Overcoming challenges to ecological condition mapping and monitoring in South Africa

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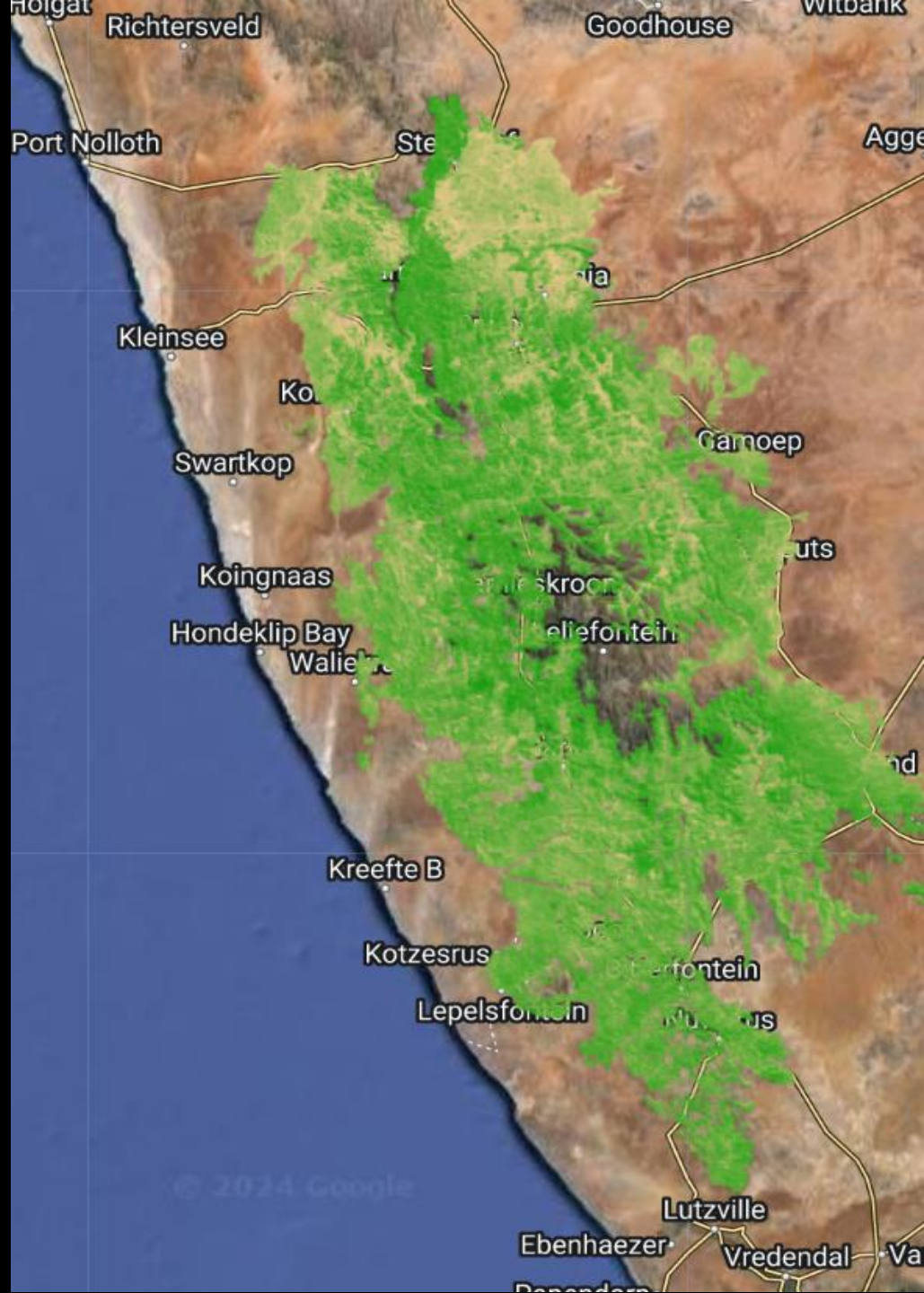
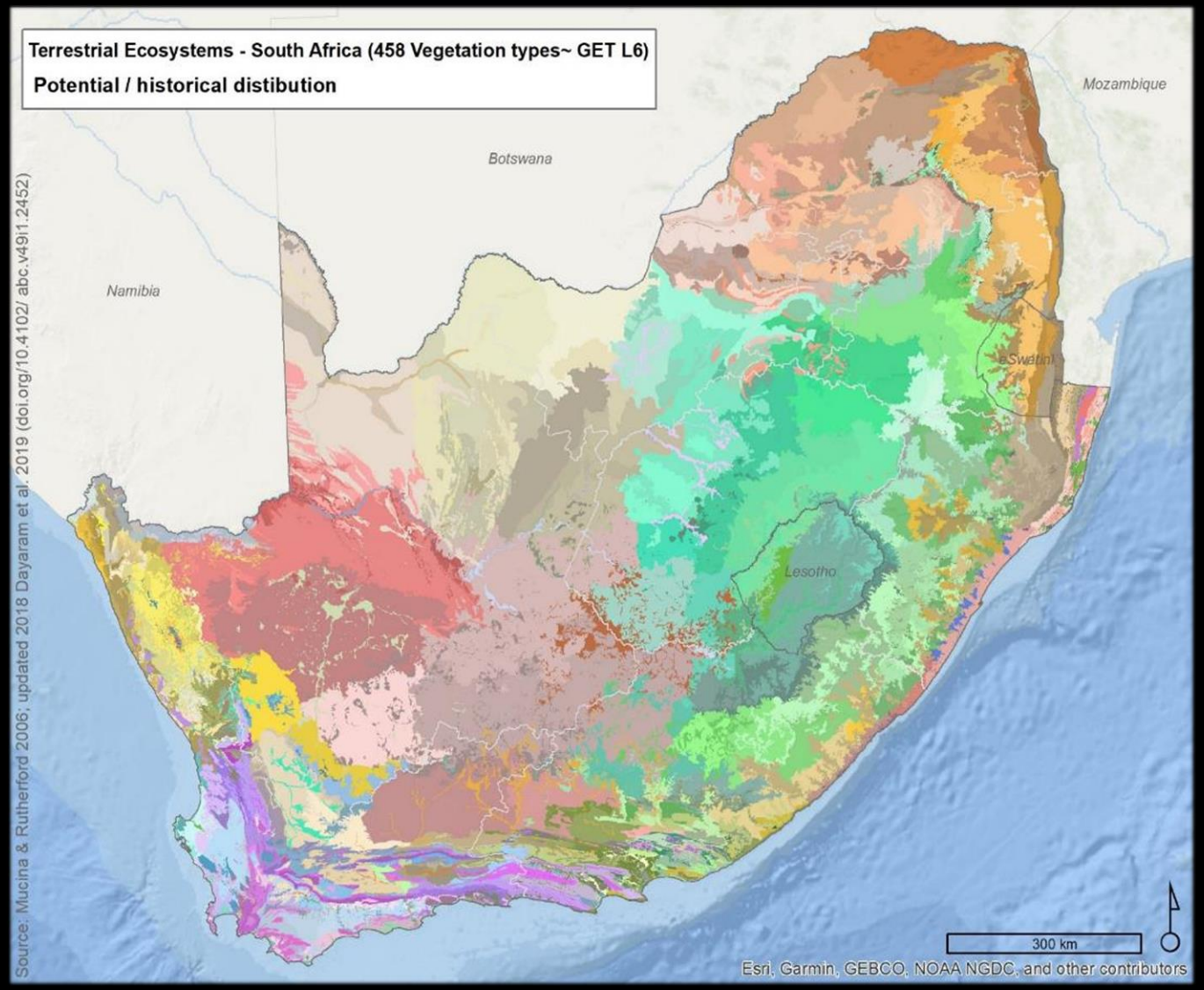


