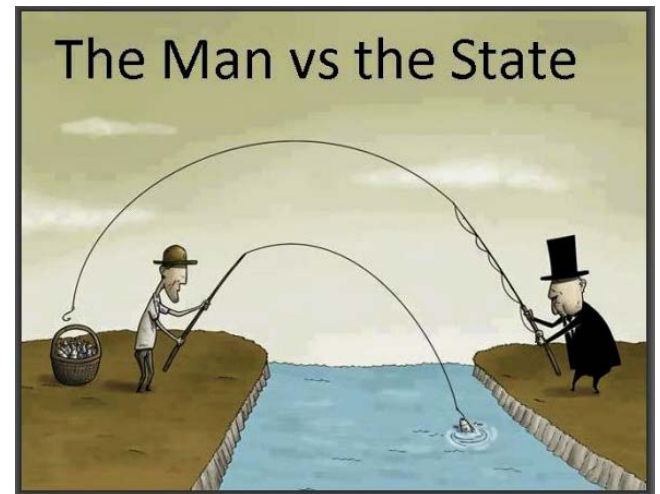
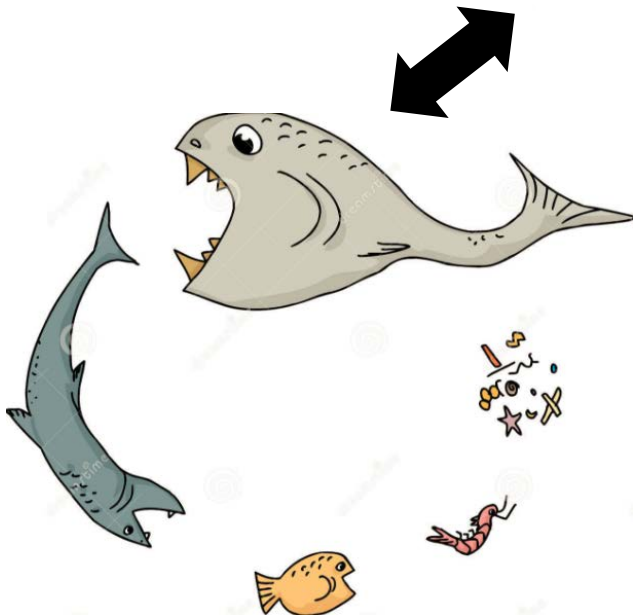


# Mind the gap

challenges in crossing the boundaries of research, policy and management

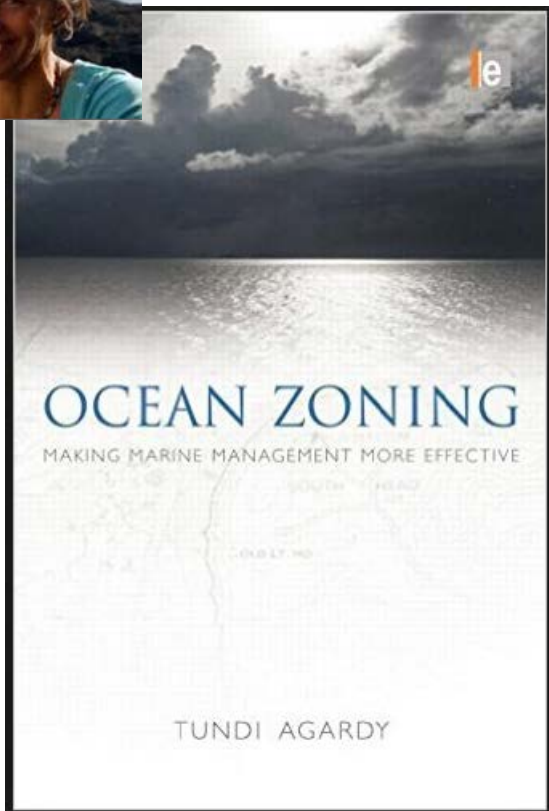


# A research programme to inform ecosystem-based Marine Spatial Planning in South Africa



Mandy Lombard (& many friends)  
Institute for Coastal and Marine Research  
Nelson Mandela Metropolitan University





## Tundi Agardy

Ocean zoning is a powerful tool that can help governments to determine **what uses are appropriate where**, and **what levels of use will keep ecosystems productive and healthy**, ....

....provides us a much needed tool for averting continued degradation and overuse of marine and coastal areas – degradation that has recently been revealed to be far more extensive than anyone had realised (**Halpern 2008**).



Science AAAS

Home News Journals Topics Careers

Science Science Advances Science Immunology Science Robotics Science Signaling Science Translational Medicine

REPORT

## A Global Map of Human Impact on Marine Ecosystems

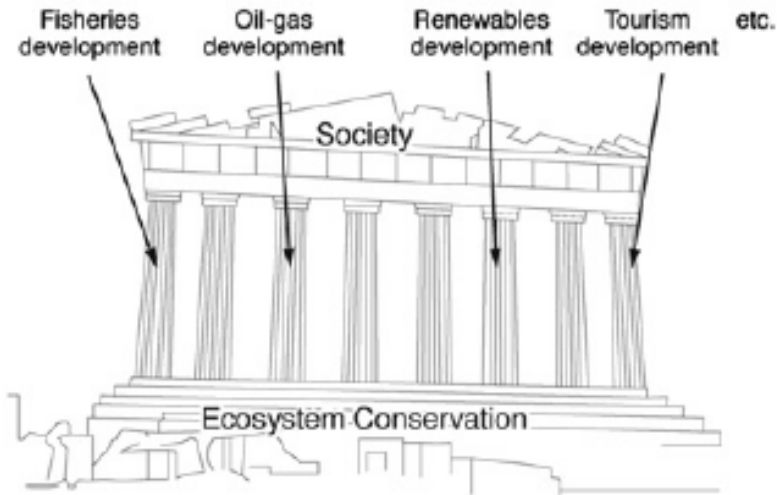
SHARE



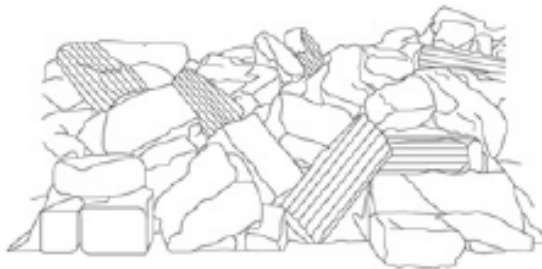
1

Benjamin S. Halpern<sup>1,†</sup>, Shaun Walbridge<sup>1,\*</sup>, Kimberly A. Selkoe<sup>1,2,\*</sup>, Carrie V. Kappel<sup>1</sup>, Fiorenza Micheli<sup>3</sup>, Caterina D'Agrosa<sup>4,†</sup>, John F. Bruno<sup>5</sup>, Kenneth S. Casey<sup>6</sup>, Colin Ebert<sup>1</sup>, Helen E. Fox<sup>7</sup>, Rod Fujita<sup>8</sup>, Dennis Heinemann<sup>9</sup>, Hunter S. Lenihan<sup>10</sup>, Elizabeth M. P. Madin<sup>11</sup>, Matthew T. Perry<sup>1</sup>, Elizabeth R. Selig<sup>6,12</sup>, Mark Spalding<sup>13</sup>, Robert Steneck<sup>14</sup>, Reg Watson<sup>15</sup>

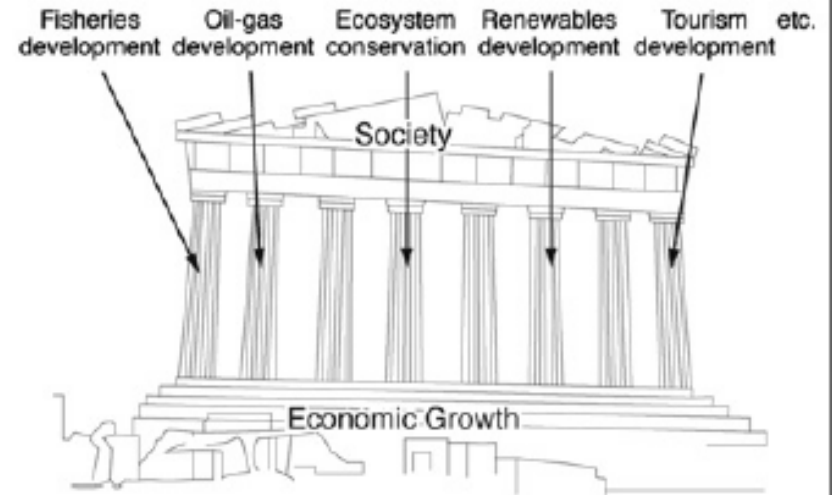
## Ecosystem based MSP - hard sustainability



**If ecosystems collapse.....**



## Integrated use MSP - soft sustainability

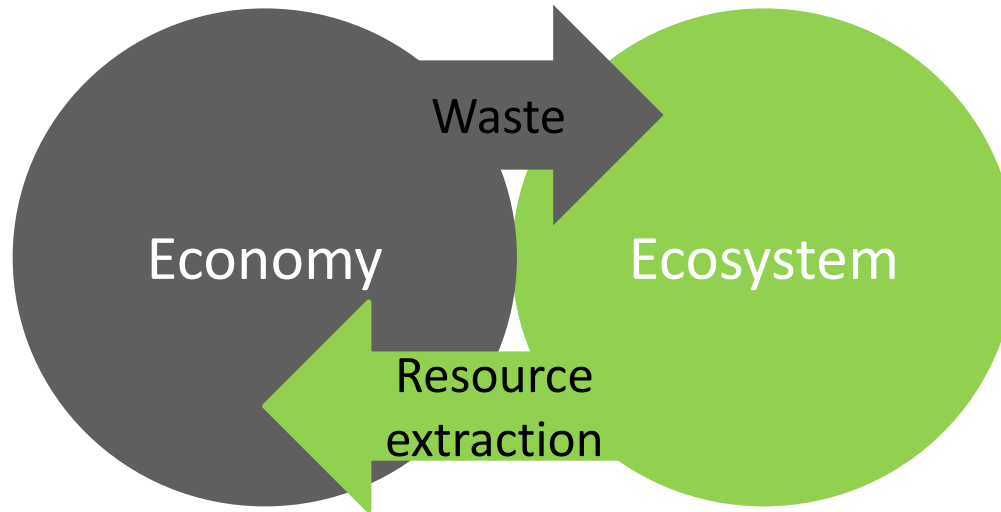


**If economic sectors and growth collapse.....**



**Wanfei Qiu and Peter Jones (2016)**

# The fallacious neoclassical model



## Today's global economy

Does not value natural resources  
Assumes natural resources are limitless  
Waste is only a nuisance  
Requires perpetual growth driven by consumption

