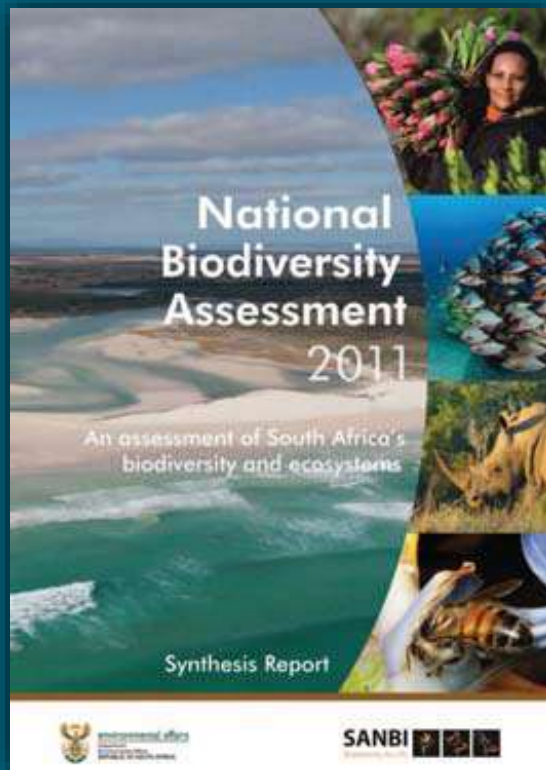


Marine ecosystem condition in South Africa: current status and future prospects

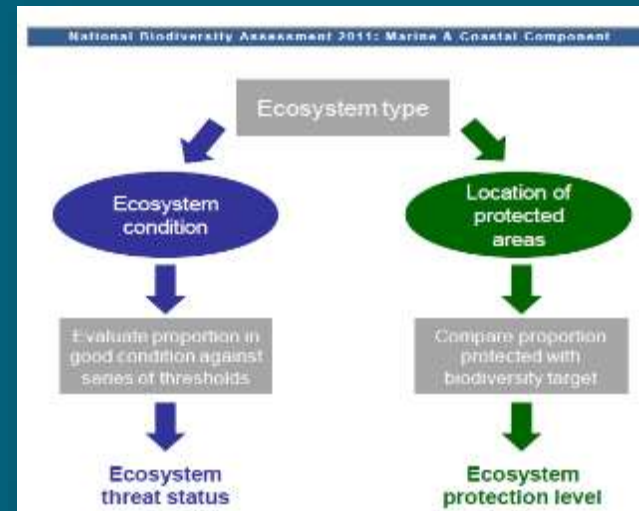
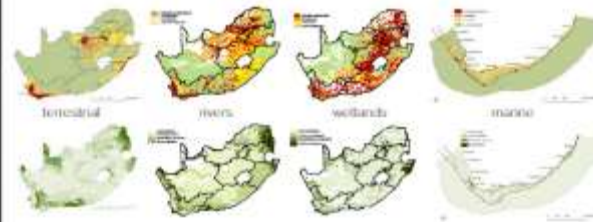
Kaylee Smit
PhD Candidate

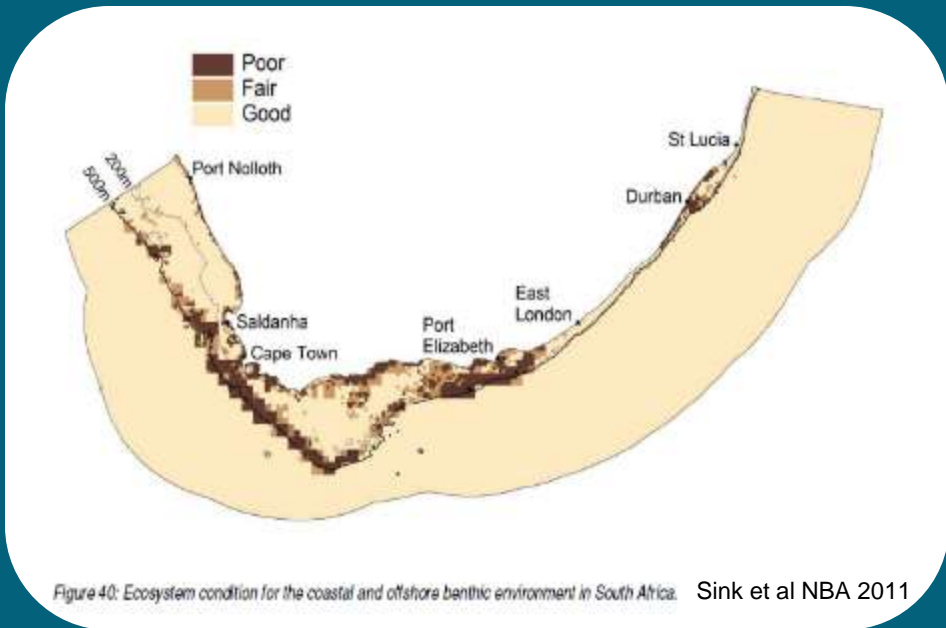
Supervisor: Dr. Amanda Lombard, Co- supervisors: Dr. Kerry Sink, Dr. Anthony Bernard