SEEC - Statistics in Ecology, Environment and Conservation

SANBI
Biodiversity for Life
South African National Biodiversity Institute

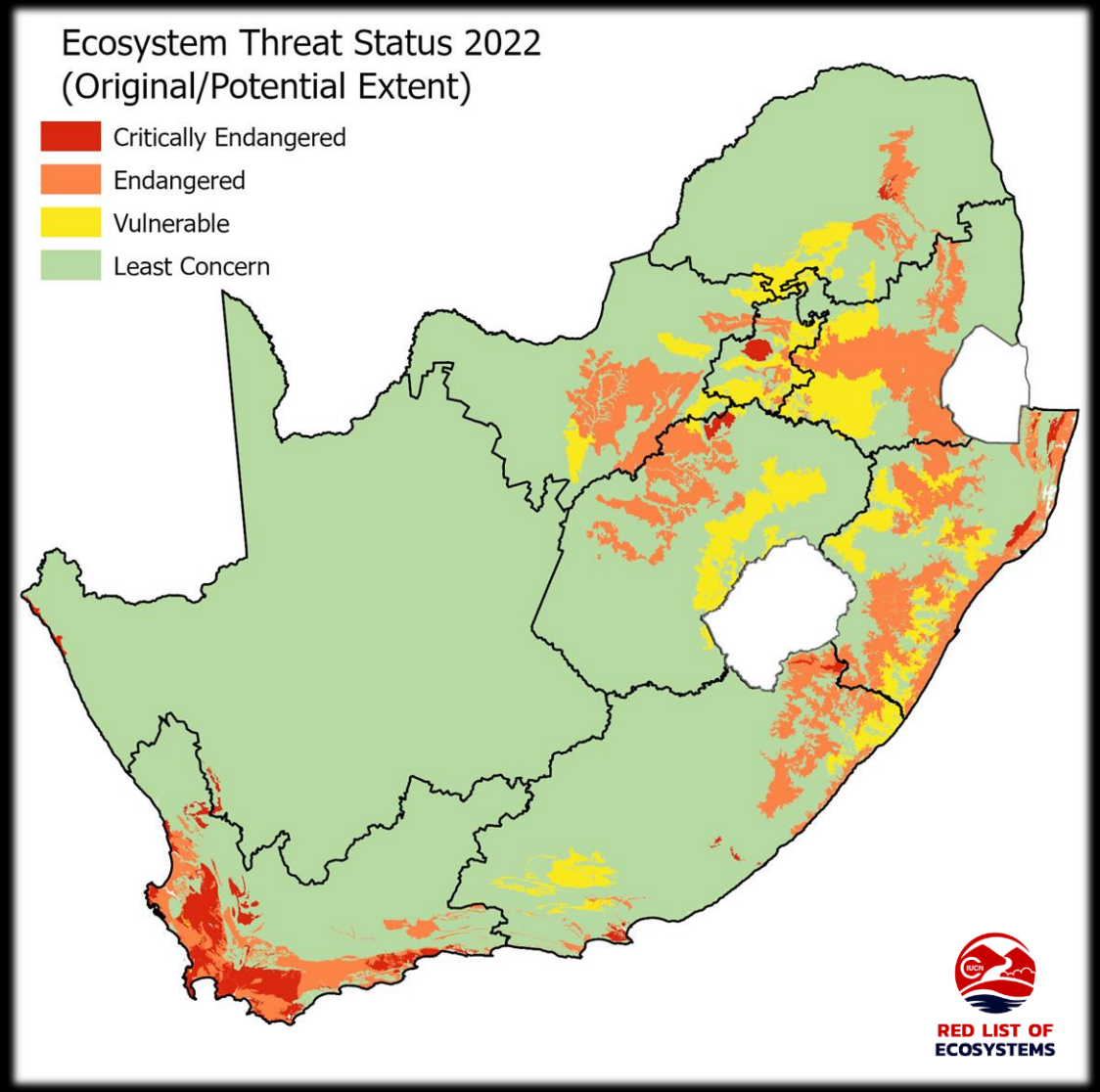
South Africa is megadiverse!



