

# ECOSYSTEM APPROACHES TO FISHERIES MANAGEMENT IN THE BENGUELA: AN AFRICAN SUCCESS STORY

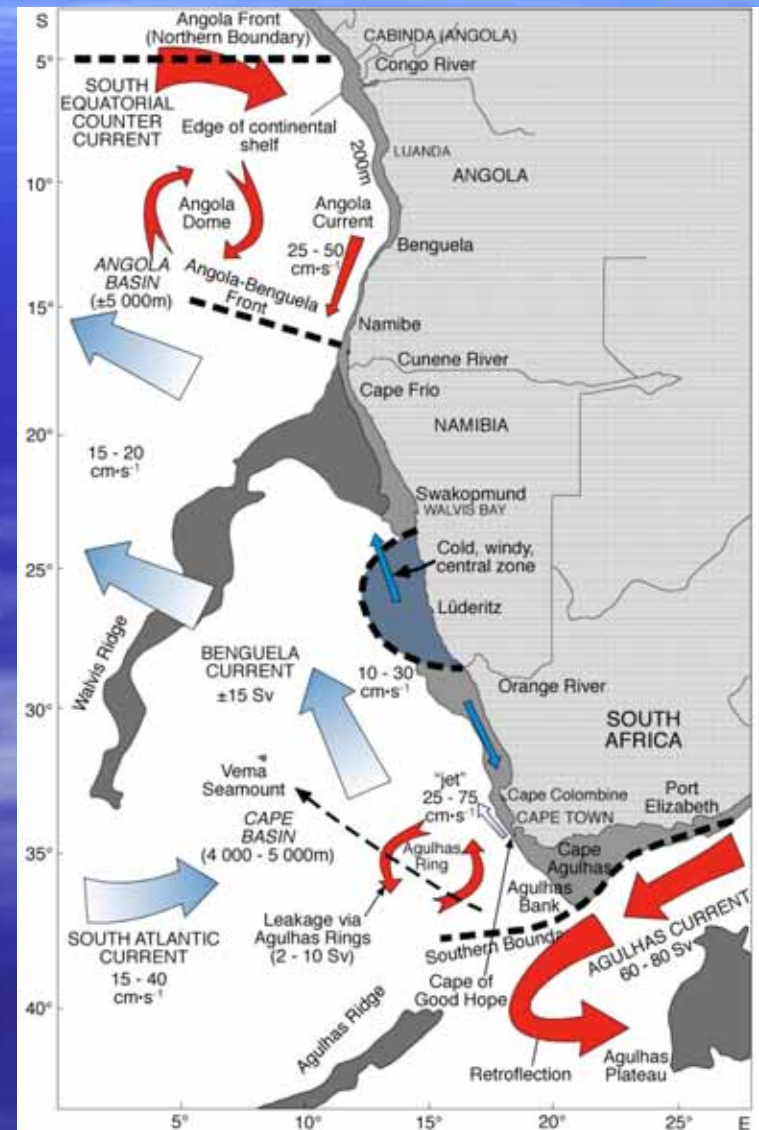
Johann Augustyn, Samantha Petersen  
and Hashali Hamukuaya



# The Benguela Ecosystem

## A highly complex ecosystem

- Highly productive cold current, bounded by warm currents in the N & S
- Intense upwelling cells
- Topographical features that affect productivity
- Frontal zones
- Oceanographic rings



# OVERVIEW

- The origins of EAF in the Benguela
- The BCLME EAF project
- The Benguela Current Commission and EAF
- The state of EAF science in the Benguela region
- Tracking EAF management in the Benguela region

# THE ORIGINS OF EAF IN THE BENGUELA

- From the 1972 United Nations Conference on Human Environment (Stockholm) and the 1982 United Nations Convention of the Law of the Sea to the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg
- WSSD & JPOI: “ Encourage the application by 2010 of the ecosystem approach, noting the Reykjavik Declaration on Responsible Fisheries in the marine ecosystem and decisions 5/6 of the Conference of Parties to the Convention on Biological Diversity “(Chapter 4, paragraph 29)

