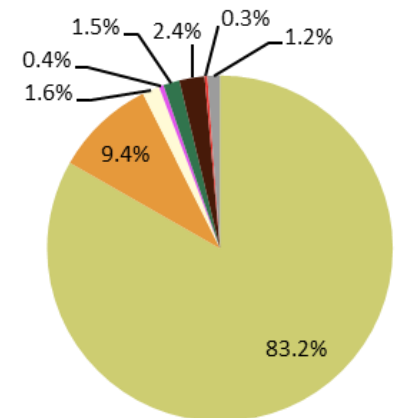
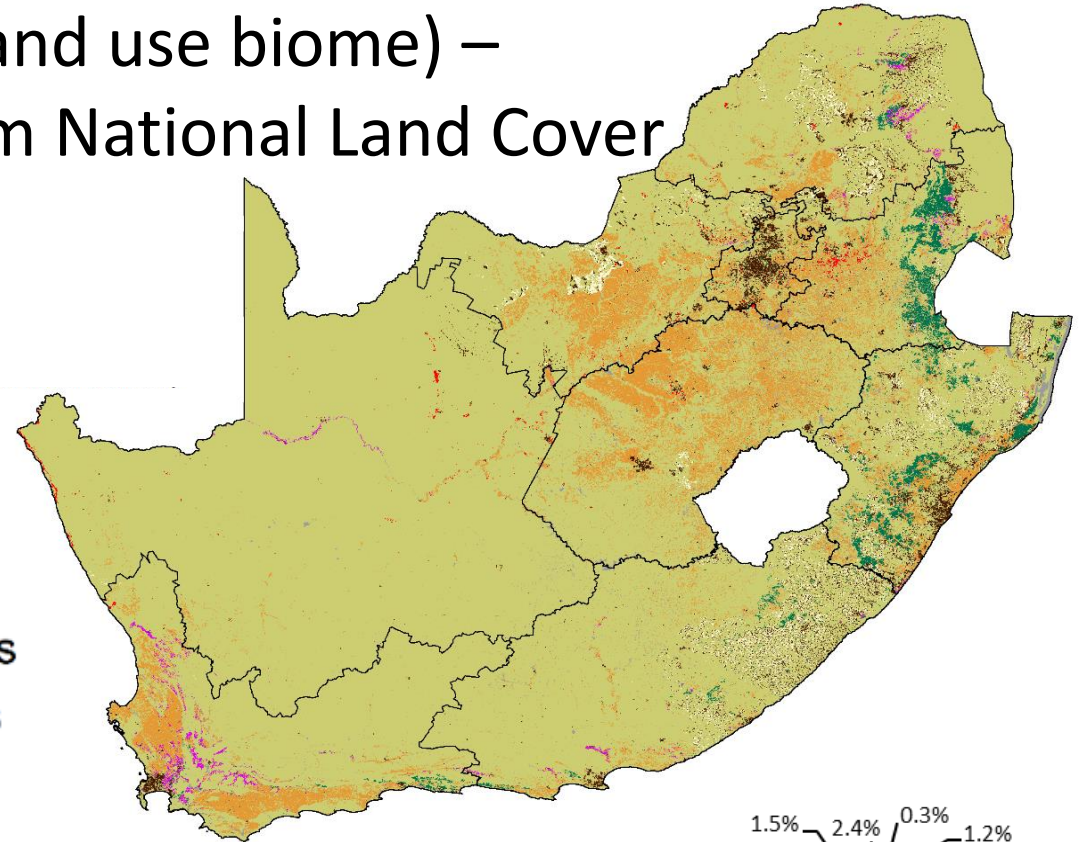
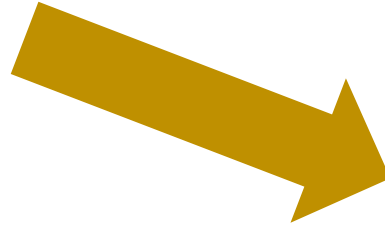


Cultivated

Built-up



Anthropogenic ecosystem types (Intensive land use biome) – derived from National Land Cover 2014