Ranked 6th out of 17 of the world's megadiverse countries

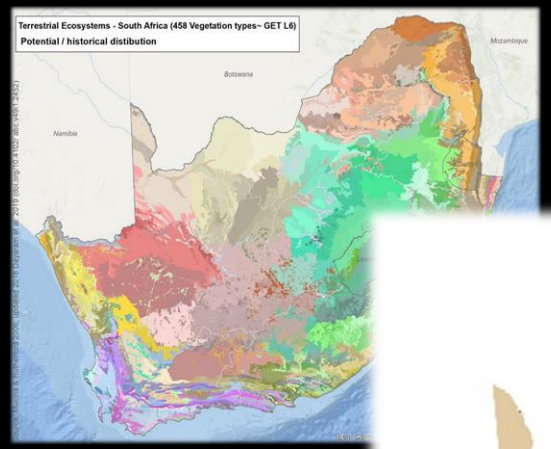
- >20 000 plant species
- Nine biomes
- Smallest of the world's floral kingdoms – Cape Floristic Region

We are losing biodiversity fast!

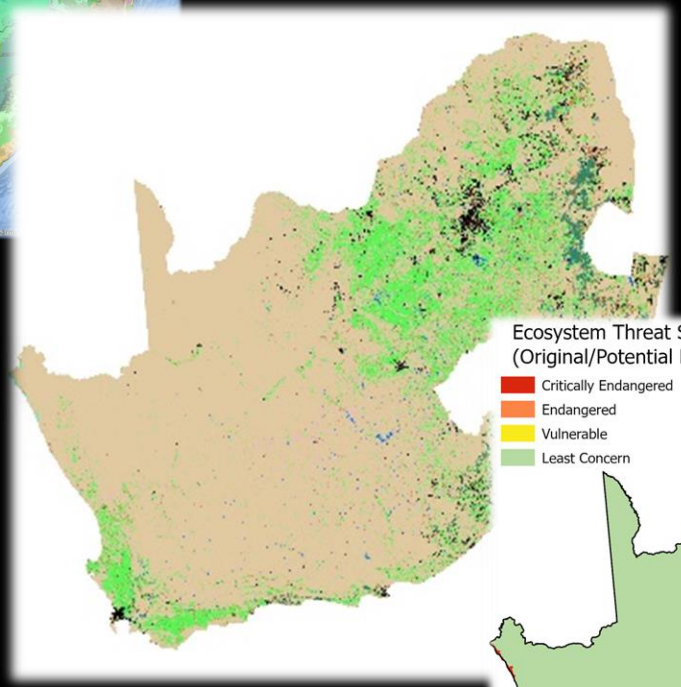


>25% threatened

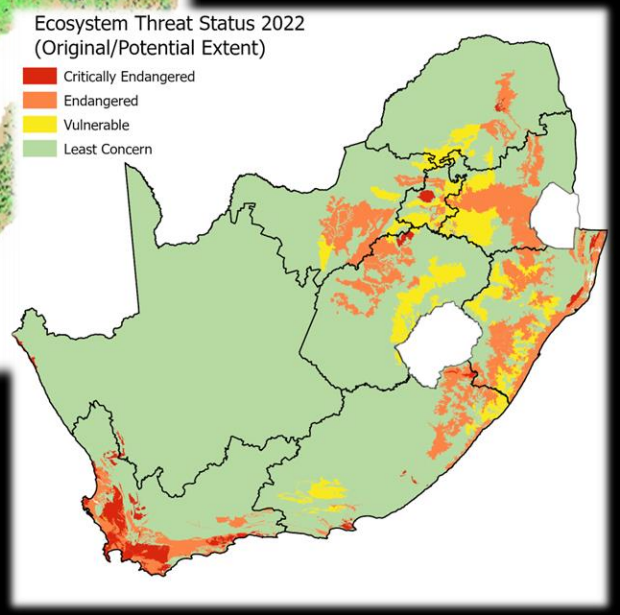
How do we know our ecosystems are threatened?



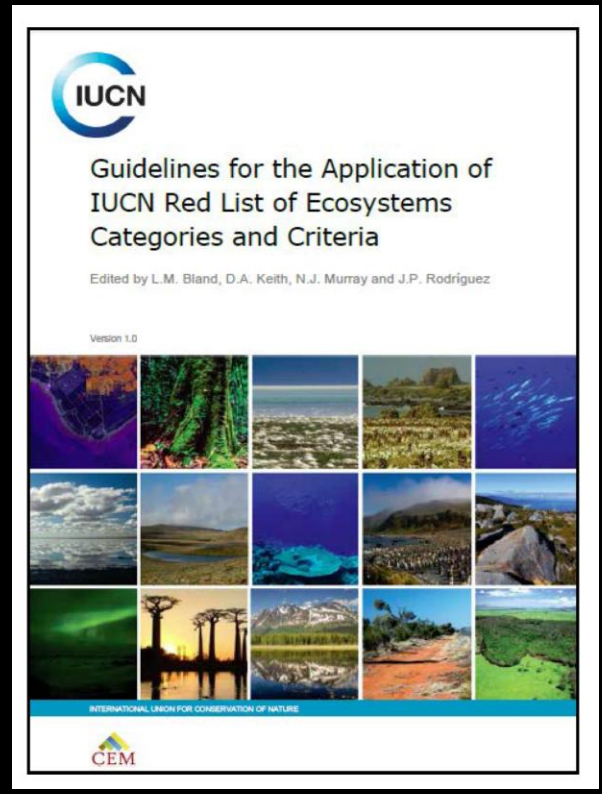
Vegetation map (potential extent)



National Land Cover (current extent)



RLE threat status



RED LIST OF ECOSYSTEMS

RLE uses 5 Criteria to assess risk of collapse

- SA RLE already implements:
  - Criterion A: decline in distribution
  - Criterion B: restricted distribution

  These focus on the extent that is left

There's a big problem – underestimating threat status

RLE Criteria A & B (extent)