# THE ORIGINS OF EAF IN THE BENGUELA

- The **Benguela Ecology Programme (BEP)** 1981-1996 : multi-disciplinary ecosystem- based approach
- The **Benguela Environment Fisheries Interaction and Training (BENEFIT)** programme (1997 – 2006) : regional collaboration
- The **Benguela Current Large Marine Ecosystem Programme (BCLME, 2002 – 2007)** : laid EAF basis from TDA/SAP
- The **Benguela Current Commission (2007)**– taking EBM & EAF forward into the future

# BCLME EAF PROJECT

## Ecosystem Approaches for Fisheries (EAF) Management in the BCLME (Project LMR/EAF/03/01) Final Report

K.L. Cochrane, C.J. Augustyn, G.  
Bianchi, P. de Barros, T.  
Fairweather, D. Japp, K. Kilongo,  
D. Nel, J-P Roux, L.V. Shannon,  
B. van Zyl and F. Vaz Velho

FAO Fisheries Circular 1026



# Project Objectives

- To investigate **the feasibility of EAF management in the BCLME region** through examining the existing issues, problems and needs related to EAF, and developing different management options to achieve sustainable management of the resources at an ecosystem level

# 1. TROM reviews

## a) Summary of available data

- Annual catches from the earliest time available
- Value of the catches from the fishery per year for the last 5 years
- Number of fishers and land-based workers by sector
- Value and employment of any value-added activities linked to the sector.
- Estimated status of the stocks per year over the last 5 years.
- Details of fishing gear used and areas fished

## b) Management measures currently being used in the fishery/sector

- Gear restrictions
- Vessel restrictions
- Details of limited entry, including number of rights holders
- Details of closed areas and seasons
- Size/age controls
- Output controls in place (e.g. TAC, bag limits, etc)

## c) Ecosystem issues



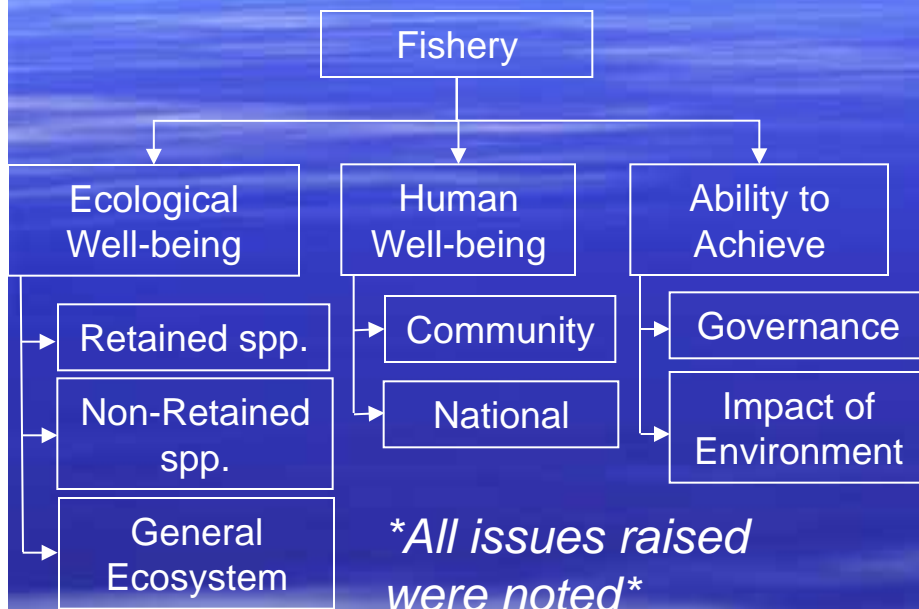
# RISK ASSESSMENT FOR SUSTAINABLE FISHERIES

## 2. Prioritisation of issues

$$\text{Risk} = \text{Impact} \times \text{Likelihood}$$

### 1. Identification of risks/issues

*Using broad categories...*



### 3. Develop Performance Reports

*Operational objective*

*Indicators*

*Performance Measure/Limit*

*Data Requirements*

*Evaluation*

*Robustness*

*Fisheries Management (current, future...)*

Impact Level	Description
0 Negligible	Very insignificant, probably not measurable against background variability
1 Minor	Possibly detectable but minimal impact
2 Moderate	Maximum acceptable level of impact
3 Severe	Above acceptable limit. Wide and long-term negative impacts
4 Major	Very serious, likely to require long restoration time to undo
5 Catastrophic	Widespread and probably irreversible