Commercial croplands



Mining



Examples of intensive land uses that replace natural or semi-natural ecosystems

Timber plantations



Settlements

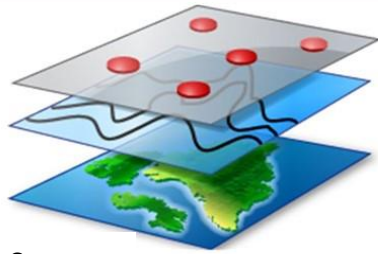


Summary of the methodology & analysis

Basic Spatial Unit (BSU)

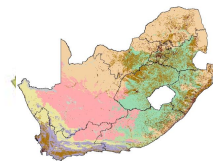
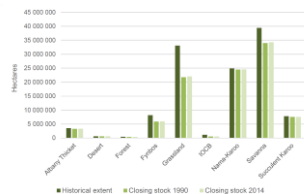
Consistent spatial framework for integrating data

- ❖ 100m x 100m cells
- ❖ Extent
- ❖ 728 M Cells



- ❖ National Land Cover
- ❖ National Vegetation Map

Data Sources



Outputs

Preparing accounts-ready data

- Pre-processing of baseline spatial data (ArcGIS)
- Verification of spatial data (EnSym)
- Conditioning of spatial data (EnSym)

Producing accounts tables

- Production of accounts (EnSym)
- Export accounts tables and change matrices (Excel)

Table formatting & analysis

- Additional formatting and analysis of accounts tables (Excel)

Visual presentation of results

- Produce graphics (Excel)
- Create maps (ArcGIS)

Summary results and indicators

South Africa's terrestrial ecosystem extent account, summarised by biome

Two accounting periods:

- Historical extent – 1990
- 1990 – 2014

Natural or semi-natural biomes

Intensive land use biomes

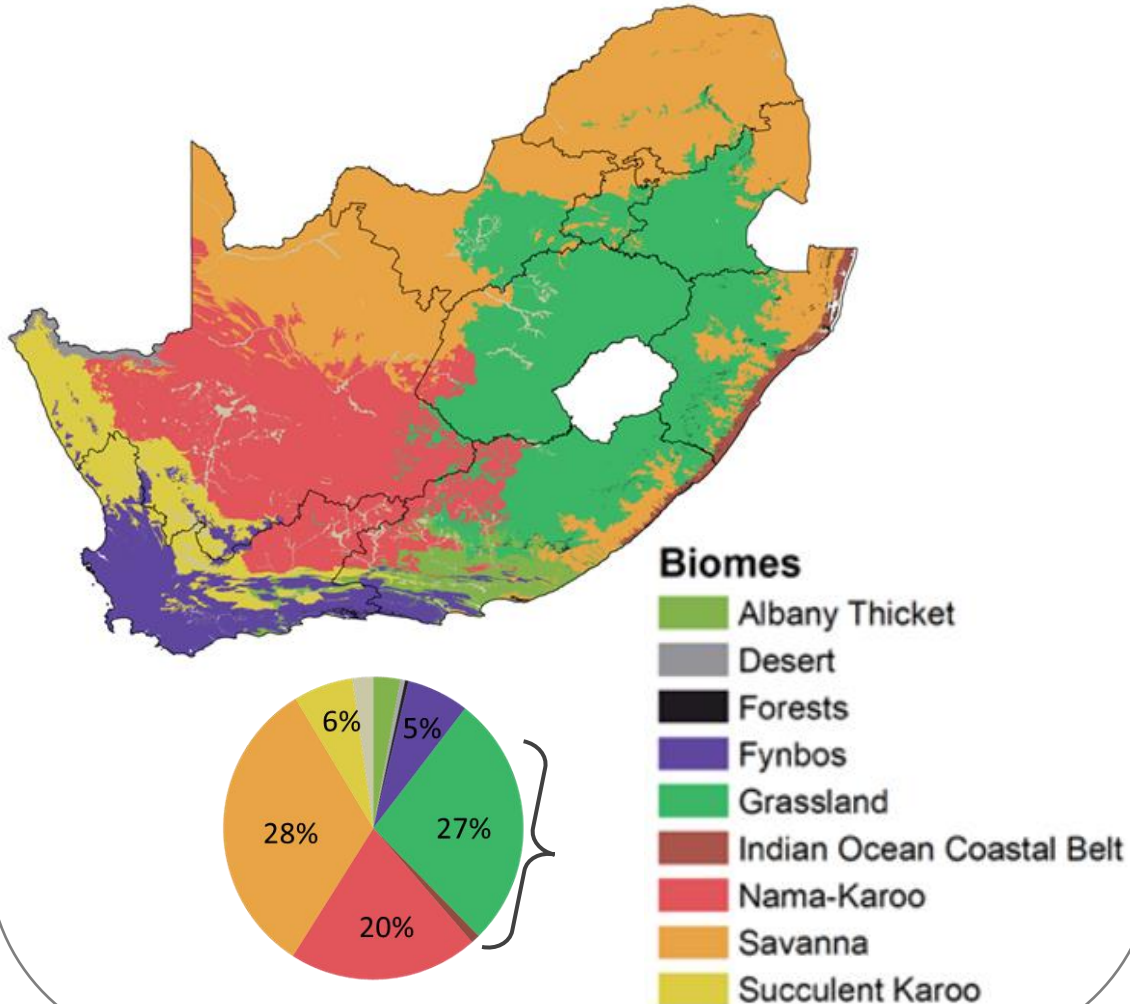
Biomes	Albany Thicket	Desert	Forest	Fynbos	Grassland	IOCB	Nama-Karoo	Savanna	Succulent Karoo	Azonal vegetation	Cultivated*	Built-up*	Water-bodies**	TOTAL
Historical extent	3 531 231	626 207	462 518	8 165 366	33 090 325	1 171 284	24 936 548	39 418 522	7 821 579	2 742 873	-	-	-	121 966 453
Additions to extent	0	0	0	0	0	0	0	0	0	0	16 156 026	3 003 883	2 096 528	21 256 437
Reductions in extent	230 091	8 237	70 673	2 253 375	11 330 606	619 656	420 995	5 396 119	251 373	675 312	-	-	-	21 256 437
Net change in extent	(230 091)	(8 237)	(70 673)	(2 253 375)	(11 330 606)	(619 656)	(420 995)	(5 396 119)	(251 373)	(675 312)	-	-	-	
<i>Net change as % of historical</i>	-6,5%	-1,3%	-15,3%	-27,6%	-34,2%	-52,9%	-1,7%	-13,7%	-3,2%	-24,6%	-	-	-	
Closing extent 1990	3 301 140	617 970	391 845	5 911 991	21 759 719	551 628	24 515 553	34 022 403	7 570 206	2 067 561	16 156 026	3 003 883	2 096 528	121 966 453
Opening extent 1990	3 301 140	617 970	391 845	5 911 991	21 759 719	551 628	24 515 553	34 022 403	7 570 206	2 067 561	16 156 026	3 003 883	2 096 528	121 966 453
Additions to extent	44 432	1 142	24 900	241 184	1 444 446	75 114	146 910	1 160 055	38 422	189 954	1 991 959	597 238	288 754	6 244 510
Reductions in extent	36 008	1 260	7 689	196 035	1 180 183	63 783	78 038	885 303	33 631	58 021	2 339 226	400 503	964 606	6 244 286
Net change in extent	8 424	(118)	17 211	45 149	264 263	11 331	68 872	274 752	4 791	131 933	(347 267)	196 735	(675 852)	
<i>Net change as % of opening</i>	0,3%	0,0%	4,4%	0,8%	1,2%	2,1%	0,3%	0,8%	0,1%	6,4%	-2,1%	6,5%	-32,2%	
Net change in relation to historical extent	(221 667)	(8 355)	(53 462)	(2 208 226)	(11 066 343)	(608 325)	(352 123)	(5 121 367)	(246 582)	(543 379)	-	-	-	
<i>Net change as % of historical</i>	-6,3%	-1,3%	-11,6%	-27,0%	-33,4%	-51,9%	-1,4%	-13,0%	-3,2%	-19,8%	-	-	-	
Closing extent 2014	3 309 564	617 852	409 056	5 957 140	22 023 982	562 959	24 584 425	34 297 155	7 574 997	2 199 270	15 808 759	3 200 618	1 420 676	121 966 453

* Cultivated areas, built-up areas and waterbodies are treated as biomes for the purpose of the ecosystem extent account table. There is no reliable spatial information on the historical extent of waterbodies, subsistence cultivation or habitation.