100% collapsed

RLE Criteria C &D

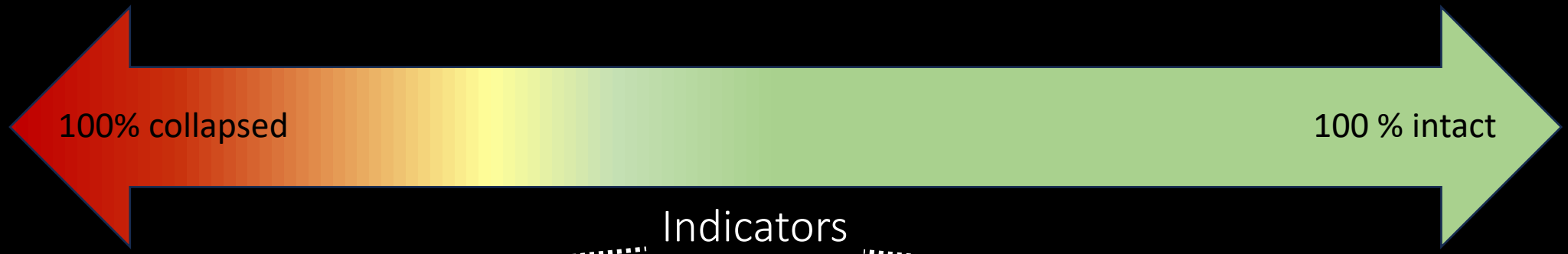
100 % intact

Continuum of ecological condition

Quick aside: what is ecological condition?

Ecological condition: Overall quality, measured in terms of quantitative metrics describing abiotic and biotic characteristics – UN SEEA

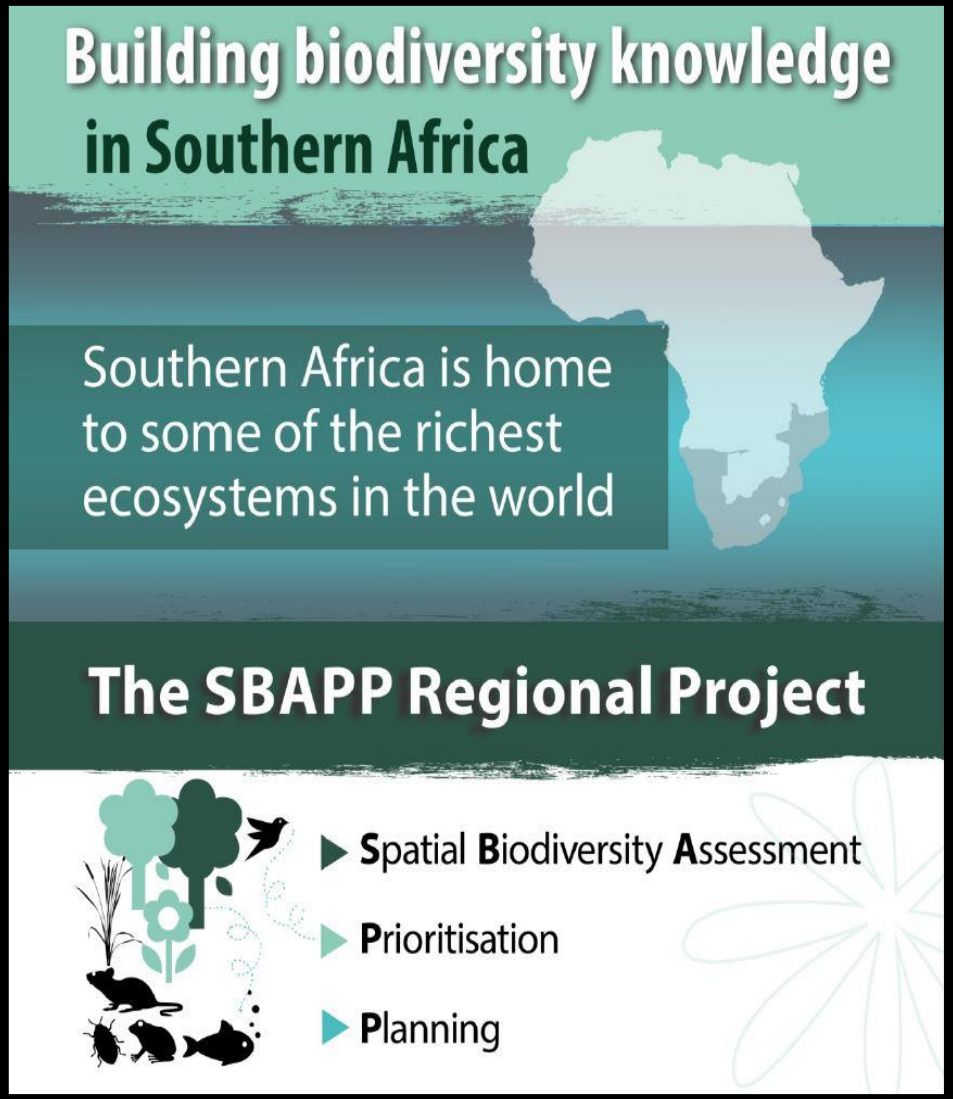
Key ecosystem components of condition: function, structure and composition