## The real economy

Everything is connected to everything  
Everything's got to go somewhere  
There's no such thing as a free lunch



# Steady state economy



'STEADY AS SHE GOES'

Is an economy of relatively stable size

It features stable population & stable consumption that remain at/below carrying capacity

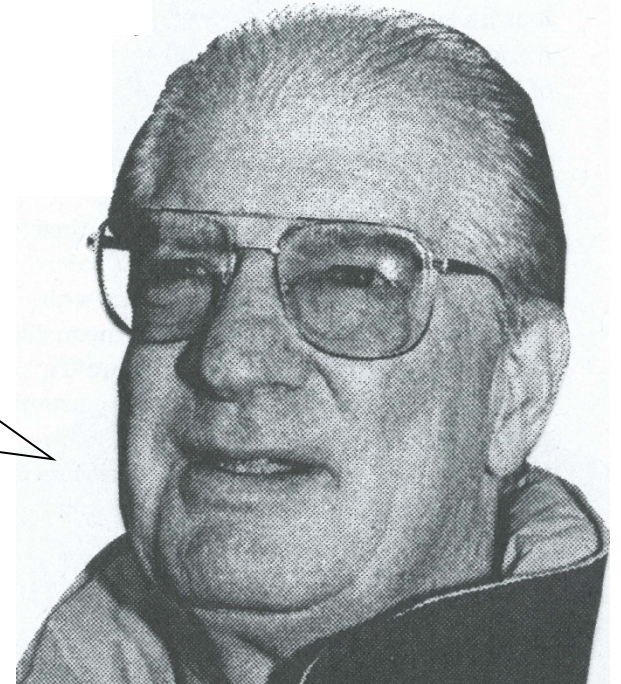
It has environmental, lifestyle & moral advantages

# 3 things that we need to do but we find hard to do

**1. Share**

**2. Control population growth**

**3. Reduce consumption**



Herman Daly (2009) *Conserv Biol*

# Human behaviour

Conservation – Can Our Pleistocene Brain Handle It?



Food

Mates

Resources

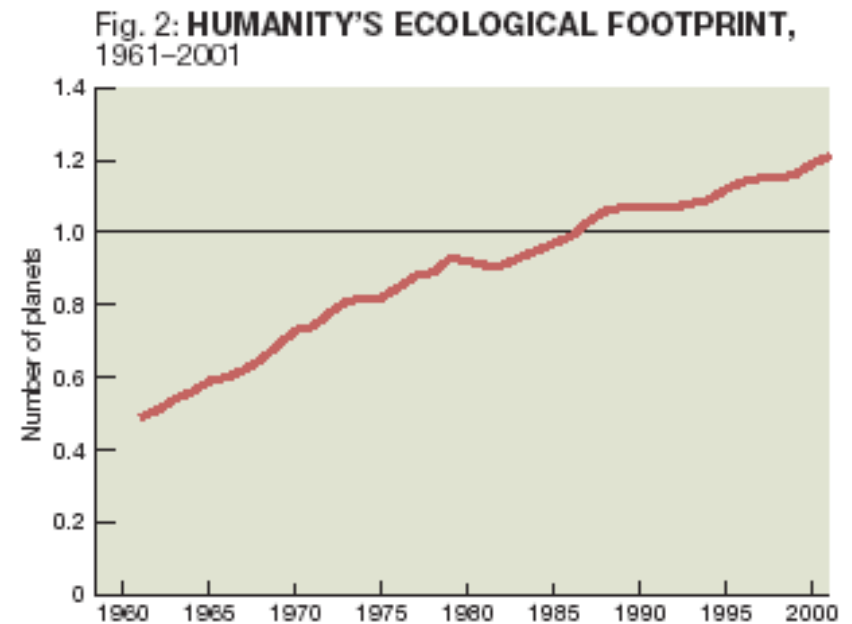
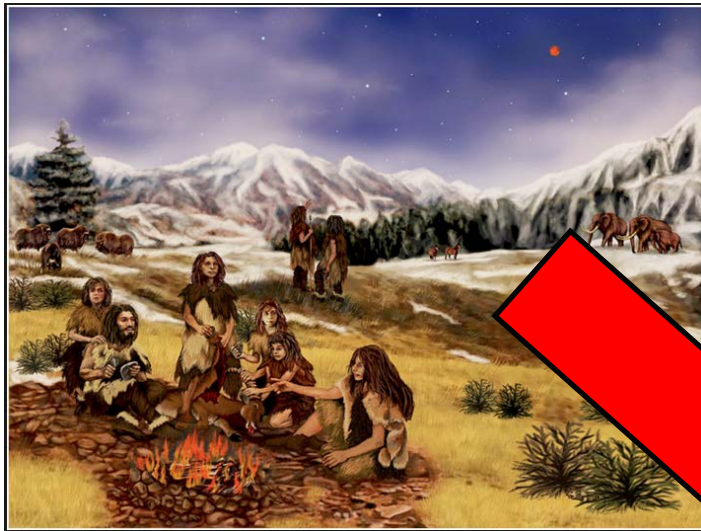
Small groups

Co-operate

Trade-offs



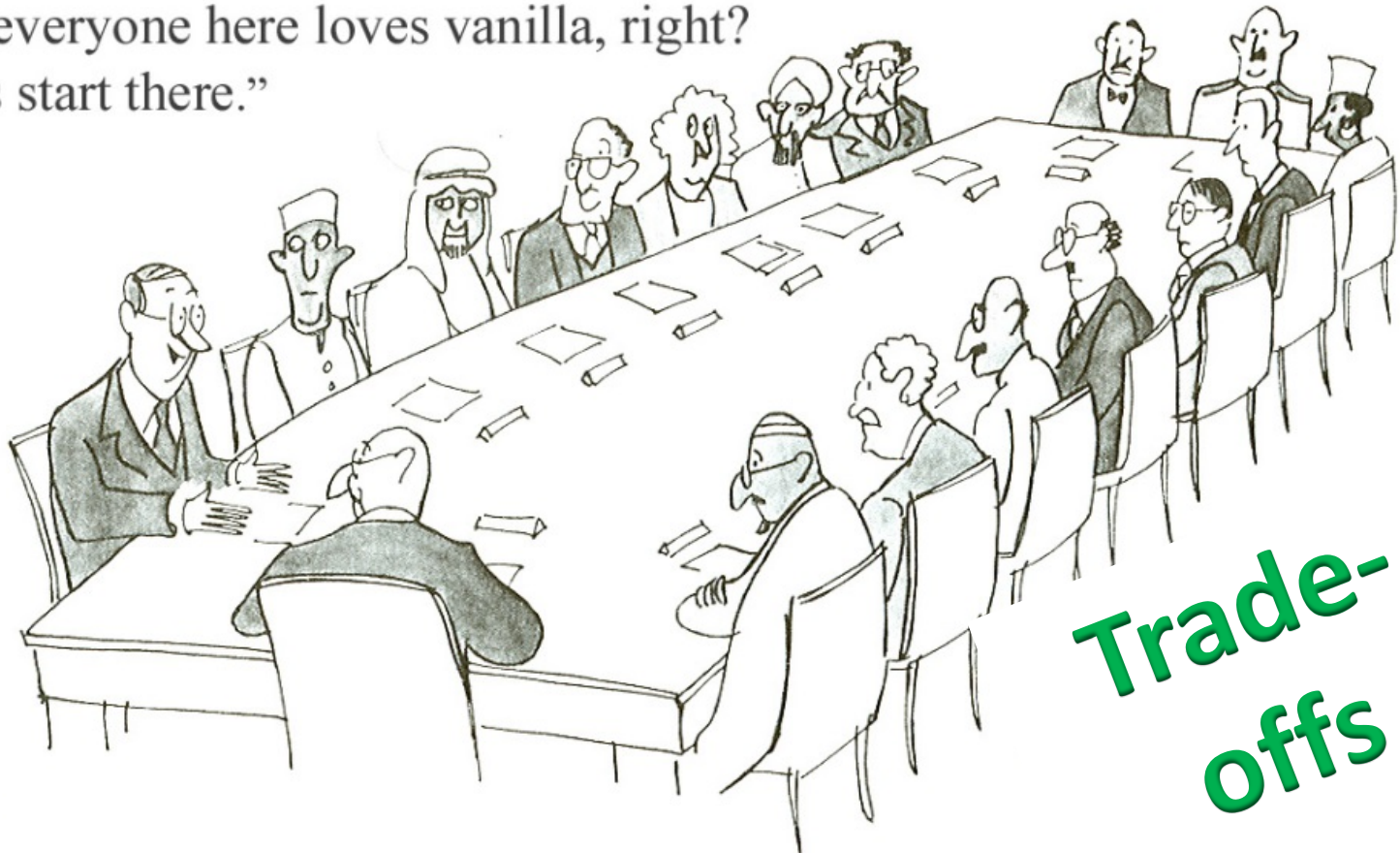
We are good at making  tools  
but we are not good at working out  
the future



# MSP is about managing people

Most people manage conflicting objectives most days

“Look, everyone here loves vanilla, right?  
So let’s start there.”