Likelihood	Description
1 Remote	Insignificant probability of occurring
2 Rare	May occur in exceptional circumstances
3 Unlikely	Uncommon, but has been known to occur either here or somewhere comparable
4 Possible	Evidence that it could occur
5 Occasional	May occur
6 Likely	Expected to occur

## Identify broad objectives for the fishery: e.g.

1. Rebuild hake stock
2. Mitigate impacts by the fishery on seabirds
3. Mitigate impacts by the fishery on substrate
4. Mitigate by-catch impacts by the fishery
5. Mitigate impacts by the fishery on seals
6. Mitigate impacts by the fishery on sharks
7. Maintain job security and create alternative livelihoods
8. Poverty alleviation
9. Meet transformation goals
10. Maximize economic benefits from fishery

\* Max of 10 – can have less but must encompass Biological, Economic and Social factors

1

## List of all issues raised in ERAs: e.g.

- #15 Monk, kingklip stocks are overexploited
- #16 Snoek stock is being impacted
- #38 Impact of trawls on the benthic biota...
- #36 Ghost fishing by net fragments etc.

2

## Define issues raised in ERAs:

**Single Species Approach (SSA)** = this would be an issue for effective SSA

**Ecosystem Approach (EAF)** = only those issues which directly address the ecosystem

3

## Group EAF issues into categories: e.g.

**a) Enforce appropriate permit conditions to manage by-catch utilisation**

- #15 Monk, kingklip stocks are overexploited
- #16 Snoek stock is being impacted

**b) Enforce appropriate permit conditions to minimise impact on benthic substrate**

- #38 Impact of trawls on the benthic biota...
- #36 Ghost fishing by net fragments

4

Identify management actions

## Incentives...

### Cost-Benefit Analysis:

How each action impacts each objective for the fishery e.g. see next slide – used a)

5

### Performance Report:

Consolidate individual reports for each issue completed during ERAs into one report for each category of issues.

6

Figure 1b

Broad Objectives for the Fishery

5

MANAGEMENT ACTION:  
By-catch Quota Allocation  
(includes levies & observers)

#	Category	Fishing Sector	Objective	Comments / rationale on the Effects of the Proposed Management Response	Short term		Long term	
					Cost	Benefit	Cost	Benefit
1	Biological	All	Rebuild hake stock	High grading of hake to maximise value of catch when by-catch is limited - possibly not attain TAC	2			3
2	Biological	All	Mitigate impacts by the fishery on seabirds	Possible effects due to change in effort or increased dumping	?	?		
3	Biological	All	Mitigate impacts by the fishery on substrate	Reduce trawling intensity on by-catch fishing grounds		2		2
4	Biological	All	Mitigate by-catch impacts by the fishery	Prevent over-fishing of by-catch species, ensure sustainable use		3		4
5	Biological	All	Mitigate impacts by the fishery on seals	Possible effects due to change in effort or increased dumping		1		
6	Biological	All	Mitigate impacts by the fishery on sharks	Reduced shark mortality in longline & handline fishery due to observer presence		2		4
7	Social	All	Maintain job security and create alternative livelihoods	Possible long-term benefits if by-catch biomass increases	2			3
8	Social	All	Poverty alleviation	Possible long-term benefits if by-catch biomass increases	2			3
9	Social	All	Meet transformation goals	No direct effects				
10	Economic	All	Maximise economic benefits from fishery	Increased CPUE, Maximise value of landed fish, encourage value-added products, contribute to economic growth	2			4