Indicators

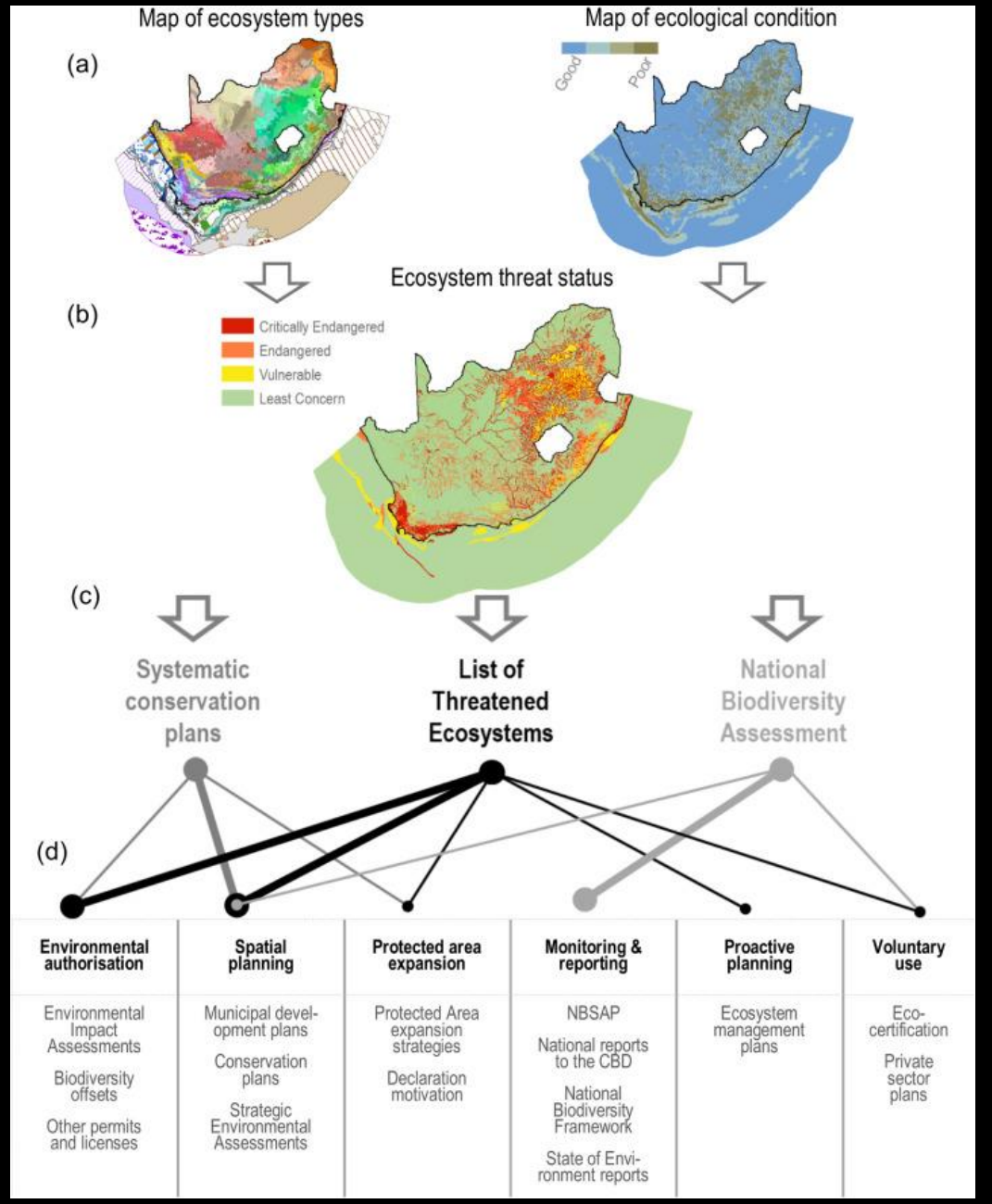
Spatial Biodiversity Assessment Planning and Prioritisation (SBAPP)

- Regional project (South Africa, Namibia, Mozambique and Malawi)
- Aim: to develop national spatial databases on ecological condition
- Inform biodiversity assessment and planning



SBAPP will provide critical supporting information for:

- Monitoring and reporting on the IUCN Red List of Ecosystems (RLE).
- Meeting the goals and targets of the Kunming – Montreal Global Biodiversity Framework.
- Achieving Land Degradation Neutrality targets set by the UNCCD.
- Conservation and restoration spatial planning.



Botts et al. (2020). *Biol. Cons.* 246

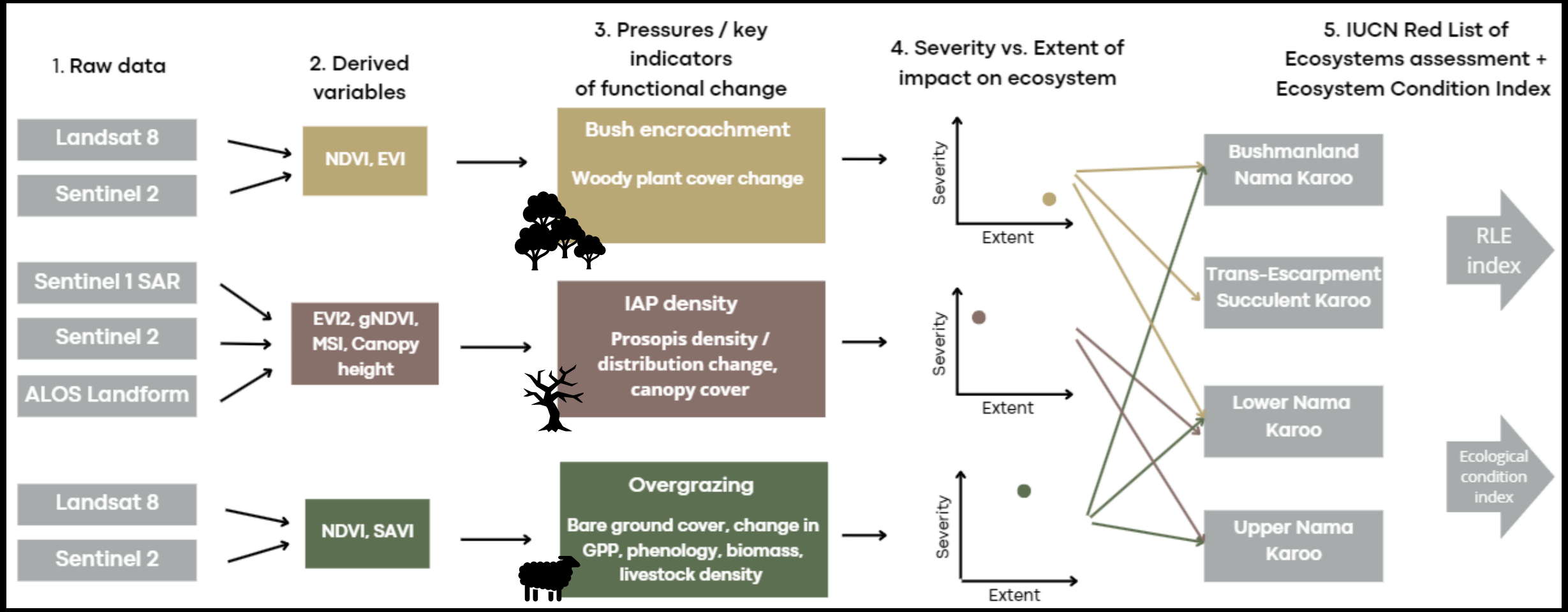
How do we plan to measure ecological condition?