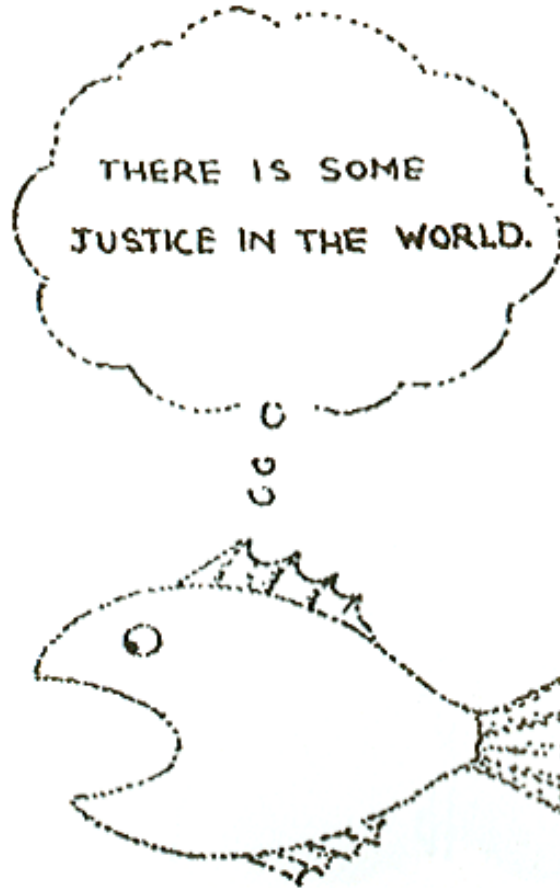


# Stakeholder viewpoints

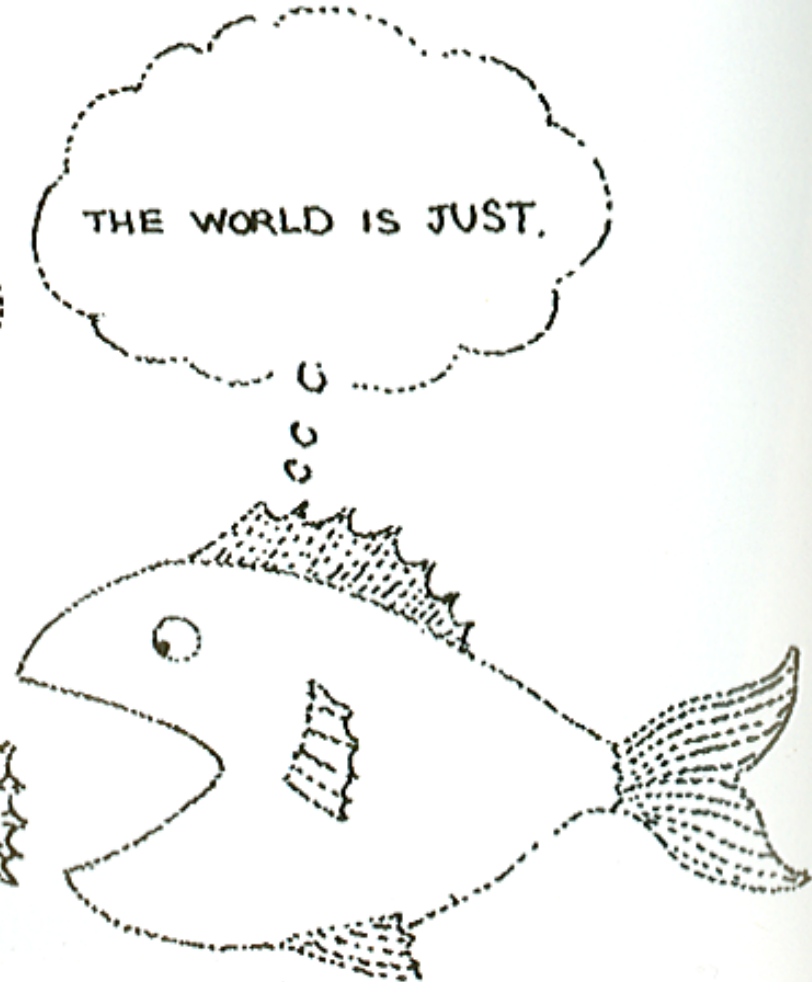
**Conservationist**



**Community**



**Industry**





REPUBLIC OF SOUTH AFRICA



# Unlocking the Economic Potential of South Africa's Oceans



# Growing the RSA Economy: Nine Point Plan

1. Revitalisation of the agriculture and agro-processing value chain (APAP)
2. More effective implementation of a higher impact IPAP
3. Advancing beneficiation (adding value to our mineral wealth)
4. Unlocking the potential of SMMEs, cooperatives, township and rural enterprises
- 5. Growing the Oceans Economy**
6. Resolving the energy challenge
7. Managing work conflict
8. Scaling up private sector participation
9. Cross-cutters (ICT, Transport infrastructure, Science and Technology, Water)



# 5. GROWING THE OCEANS ECONOMY

1



- Marine Transport and Manufacturing

2



- Offshore Oil and Gas exploration

3



- Aquaculture

4



- Marine Protection Services and ocean Governance

5



- Coastal Tourism

**MSP**



> INITIATIVES

## Integrated Ocean Governance and Protection

### Integrated framework and governance



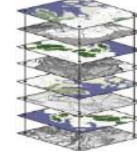
- 1 Ministerial Committee and Secretariat to govern activities
- 2 Enhancement of legislation for the Integrated Coastal and Oceans Management Act or Oceans Act
- 3 Review of ocean-related legislation
- 4 Accelerated capacity-building intervention in ocean governance

### Ocean protection



- 5 Enhanced and coordinated enforcement programme
- 6 National ocean and coastal information system and extending earth observation capacity
- 7 National ocean and coastal water quality monitoring programme
- 8 **Creation of a Marine Protected Area (MPA) representative network** ★
- 9 MPA/MSP discovery, research and monitoring programme

### Marine spatial planning (MSP)

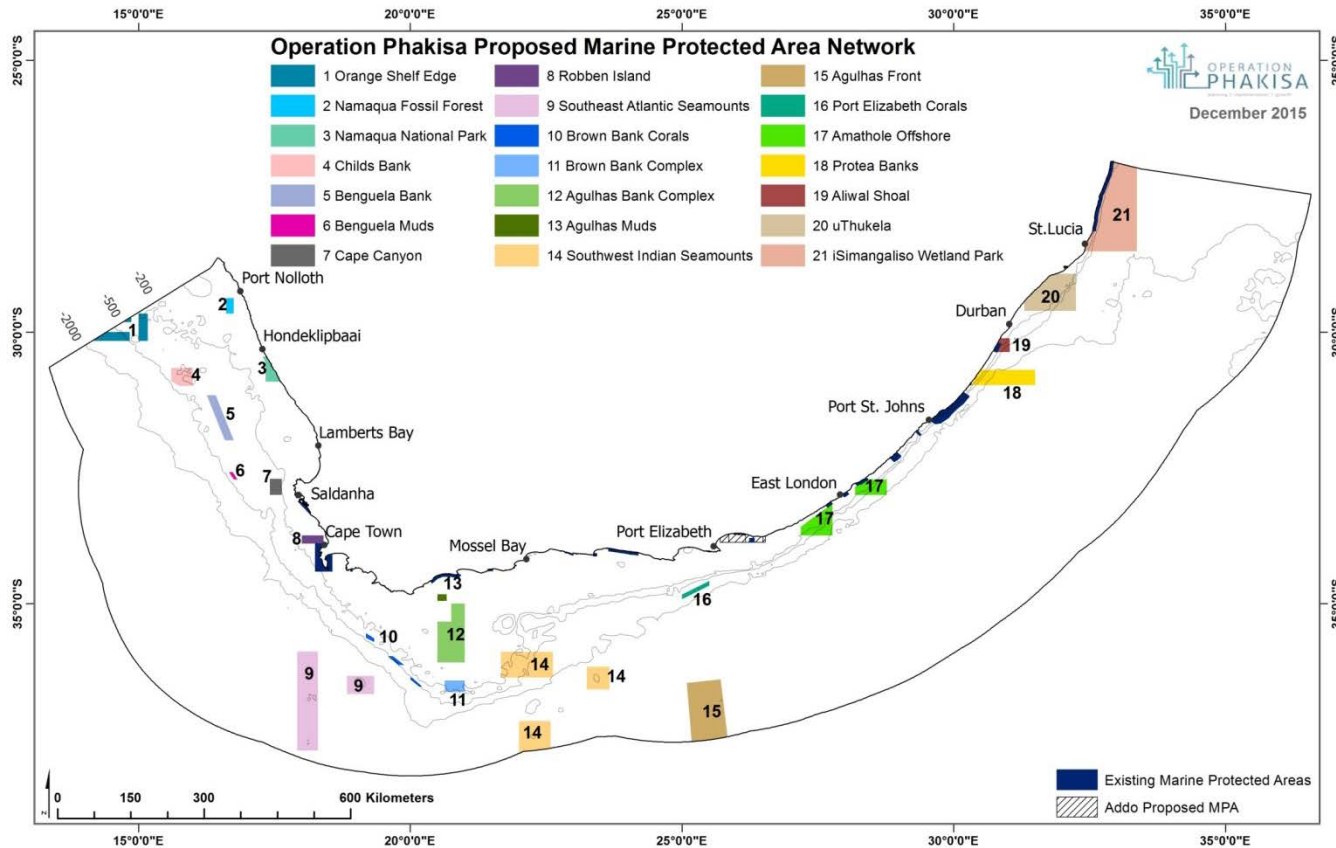


- 10 **Marine Spatial Planning (MSP) process** ★



## > PROGRESS

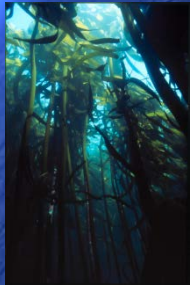
- Legal drafting of the regulations and declaration notices has been completed for 21 Offshore Marine Protected Areas (MPAs).