National ecosystem indicators

- How threatened are our ecosystems?
- How well protected are our ecosystems?





A Global Map of Human Impact on Marine Ecosystems

Benjamin S. Halpern,^{1,2} Shaun Walbridge,^{3,4} Kimberly A. Selisk,^{5,6,7} Carrie Y. Kappel,⁸ Florence Micheli,⁹ Caterina D'Agostini,¹⁰ John F. Bruno,¹¹ Kenneth S. Casey,¹² Colin Ebert,¹³ Helen E. Fox,¹⁴ Raul Fujita,¹⁵ Dennis Gochert,¹⁶ Hunter S. Levin,¹⁷ Elizabeth R. M. Reed,¹⁸ Matthew J. Perry,¹⁹ Elizabeth R. Selig,^{20,21} Mark Spilling,²² Robert Steneck,²³ Dag Stånes²⁴

The management and conservation of the world's oceans require synthesis of spatial data on the distribution and intensity of human activities and the overlap of their impacts on marine ecosystems. We developed an ecosystem-specific, multiscala spatial model to synthesize 12 global data sets of anthropogenic drivers of ecological change for 28 marine ecosystems. Our analysis indicates that no area is unaffected by human influence and that a large fraction (57%) is strongly affected by multiple stressors. However, large areas of relatively little human impact remain, particularly near the poles. The analytical process and resulting maps provide flexible tools for regional and global efforts to allocate conservation resources, to implement ecosystem-based management, and to inform marine spatial planning, education, and basic research.