- By mapping the processes that cause a decline in ecosystem function or structure = **pressures**

Biome	Over-grazing	Bush encroachment	Fire regime disruption	IAP (Woody)	IAP (Herb)	Soil erosion	Climate Change	Over-harvesting	Groundwater abstraction	Pollution
Albany Thicket	2	4	4	3	3	3	4	3	5	4
Desert	1	5	5	3	5	2	2	3	5	3
Forest	5	5	4	4	4	5	4	3	4	4
Fynbos	3	5	1	1	3	4	3	3	4	4
Grassland	1	1	2	2	3	3	3	4	4	3
IOCB	1	2	2	2	3	4	3	4	3	4
Nama Karoo	1	3	4	3	4	3	4	4	5	4
Savanna	1	2	2	3	4	4	3	4	4	4
Succulent Karoo	1	5	5	3	4	3	3	3	5	3

Summary of key pressures per biome.
1 represents the highest impact, 5 represents little to no impact.

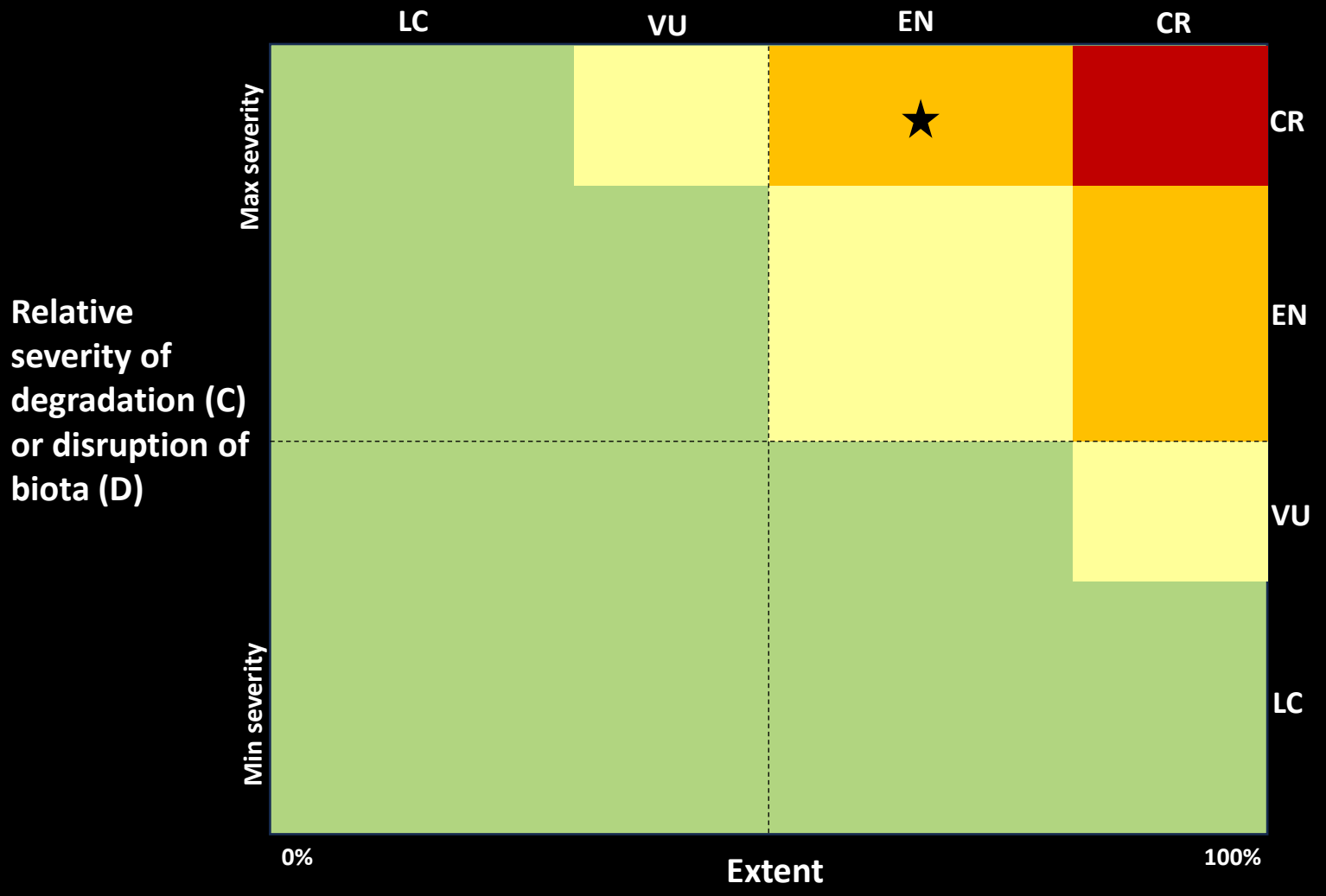
How do we map pressures?