- Marine Spatial Planning Bill



# PROJECTS



BCC

National Spatial  
Biodiversity  
Assessment  
2004, 2010



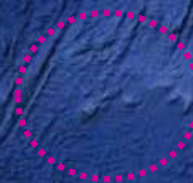
SeaPlan

Offshore MPAs

Inshore demersal trawl

Agulhas  
Bioregion

Prince  
Edward  
Islands





# conceptual contributions

OPEN ACCESS Freely available online

PLoS one

## Accommodating Dynamic Oceanographic Processes and Pelagic Biodiversity in Marine Conservation Planning

Hedley S. Grantham<sup>1\*</sup>, Edward T. Game<sup>2</sup>, Amanda T. Lombard<sup>3</sup>, Alistair J. Hobday<sup>4</sup>, Anthony J. Richardson<sup>1,5,6</sup>, Lynnath E. Beckley<sup>7</sup>, Robert L. Pressey<sup>1\*</sup>, Jenny A. Huggett<sup>8,9</sup>, Janet C. Coetzee<sup>8</sup>, Carl D. van der Lingen<sup>8,9</sup>, Samantha L. Petersen<sup>10</sup>, Dagmar Merkle<sup>8</sup>, Hugh P. Possingham<sup>1</sup>

*Antarctic Science* 19 (1), 39–54 (2007) © Antarctic Science Ltd Printed in the UK

DOI: 10.1017/S0954102007000077

## Conserving pattern and process in the Southern Ocean: designing a Marine Protected Area for the Prince Edward Islands

A.T. LOMBARD<sup>1\*</sup>, B. REYERS<sup>2</sup>, L.Y. SCHONEGEVEL<sup>2</sup>, J. COOPER<sup>3</sup>, L.B. SMITH-ADAO<sup>2</sup>, D.C. NEL<sup>4</sup>, P.W. FRONEMAN<sup>5</sup>, I.J. ANSORGE<sup>8</sup>, M.N. BESTER<sup>7</sup>, C.A. TOSH<sup>7</sup>, T. STRAUSS<sup>8</sup>, T. AKKERS<sup>8</sup>, O. GON<sup>10</sup>, R.W. LESLIE<sup>9</sup> and S.L. CHOWN<sup>11</sup>

## Pelagic protected areas: the missing dimension in ocean conservation

Edward T. Game<sup>1,2</sup>, Hedley S. Grantham<sup>2</sup>, Alistair J. Hobday<sup>3</sup>, Robert L. Pressey<sup>4</sup>, Amanda T. Lombard<sup>5</sup>, Lynnath E. Beckley<sup>6</sup>, Kristina Gjerde<sup>7</sup>, Rodrigo Bustamante<sup>8</sup>, Hugh P. Possingham<sup>2</sup> and Anthony J. Richardson<sup>2,8,9</sup>

# How do we deal with the problem?



Catch limits



Fishing gear



Marine Protected Areas



The Southern African Sustainable Seafood Initiative

Marketing

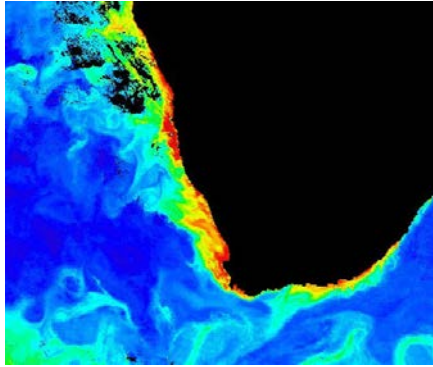


Influence Policy

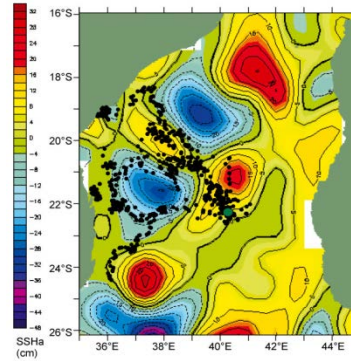
**MSP**



# The science that we draw on ....



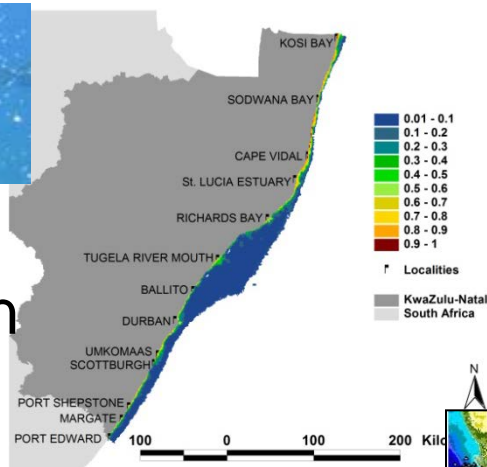
Physical oceanography



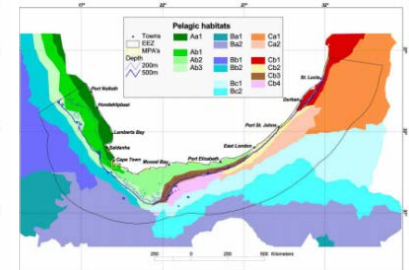
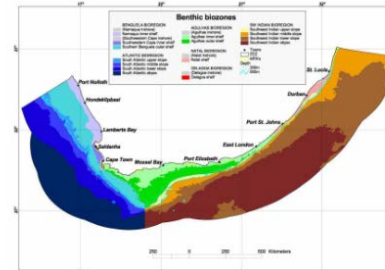
Biological oceanography



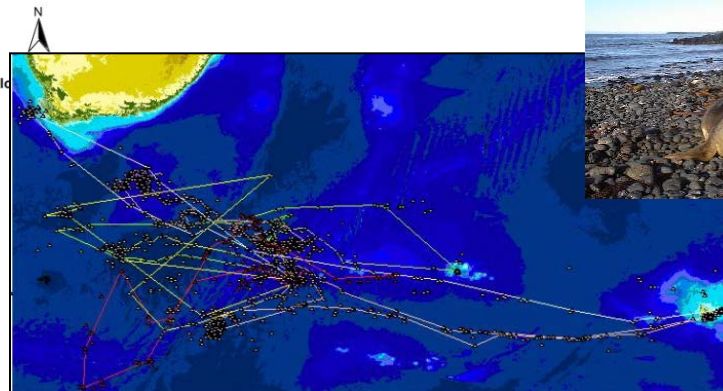
Species distribution modelling



## Biogeography



Animal movement



Southern elephant seals



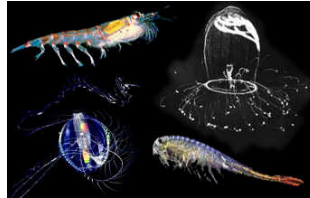
# The science that we draw on ....

Molecular ecology  
(Genetic diversity)



Taxonomy

Population ecology  
(larval dispersal)



Invasion biology

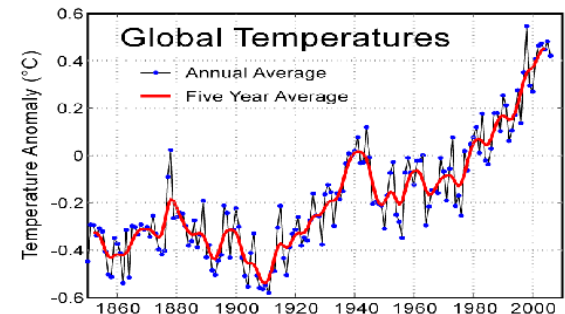
Community ecology  
(trophic cascades)



Ecosystem  
ecology  
(nutrient cycles)