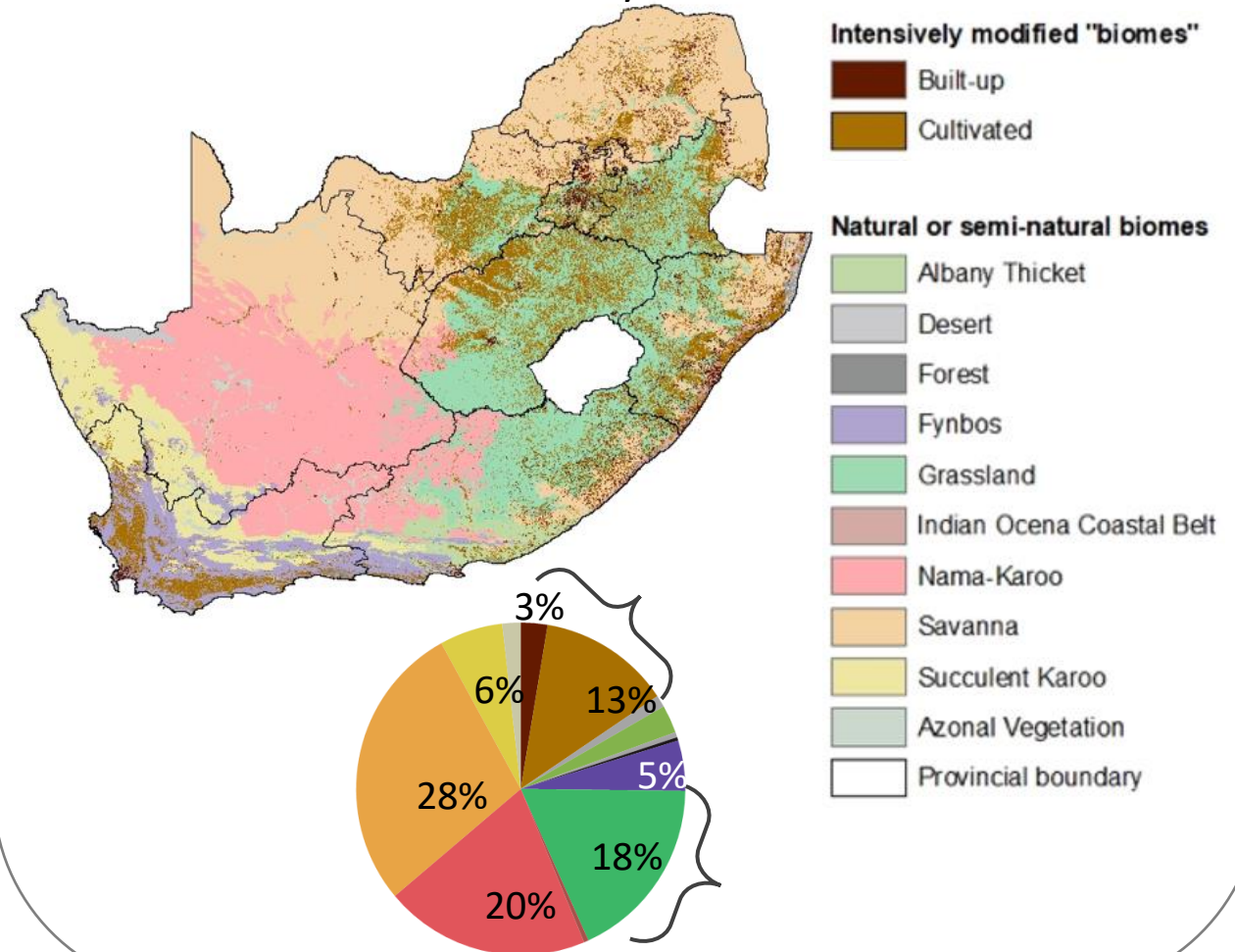
** The large net decrease in the extent of waterbodies reflects primarily that 1990 was a much wetter year than 2014. Waterbodies include both natural and artificial water bodies (such as dams).