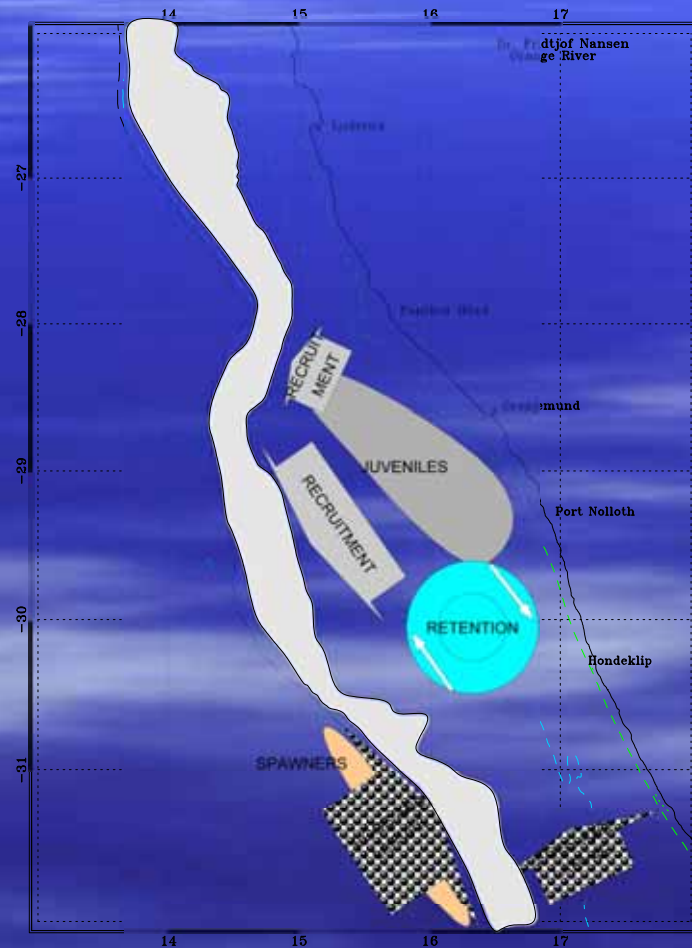
# THE BENGUELA CURRENT COMMISSION (BCC) and EAF



## Objective (BCC Interim Agreement)

- To give effect to the Strategic Action Programme (of the BCLME) by establishing a Benguela Current Commission in order to establish a formal institutional structure for co-operation between the Contracting Parties **that will facilitate the understanding, protection, conservation and sustainable use of the Benguela Current Large Marine Ecosystem** by the Contracting Parties; and to further the objectives recorded in the Strategic Action Programme.

# STATE OF EAF SCIENCE IN THE BENGUELA



# How does science feed into the BCC?



# BCC-EAC SCIENCE PROGRAMME

- 21 EAC Norwegian-funded Projects – total value \$8 million (5 years) , includes
  - Building capacity for EAF
  - Linking science and management for EAF
- FAO/SAPImp EAF Projects – total value \$470 000
  - Institutional arrangements which support EAF
  - Integrating the Human Dimension of EAF into fisheries management in the BCC region.
  - Auditing and tracking of EAF in management



# BCC-EAC SCIENCE PROGRAMME

- BCC EU Project (\$2 million, 5 years)

“Development of ecologically sustainable fisheries practices in the Benguela Current Large Marine Ecosystem (ECOFISH)”

Objective: To promote the ecosystem approach to fisheries (EAF) in the BCLME through:

- 1) Adaptation of state-of-art assessments methods and Marine Protected Areas (MPA) planning tools to the BCLME;
- 2) Validation or modification of current assessment practices based on spatially explicit analyses;
- 3) Incorporation of stakeholders' knowledge in data collection and analysis;
- 4) Strengthening of regional capacity to apply the developed assessment tools on a regular basis



Benguela Current Commission  
Ecosystem Advisory Committee  
Proposed Science Programme

## Training and Capacity Building Programme

Part funded by Iceland (\$500 000)

Part funded from projects

Shared with SAP-IMP Project (Training Officer post)

Technical / scientific in-service courses



Training and Capacity Building:  
Specialist courses, workshops; computer –IT equipment  
English courses, technical writing skills; data analyses



# “Developing a science base for implementation of EAF in South Africa”

A review by Lynne Shannon, Astrid Jarre and Samantha Petersen

# EAF Science Base

- Implementation of EAF requires a solid scientific basis – a toolkit from which management measures can be considered and implemented
- Projects
  - Foodweb studies and models of changes in the structure and functioning of the Southern Benguela
  - Effects of fishing and environmental change modelled