Climate  
change

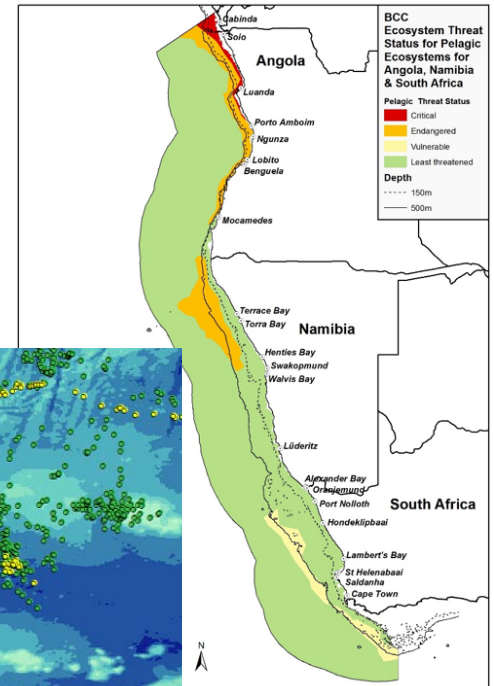
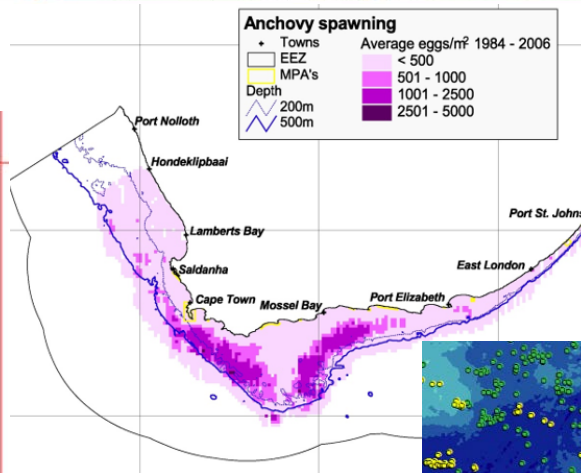
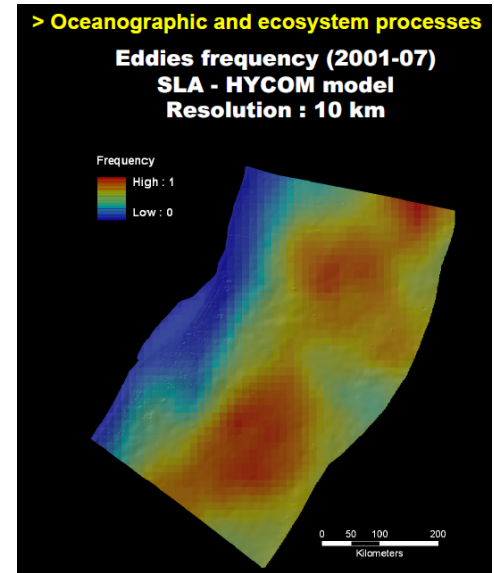
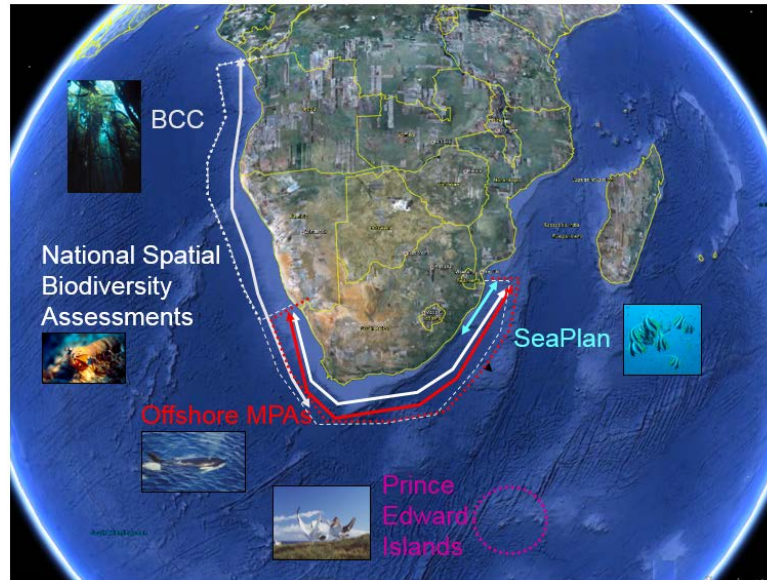
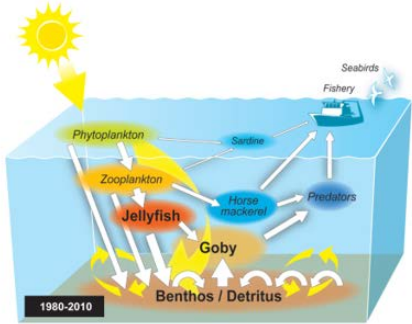
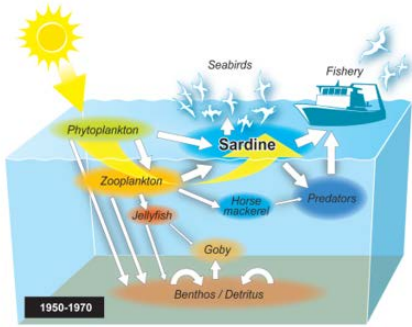


Decision analysis

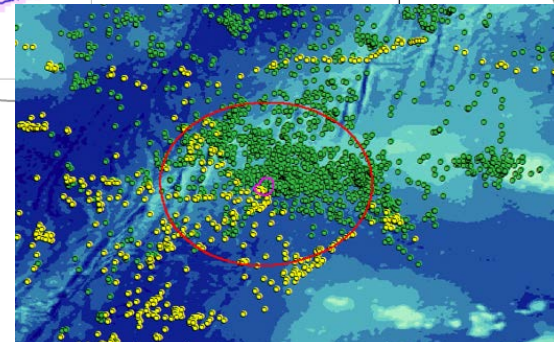
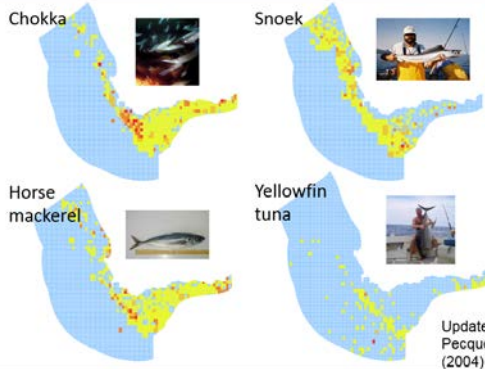
$$\sum_{PUs} Cost + BLM \sum_{PUs} Boundary + \sum_{ConValue} FPF \times Penalty + CostThresholdPenalty(t)$$