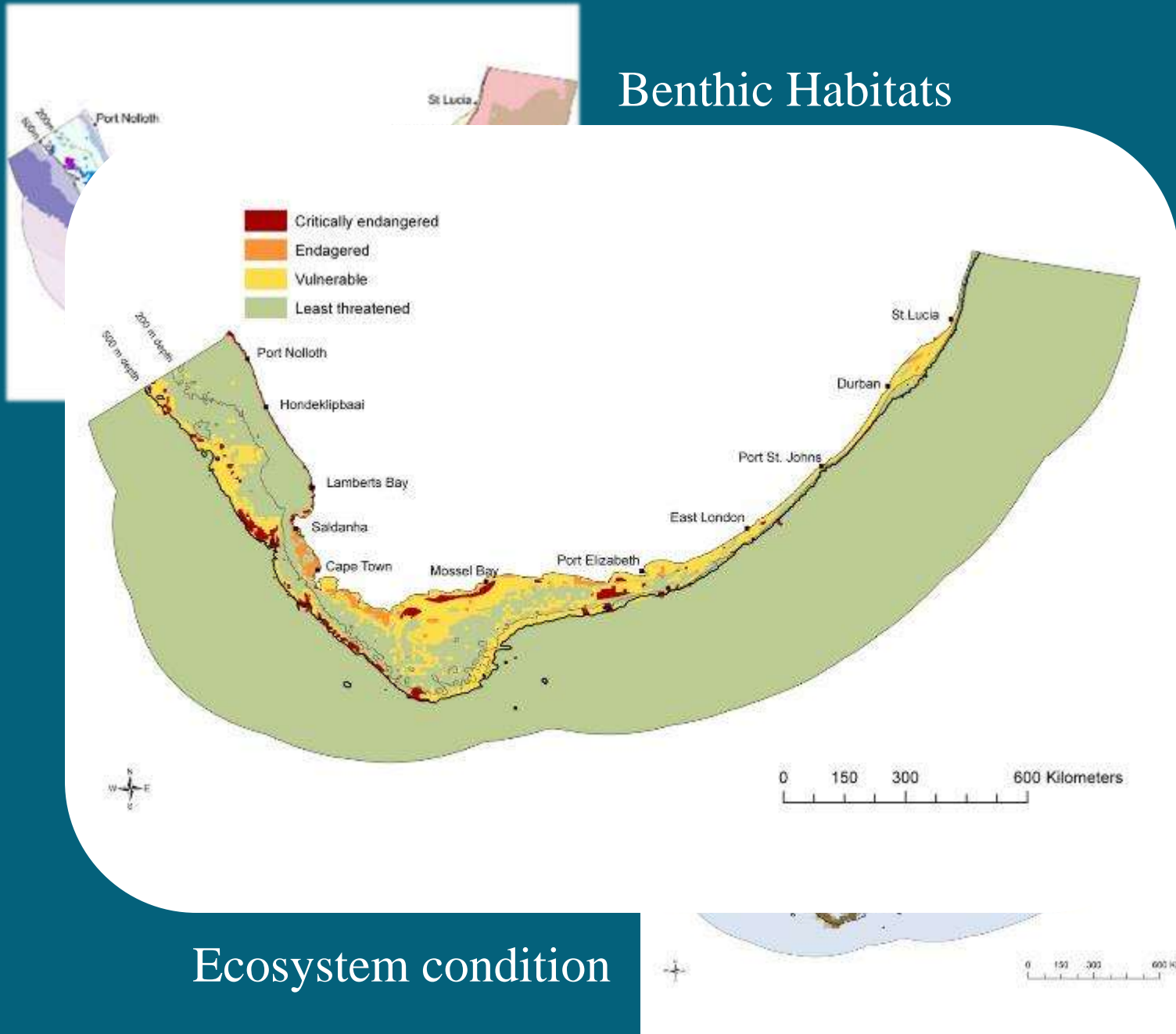
$$I_{cj} = \sum_{i=1}^n \beta_i \times W_{ij}$$



Challenges of working in the marine environment

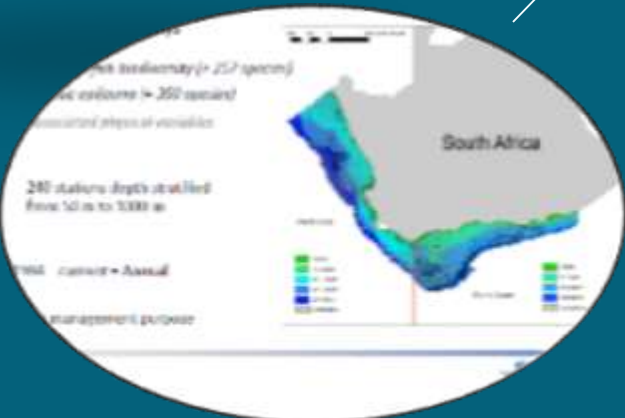
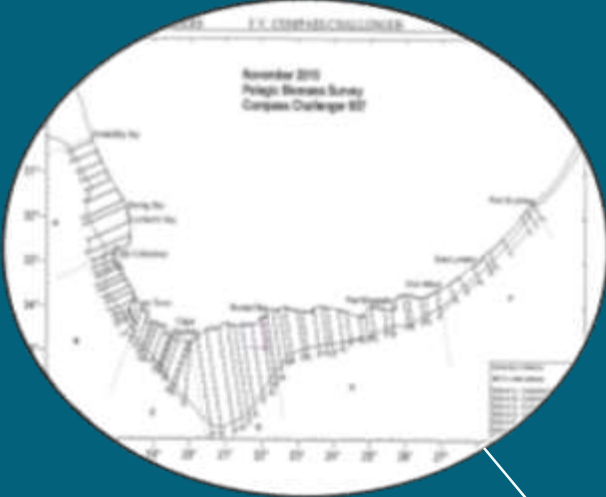


Benthic Habitats



Ecosystem condition

Marine biodiversity Monitoring in South Africa



How do we measure ecosystem condition In the marine environment?