# EAF Science Base (cont'd)

- Assessment of changes at multiple spatial and temporal scales
  - e.g. impact of pelagic fishing in key foraging areas of critically dependent predators,
  - Impact of demersal trawls on the benthos and demersal fish assemblages
- Stakeholder involvement to develop indicators to address human dimensions
- Knowledge-based systems being developed as decision support tools

# EAF Science Base (cont'd)

## ■ Future Priorities

- More emphasis on conservation and biodiversity aspects
- Linking of environmental knowledge to management objectives,
- Spatial aspects
- Increased focus on the human dimension and transdisciplinary approaches
- Indicators – synthesizing multi-disciplinary information for consideration in management
- Bridging the gap between classical single species approaches and broader ecosystem approaches through “respectful” collaboration

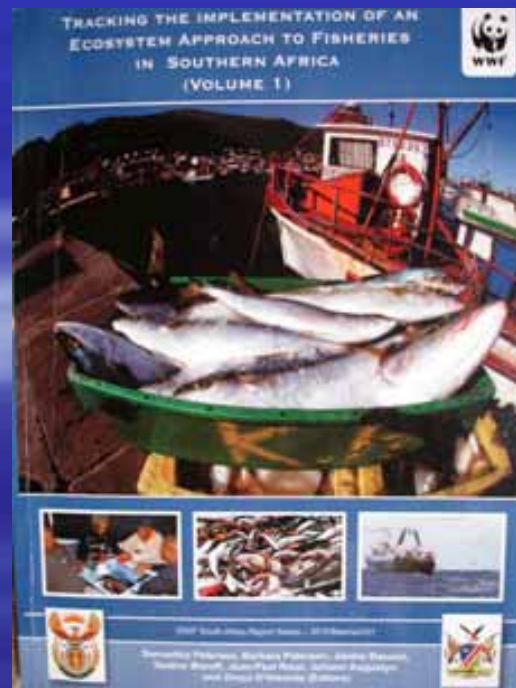
# TRACKING EAF MANAGEMENT IN THE BENGUELA REGION





# “Tracking the implementation of an Ecosystem Approach to Fisheries in Southern Africa”

Samantha Petersen, Barbara Paterson, Janine Basson, Nadine Moroff, Jean-Paul Roux, Johann Augustyn and Graca D’Almeida (Editors)  
WWF SA REPORT SERIES – 2010/Marine/001



# 2010 WSSD commitment

- How can we measure the success of EAF implementation?
  - Elimination of all impacts highly unlikely
  - ERAs and reviews to track progress



## ERAs

- South Africa – Small pelagics, Hake, line, toothfish, large pelagics and WCRL
- Namibia – Small pelagics, Hake, Horse mackerel, large pelagics and Monkfish

## ERA Reviews

- South Africa – Small pelagics, Hake, West Coast Rock Lobster , Large pelagics)
- Namibia – Small pelagics, Hake and Horse mackerel