Terrestrial ecosystem extent account, 1990 to 2014, in maps

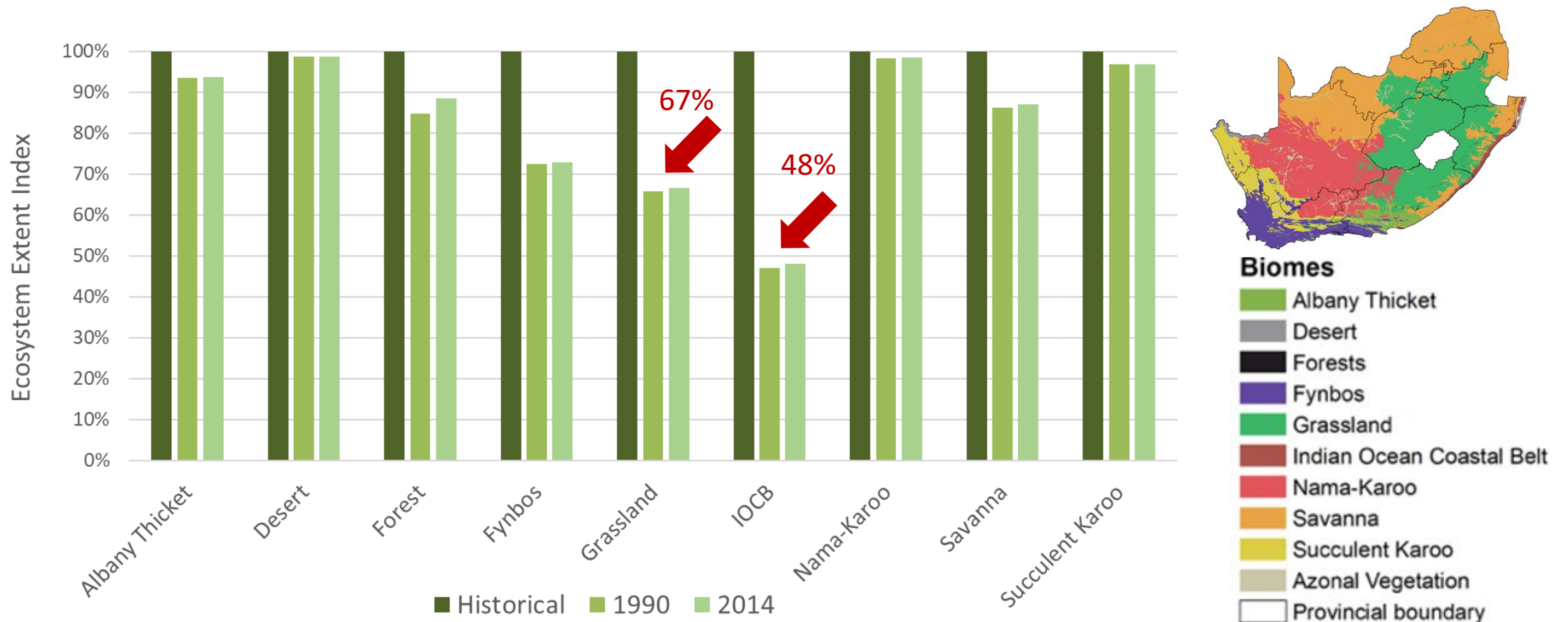
Historical extent of natural ecosystems



Contemporary extent (2014) of ecosystems showing where anthropogenic ecosystems have replaced natural ecosystems



The **closing extent of each accounting period** can be shown as an indicator: Natural ecosystems as a proportion of total area



Indicator: **Ecosystem Extent Index**
Measures contemporary extent of natural biomes relative to their historical extent

→ Provides **GBF headline Indicator** for **Goal A.2** on the extent of natural ecosystem types

Net change in area covered by specific Ecosystem Types

- **Net change in area covered by specific Ecosystem Types (ha and %)**
- Some remarkable changes in anthropogenic ecosystem types 1990 – 2014
- Centre-pivot irrigated cultivation increased by 220%, from 240 000 ha to 770 000 ha
- Large ecological impacts including on water