Indicators & Indices

Index	Index	Data input	References
AMBI	Marine Biotic Index		Borja et al (2000)...
BENTIX	Biotic Index		Simboura & Zenetos_2002
	Functional Distinctness	Community assemblage- spp occurrence; life history; ecological traits	Sommerfield et al_2008
	Taxonomic distinctness		
	Taxonomic distinctness		Prato et al_2009
TD	Taxonomic diversity	Using a & B diversity indices- community composition of coralligenous ecosystems- Horizontal & Vertical diversity	Doxa et al_2016
FD	Functional diversity		
PD	Phylogenetic diversity		
CAI	Coralligenous Assemblage Index	Coralligenous community- CAI from various indices	Deter et al_2012

An underwater photograph showing a school of fish swimming in clear blue water above a coral reef. The fish are silvery with yellowish-green tints. The coral is dark and textured.

This is the plan...

1. Develop a national marine ecosystem condition map
2. Use existing data to assess condition- indicators/indices
3. Validate current condition maps
4. Collect data to fill in gaps
5. Use standardised health indices -spatial comparison of marine ecosystem condition

Using MPAs in KZN

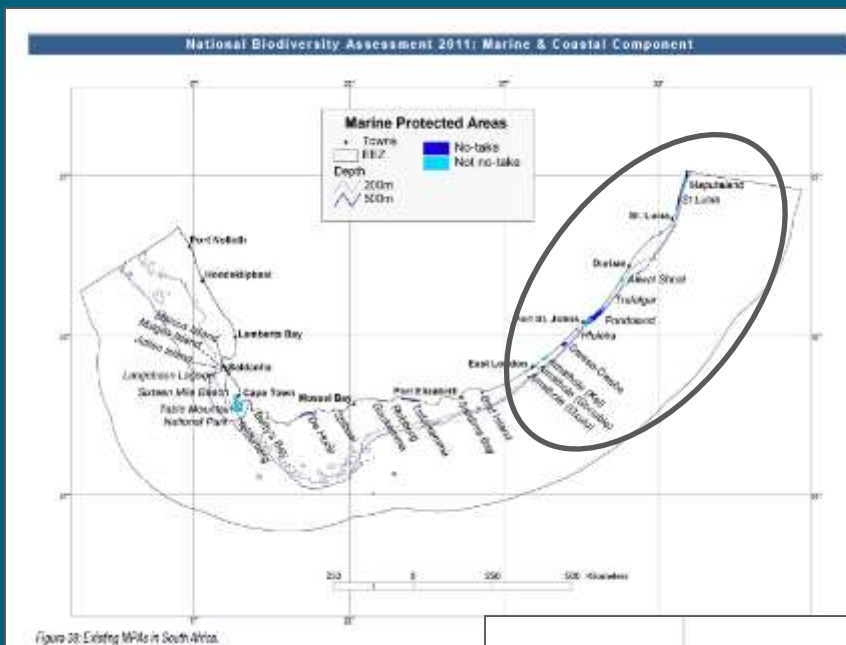
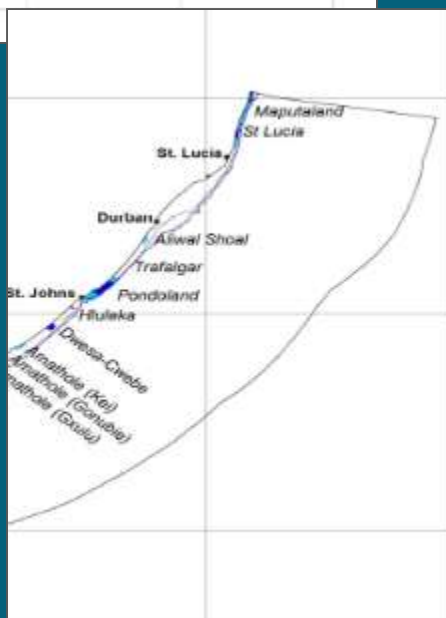


Figure 28: Existing MPAs in South Africa.



- Habitat data
- Abiotic data
- Fish monitoring and tagging
- Reef biodiversity surveys
- Deep reef surveys
- Soft-bottom community data
- Coral reef health monitoring

- Marine ecosystem condition map- national scale
- Validate existing & improved condition maps
- Standardised method to compare condition
- Inform the NBA & support decision making & planning