# Tracking Tool Process

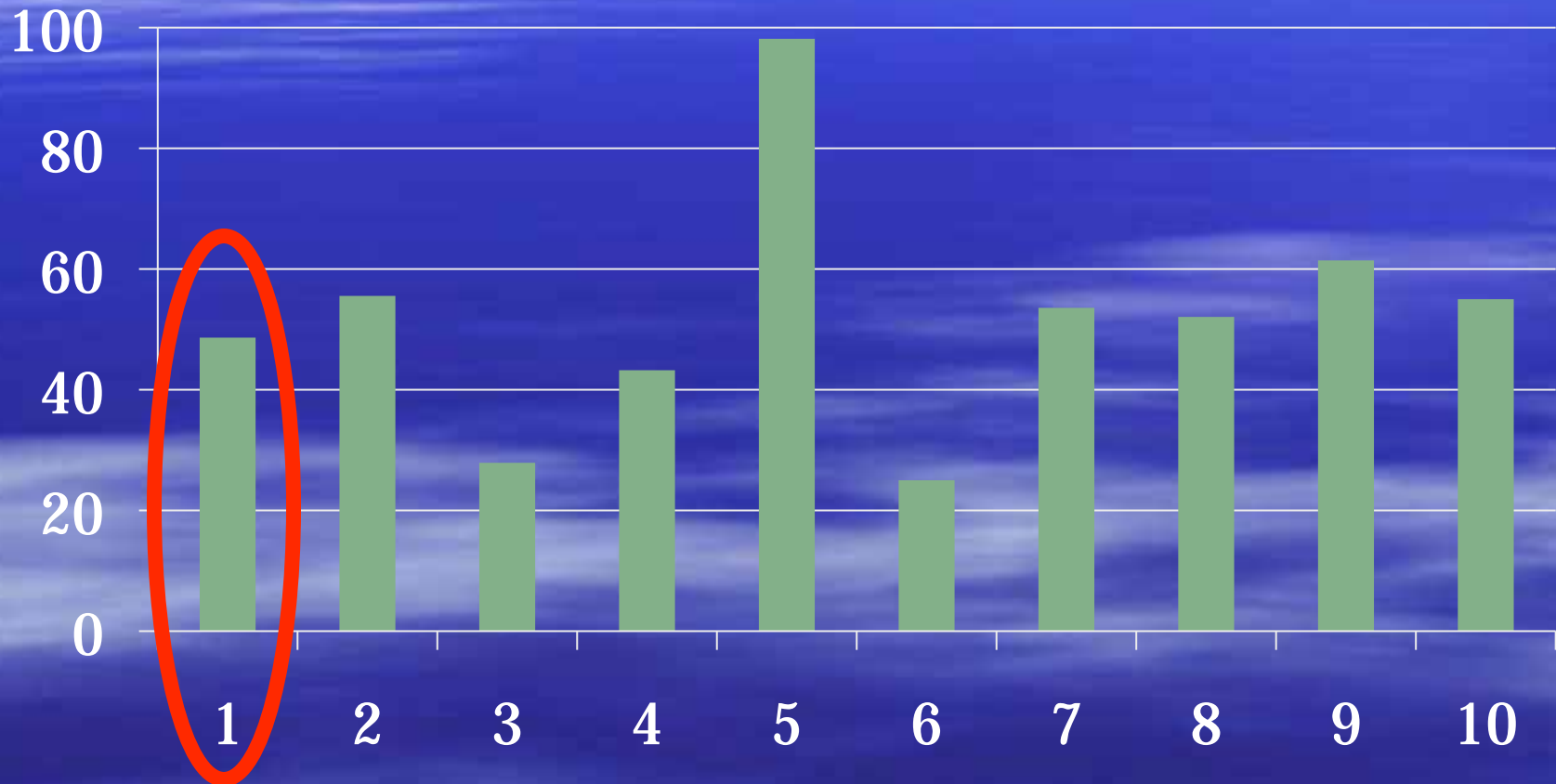
- Based on the **22 cross cutting ERA management objectives** a generic objectives hierarchy (**value tree**) is developed
- This prototype further **refined to 10 objectives through focus group discussions** with resource managers & social scientists in SA & Namibia.
- Value tree represents **goals & objectives** to be achieved in order to assume that EAF is being implemented.
- The tree follows the same approach as the ERA structure: 3 dimensions - **ecological wellbeing, human wellbeing, governance**.
- For each dimension, general top level goals are unpacked into increasingly **specific sub-objectives**
- Lowest level of each tree consists of **operational objectives** linked to **input variables**.
- For each operational objective **7 process steps** towards achieving identified.
- Step which best describes the current situation for the fishery is used as the **input value** for each objective.
- The input values are transformed into **truth values** between -1 and 1 and propagated upwards through the hierarchy.