# Incorporating Pelagic Ecosystem Services into MSP

Kerry Sink & Carl van der Lingen

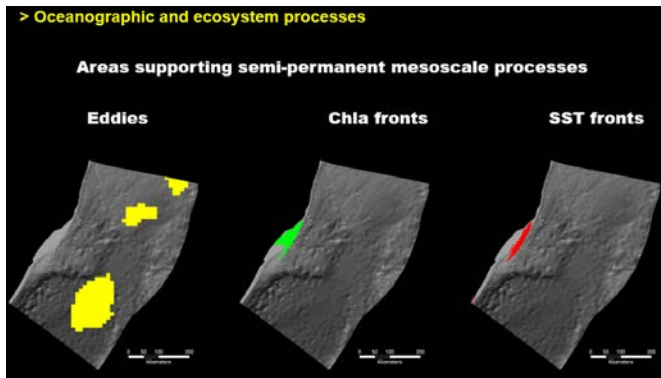


## Abundance of commercial species



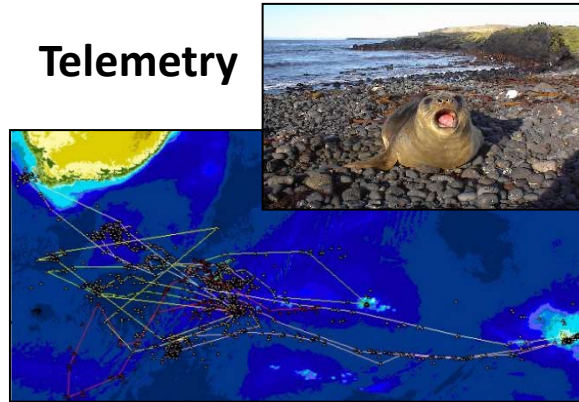


# Oceanographic mapping

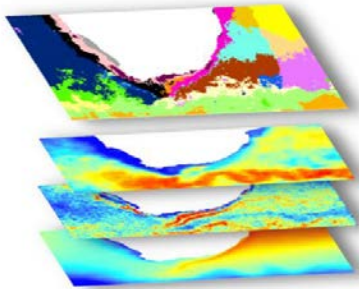


# Tools

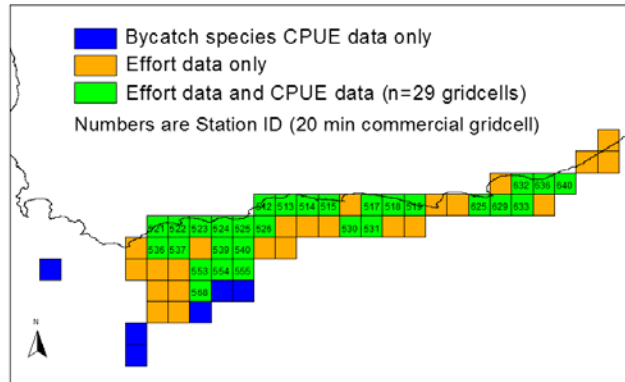
## Telemetry



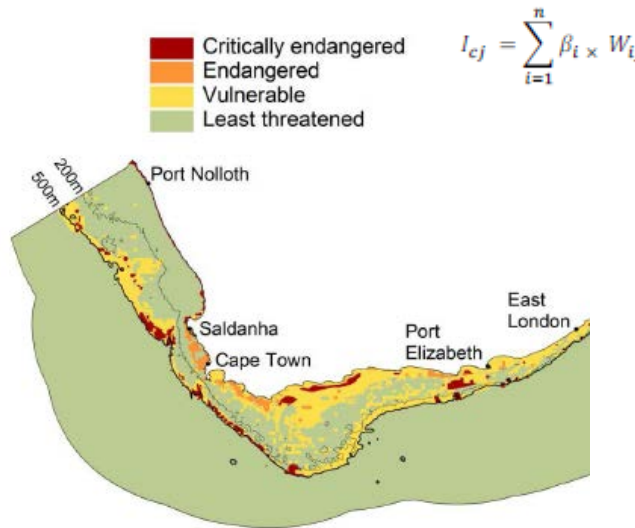
## Bioregionalisation



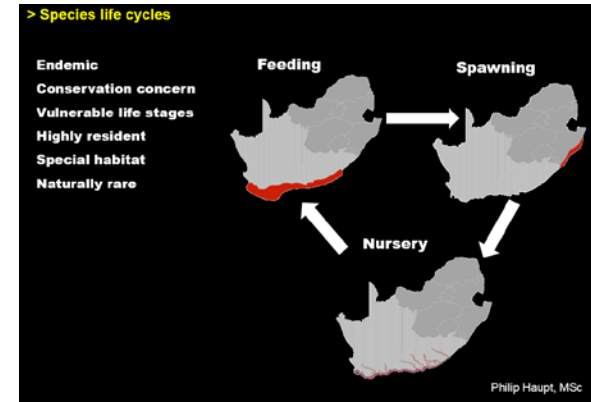
## Fisheries management



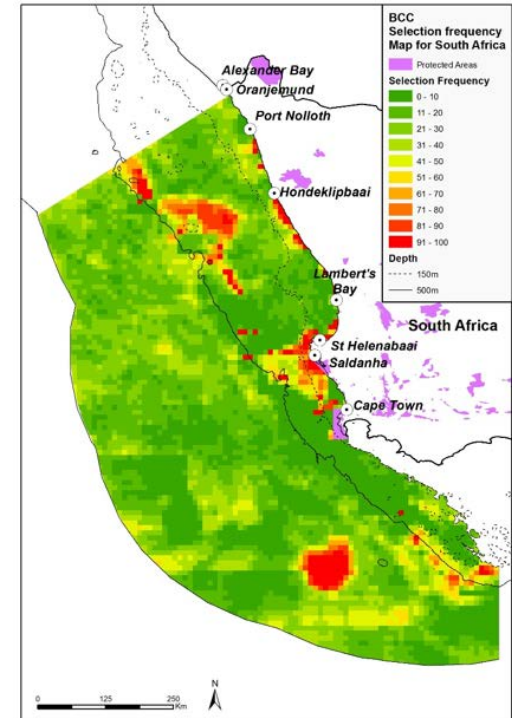
## Cumulative impact assessment



## Species life cycle envelopes



## Decision support software (Marxan)



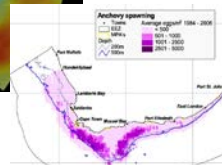
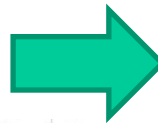
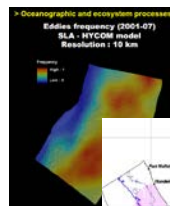
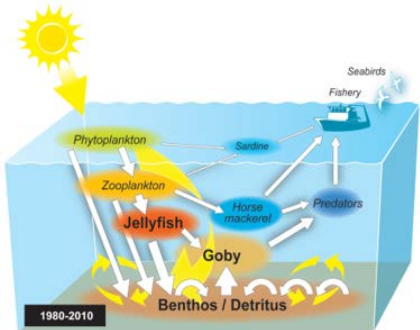
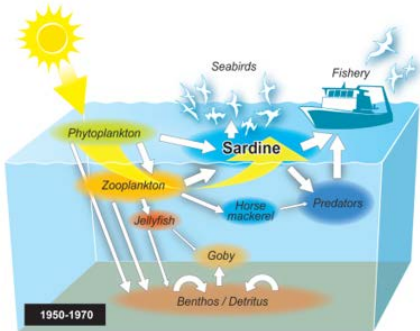
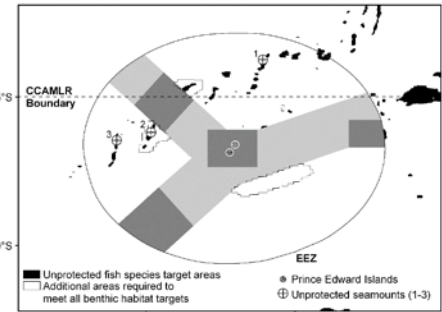
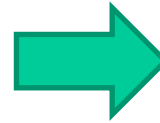
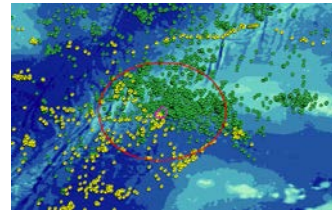


# Policy uptake

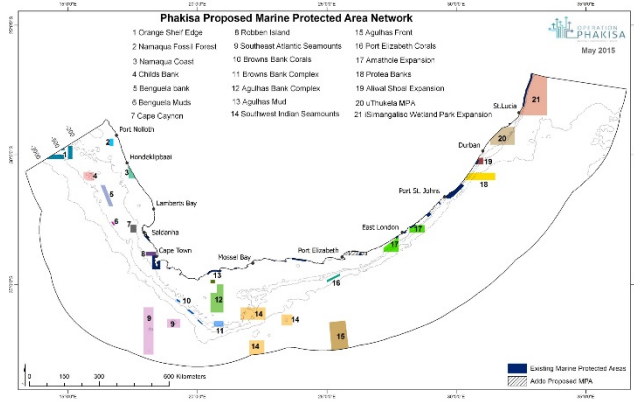
## Strong legislative framework:

- ICMA
- NEMA (and regs)
- NEMBA
- NEMPA
- MLRA
- Oceans Bill

## Ecological infrastructure



Sardine fishery management plan  
Spatial management plan being developed





## What

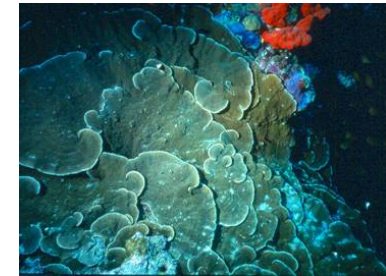
Marine Spatial Planning Research Group  
Institute for Coastal & Marine Research  
(interdisciplinary)

Nelson Mandela Metropolitan University



## When

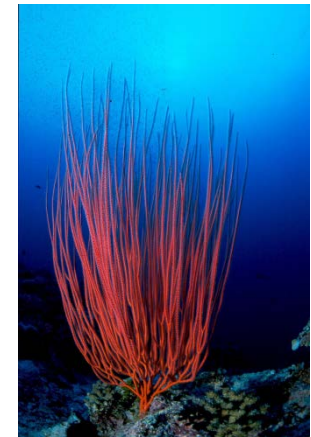
Started at NMMU Jan 2016



## Where

Virtual campus

New Marine and Maritime Campus 2017 PE



## Vision 2016

to undertake research that will inform  
ecosystem-based Marine Spatial Planning in  
South Africa

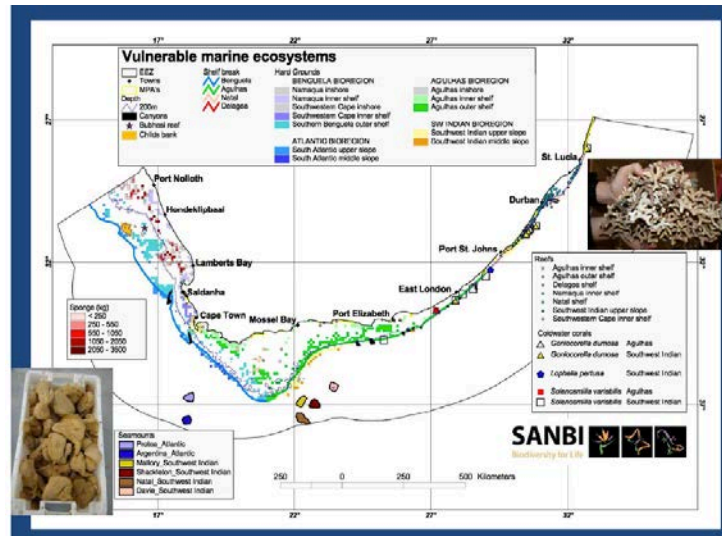


# Zoleka Filander (PhD) (DEA)

## Identifying and mapping sensitive deep-sea ecosystems in South Africa.



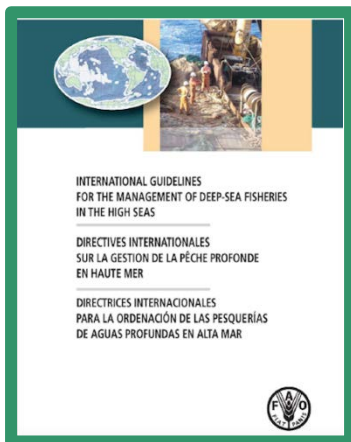
Dead reef-building coral specimens collected from a dredge sample off the Cape Canyon head (2016)



Potential sensitive systems mapped to date (Sink & Samaai, In press)



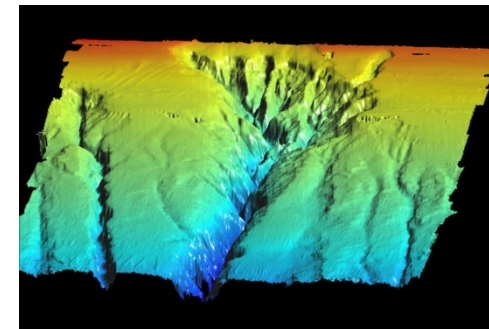
Trawl by-catch



FAO VME report, 2006



Unidentified cold-water coral species



Leadsman and Chaka in northern KZN (east coast of South Africa: Indian Ocean)

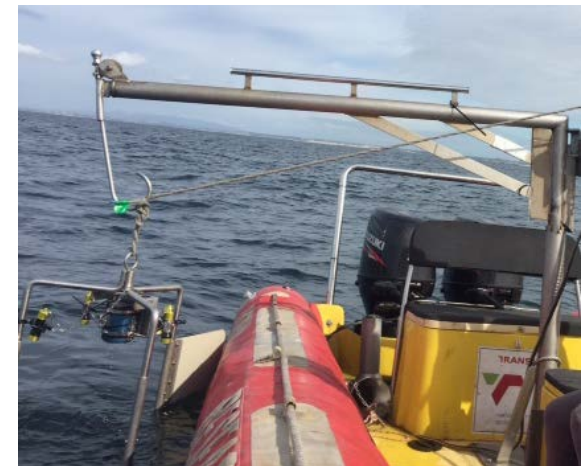
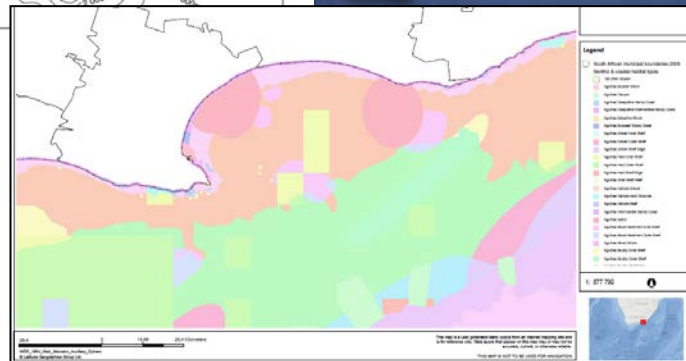
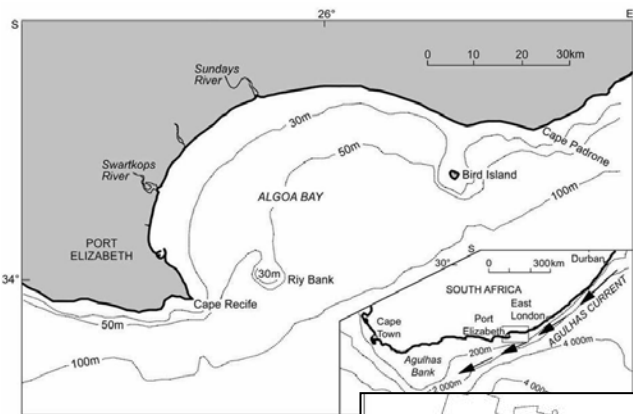