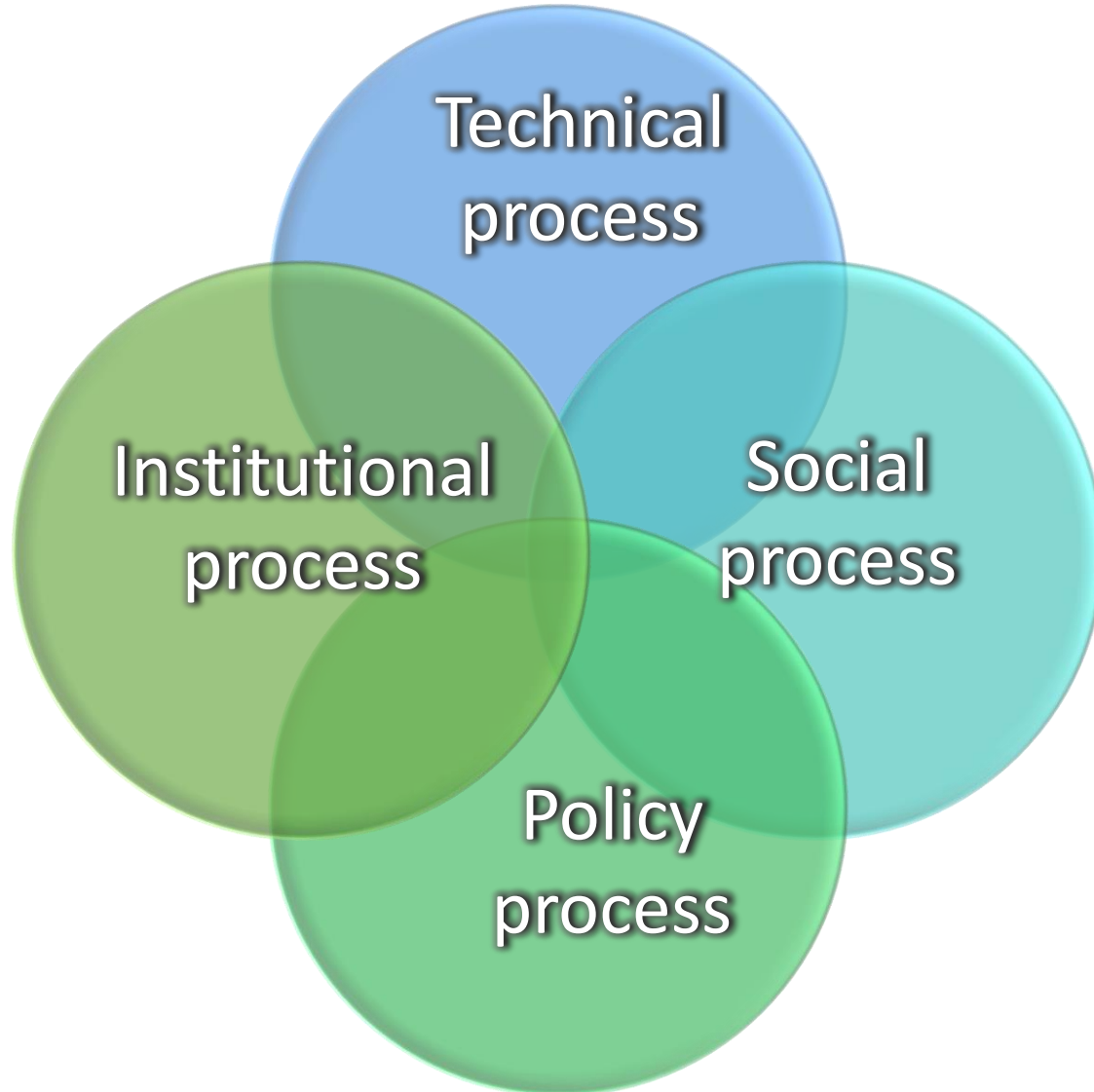


- Area of informal urban settlements almost doubled, from 31 000 ha to 60 000 ha
- Significant challenges for urban planning and service provision

Summary of key Indicators from ecosystem extent accounts

- **Proportion of accounting area** (SA mainland/ province/ municipalities) covered by specific ecosystem types.
- **Net change in area** covered by specific ecosystem types (ha and %).
- Percentage of **area unchanged** for specific ecosystem types.
- Percentage **spatial turnover** in specific ecosystem types.
- **Ecosystem Extent Index** for ecosystem types.

Lessons and challenges



- Frequency of updating these accounts is limited by capacity rather than data.
- Compiling accounts, is not simply a technical endeavour.
- Producing accounts is an institutional process with a social process
- Inclusive stakeholder involvement and making sure the right people are in the room
- Time for quality conversation and slow discussions.
- Shared learning and patience

Thank you for listening

The **Land and Terrestrial Ecosystem Accounts, 1990 to 2014** are available on the Stats SA website at <http://www.statssa.gov.za/publications/D04011/D040111990to2014.pdf>

More about NCA in South Africa - <http://nca.sanbi.org.za/>

More about NCAVES Project - <https://seea.un.org/content/about-ncaves-project>



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System of
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