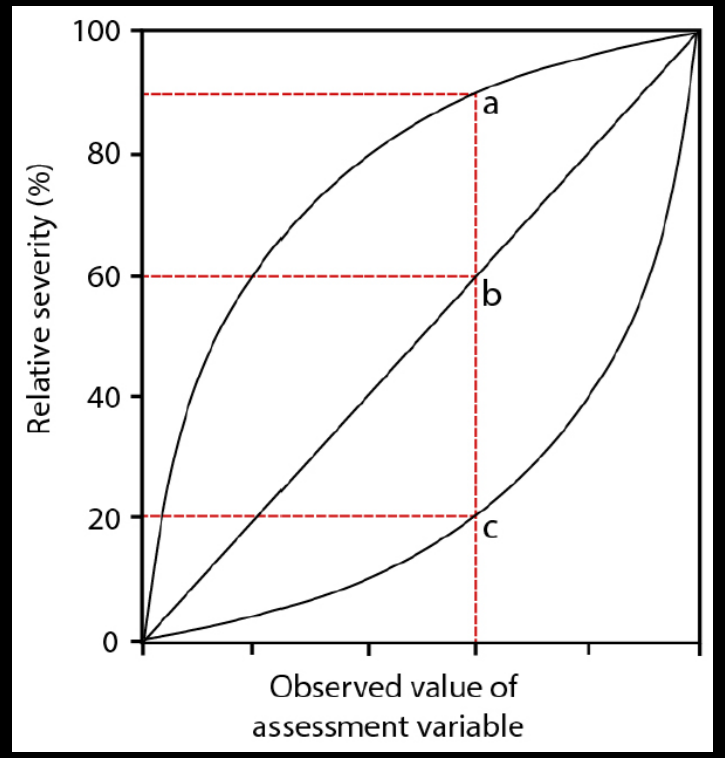


Expert interpretation and scientific evidence

Assessing condition within the RLE framework

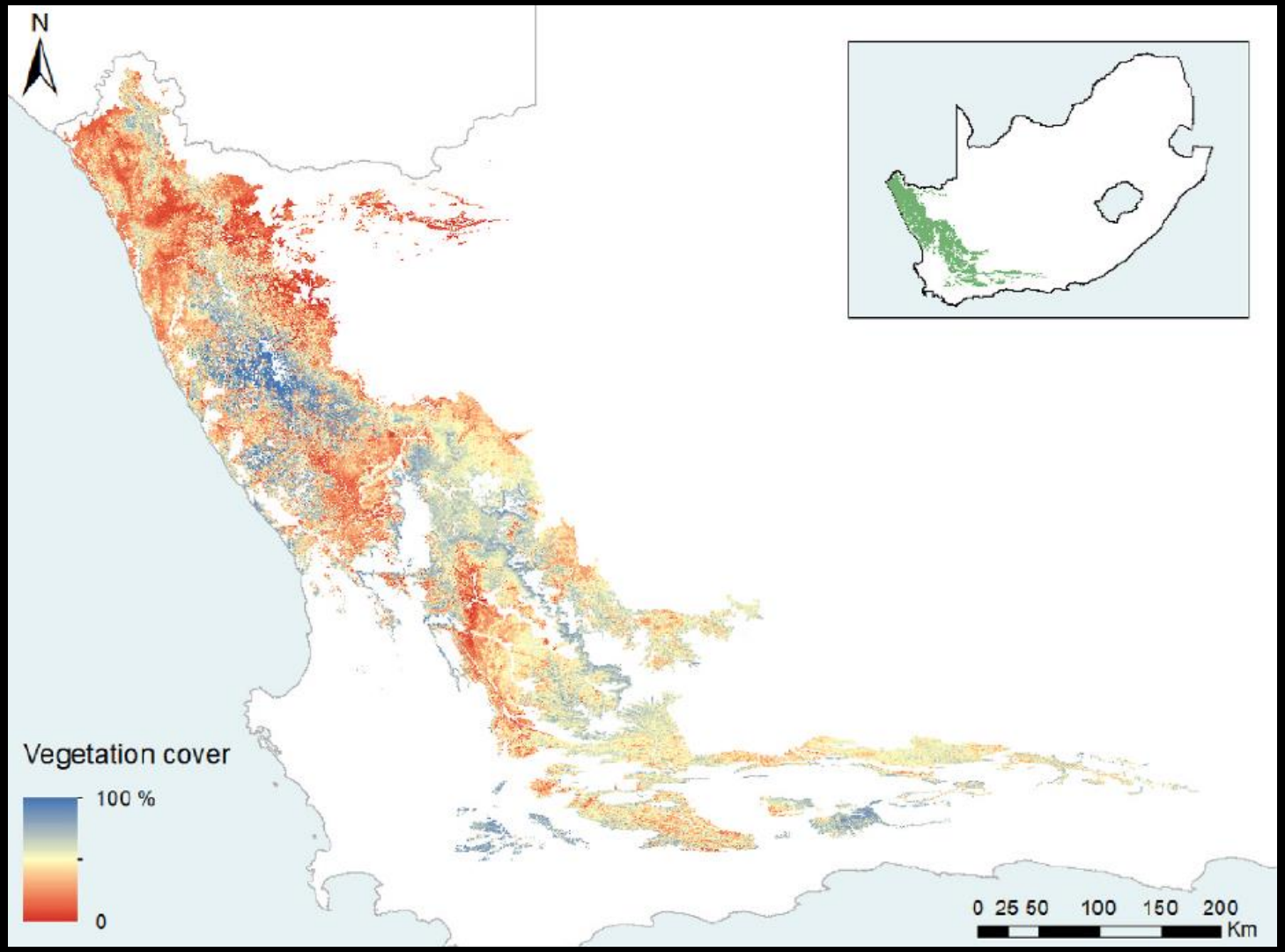
Criterion C: degradation of the abiotic environment
Criterion D: disruption of biotic processes and interactions