Hannah  
Raven  
(MSc)  
(SAEON)



# Spatial patterns and characterization of benthic epifaunal biodiversity in Algoa Bay





# Summer Newton (MSc)

The development of a humpback whale photo identification guide to inform MSP in KwaZulu-Natal

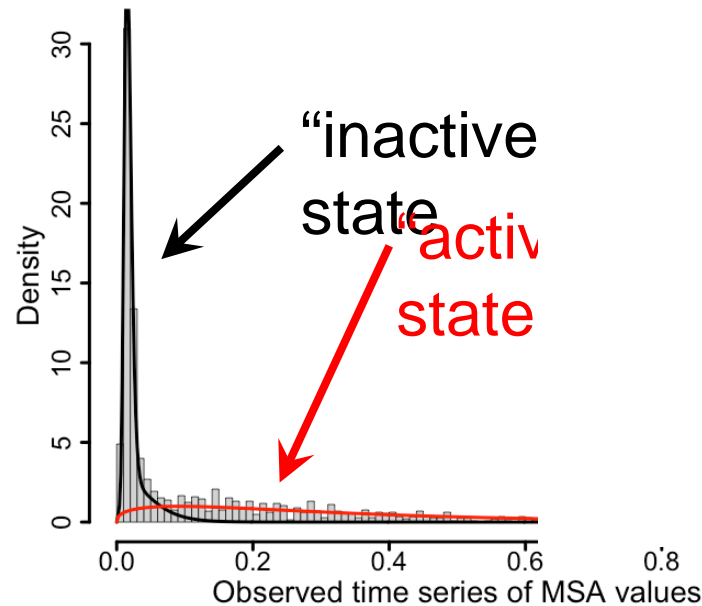






# Theoni Photopoulou (Postdoc)

Quantifying the impact of **environmental change** on the **movement ecology** of **marine top predators** with applications to **marine spatial planning**



Day

Night



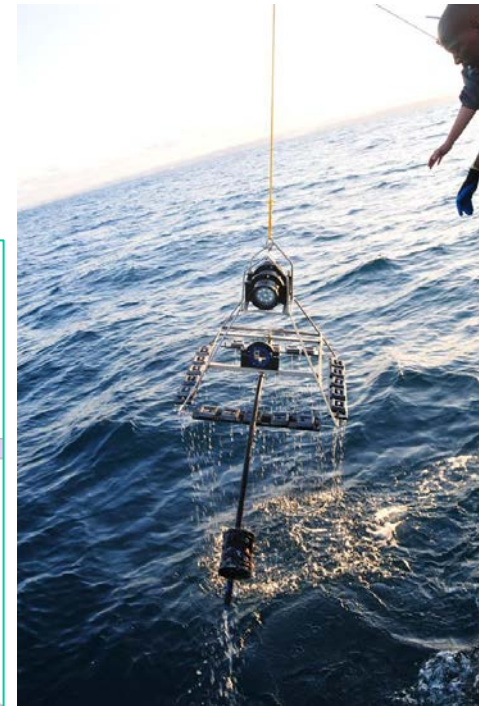
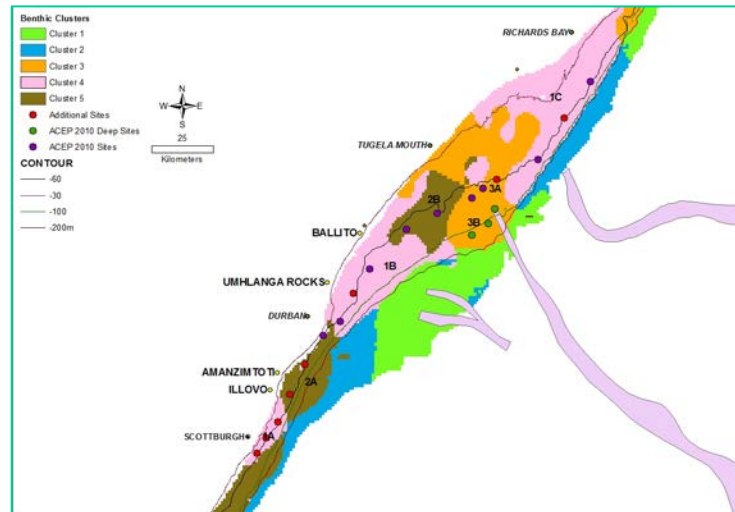


# Nokuthula Daweti (MSc)

Deep water Benthic fish communities along the continental shelf off KwaZulu-Natal assessed using a Baited Remote Underwater Video (BRUV) system to support marine spatial planning

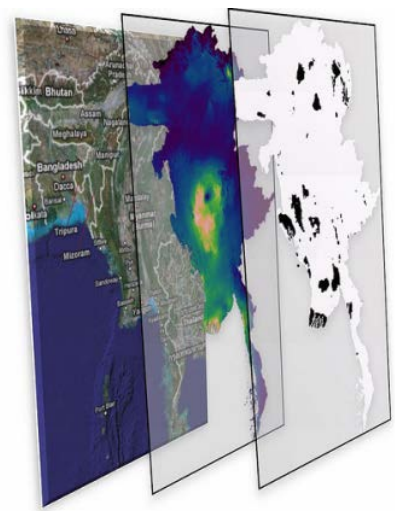
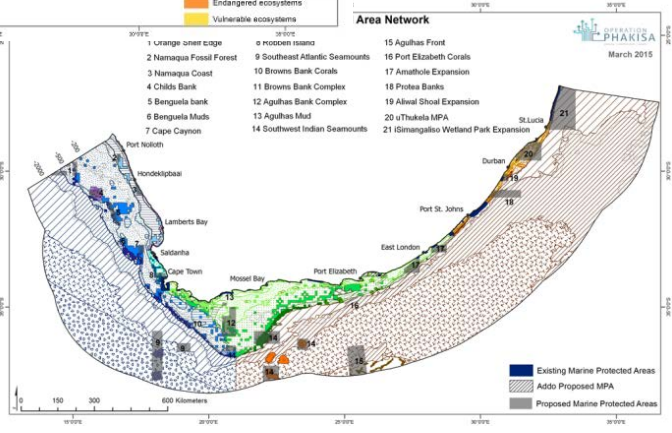
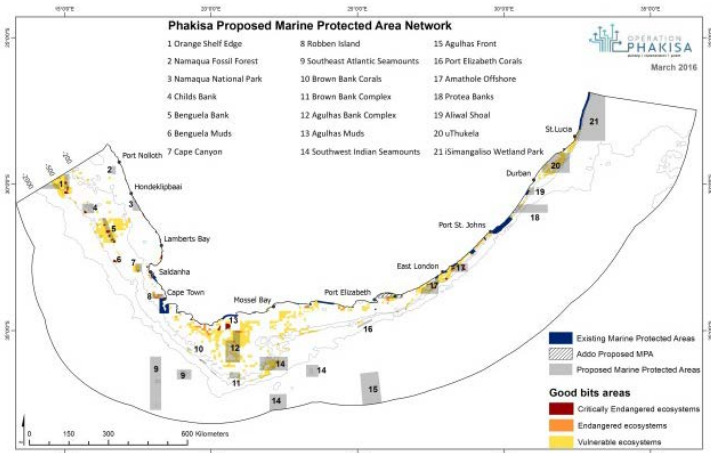