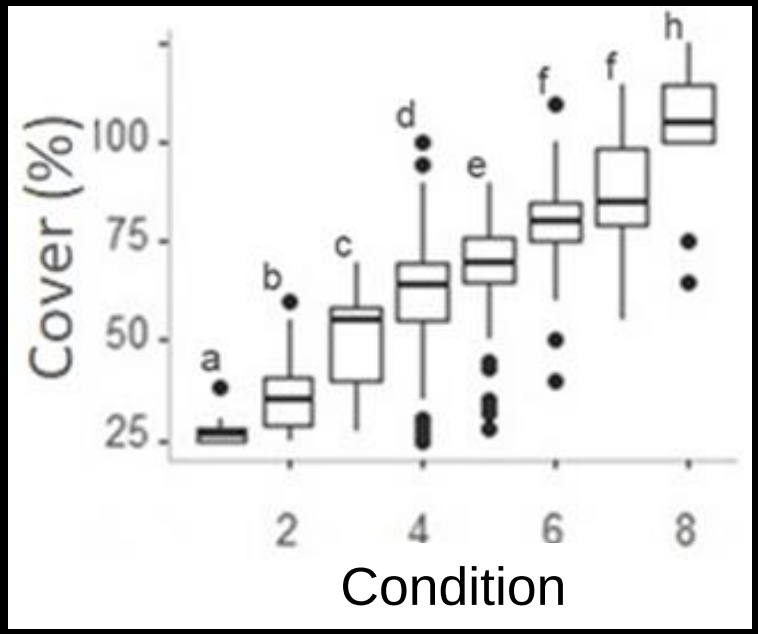




Bland et al. (2017). IUCN RLE Guidelines

A practical example – Succulent Karoo

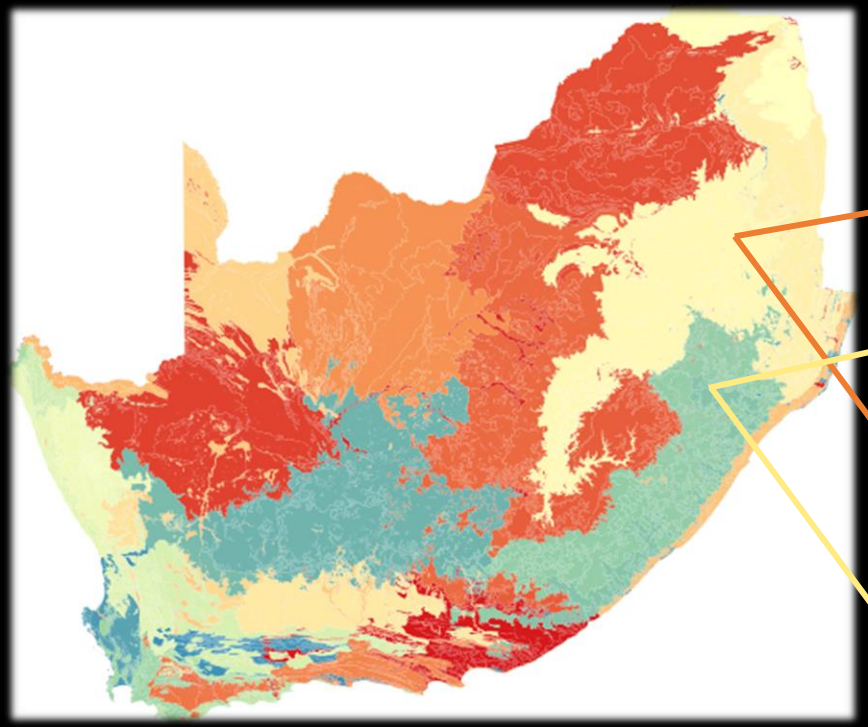


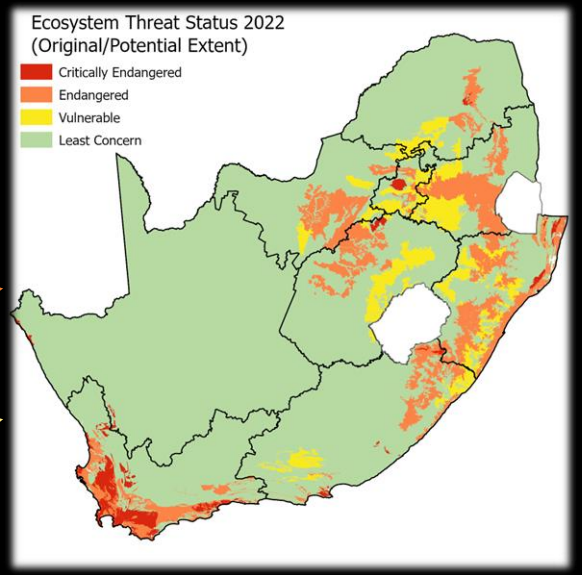


bit.ly/SucculentKarooEcologicalCondition

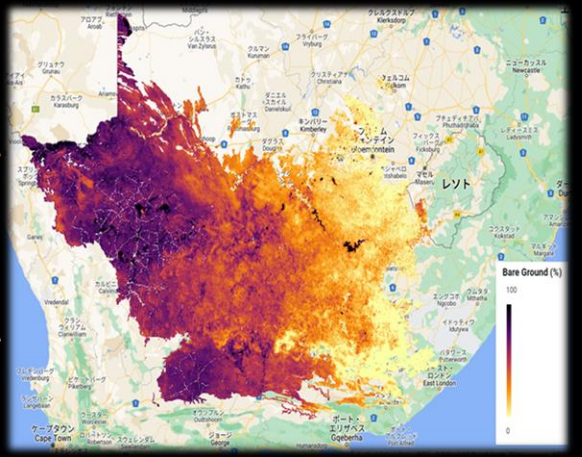
Bell et al. (2023). *J. Arid Env.*

What is our ultimate goal?





Update the RLE



Pressures / indicator layers

How can you contribute?

1 Collaborative expertise

2 Data contributions

3 Connect us with similar projects

Thank you!

Special thanks to the postdocs, students and intern who are making this work possible:
Stephni van der Merwe, Wataru Tokura, Curtley Tonkin, Wesley Bell and Tim Kirsten

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