Phakisa proposed Reef MPA site



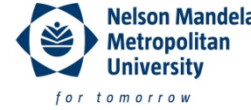


# Identifying and Mapping Key Fishing Areas within Exclusive Economic Zone

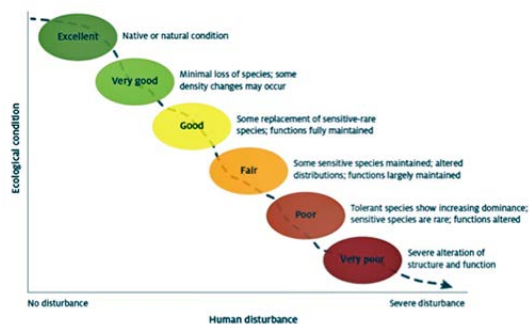
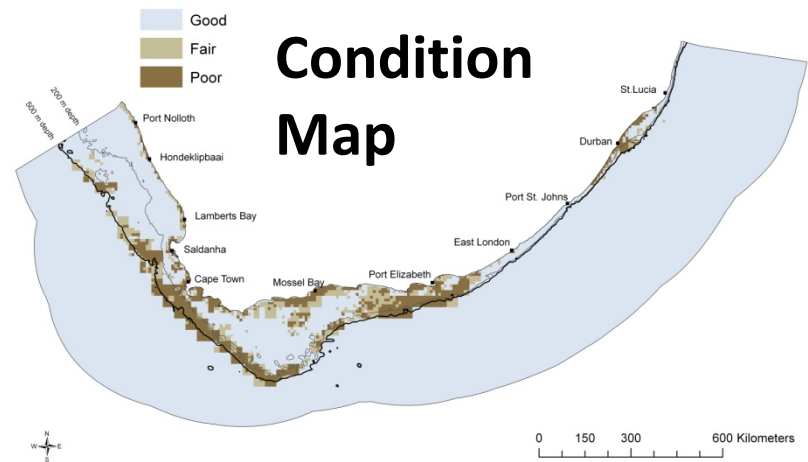
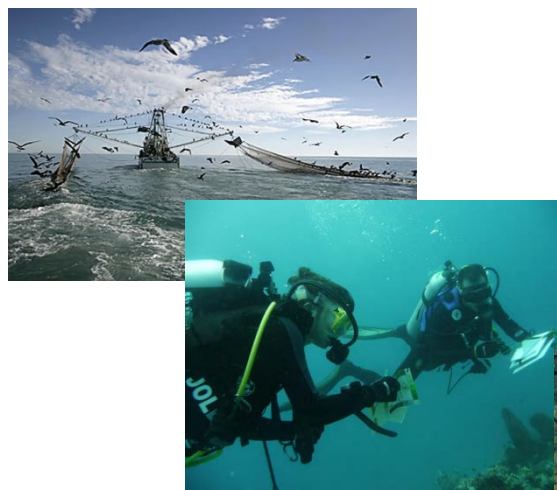
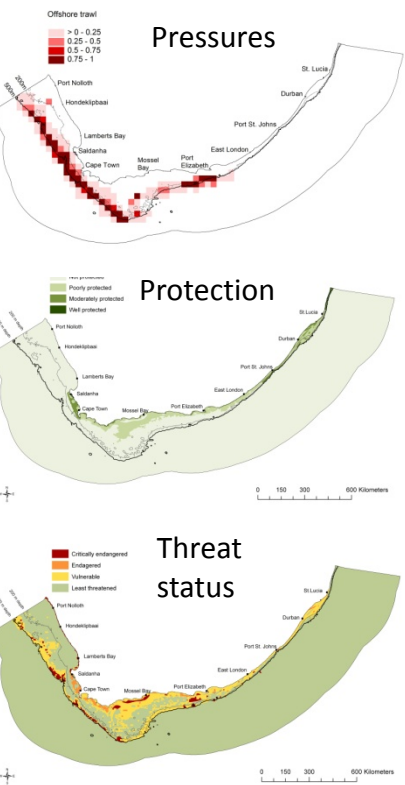




# Kaylee Smit (PhD)



# Measuring marine ecosystem condition on hard and unconsolidated benthic habitats in South Africa

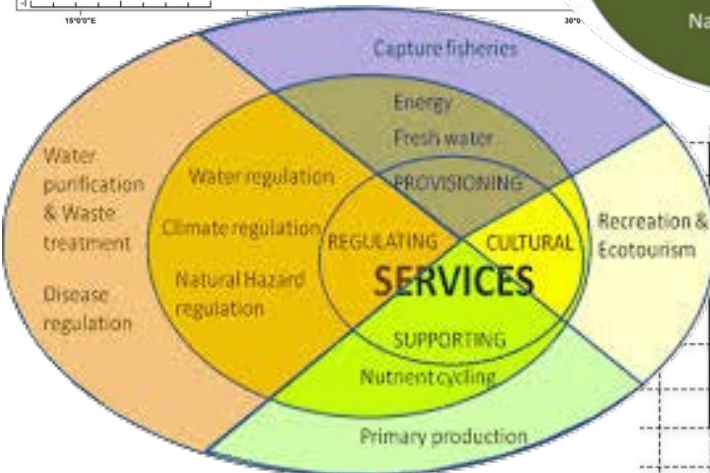
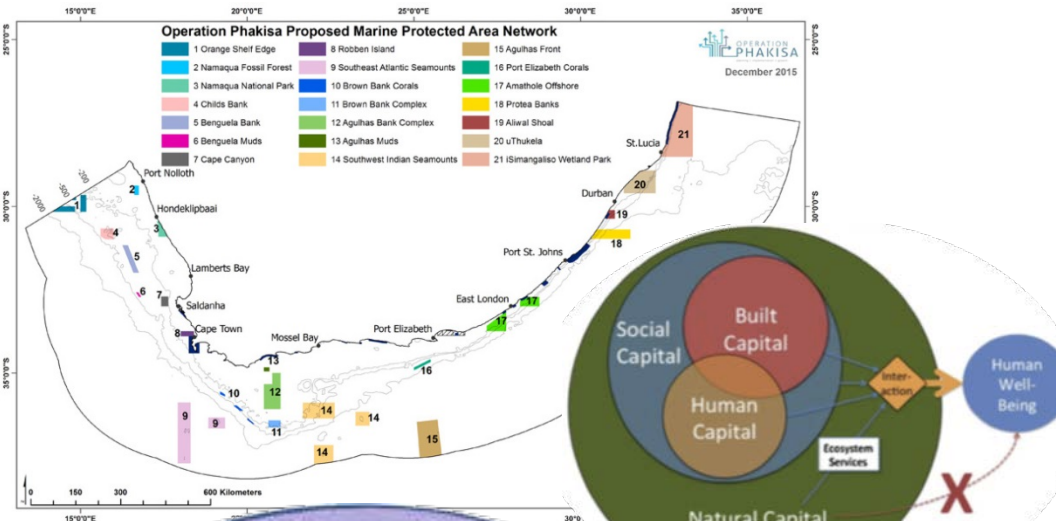




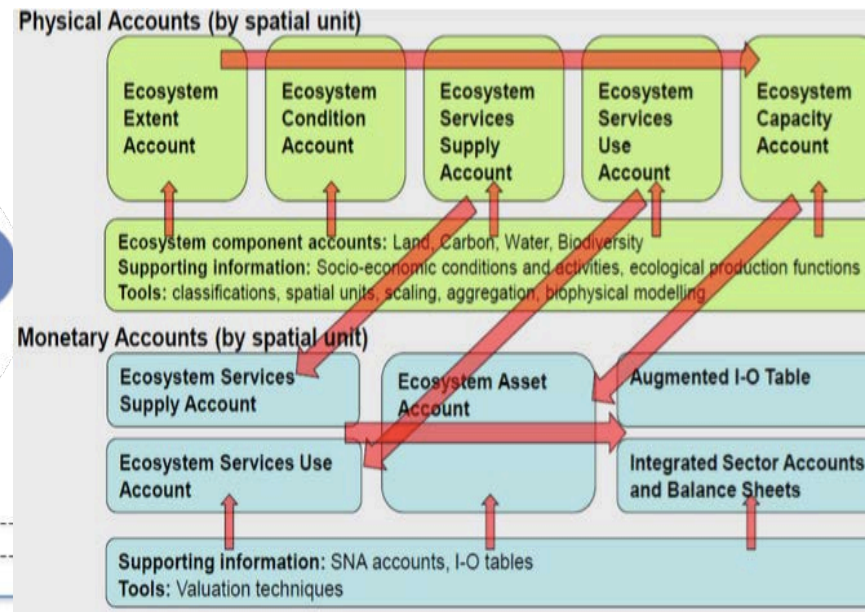


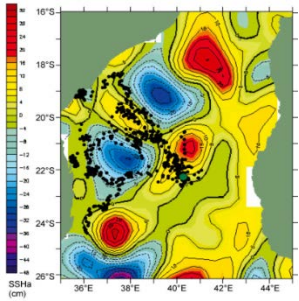
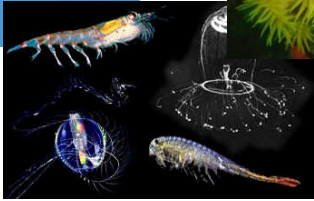
# Jodie Reed (PhD)

## Ecosystem services valuation and ecosystem accounting techniques for Phakisa MPAs



		LCEU type A	
	Ecosystem accounting unit		
BSU			LCEU type C
	LCEU type B		LCEU type A





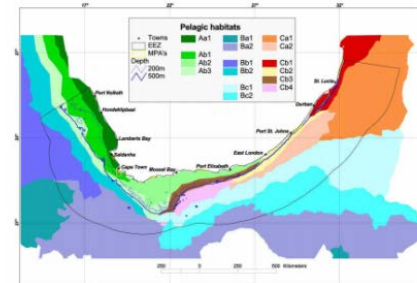
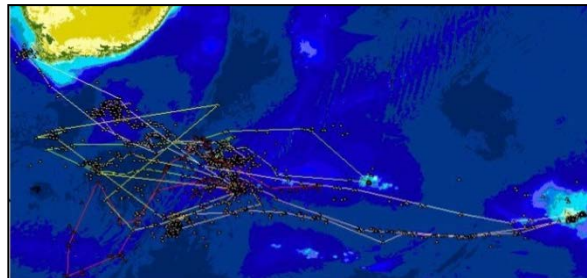
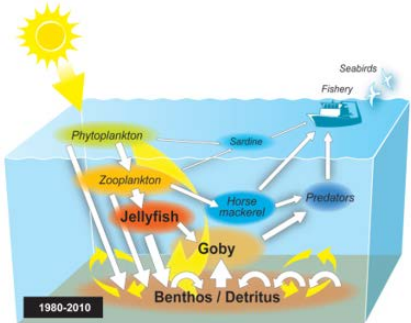
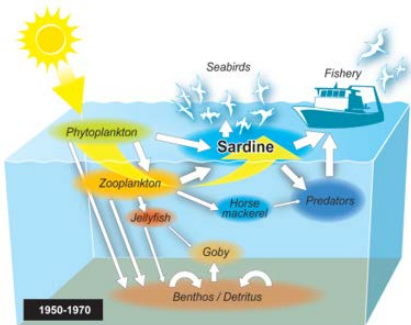
REPUBLIC OF SOUTH AFRICA

MARINE SPATIAL PLANNING BILL

(As introduced in the National Assembly (proposed section 75); explanatory summary of Bill published in Government Gazette No. ... of ... 2015)

(The English text is the official text of the Bill.)

(MINISTER OF ENVIRONMENTAL AFFAIRS)



The End