# EAF Checklist (Top 10 non-fishery specific objectives)

1. Good understanding of ecosystem impacts
2. Ecosystem impacts are incorporated into management advice
3. The social wellbeing of dependent fishing communities is accounted for in management advice
4. The economic wellbeing of fishing industry is ensured
5. Transparent and participatory management structures exist
6. Management plans incorporate EAF considerations
7. Good compliance to regulations
8. Sufficient capacity, skills, equipment and funding
9. Good data procedures exist to support EAF implementation
10. External impacts on fisheries are addressed (e.g. the effect of other sectors, other industries, climate change etc)

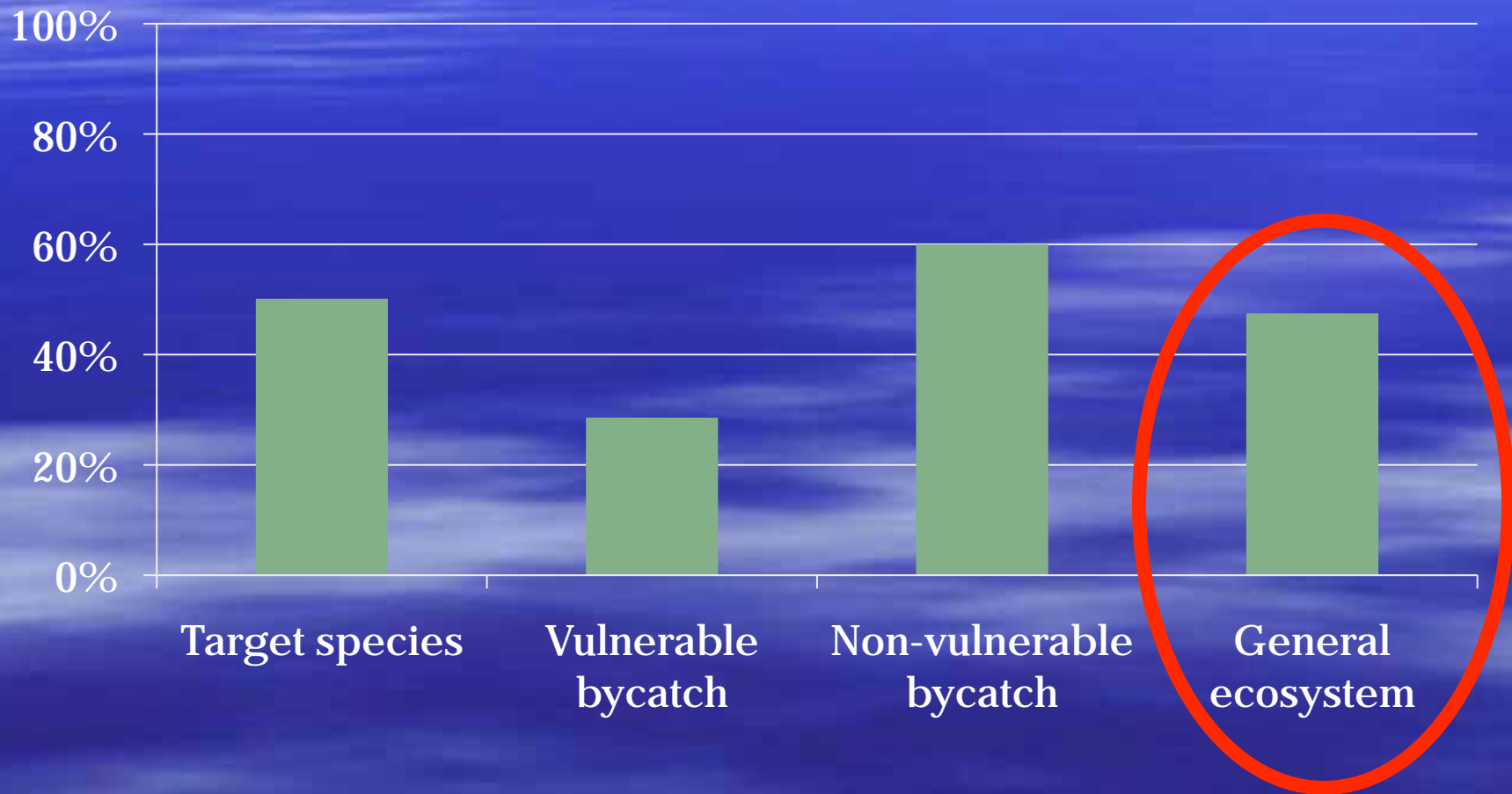
# Across objectives

## Fishery: SA Small Pelagic Fishery



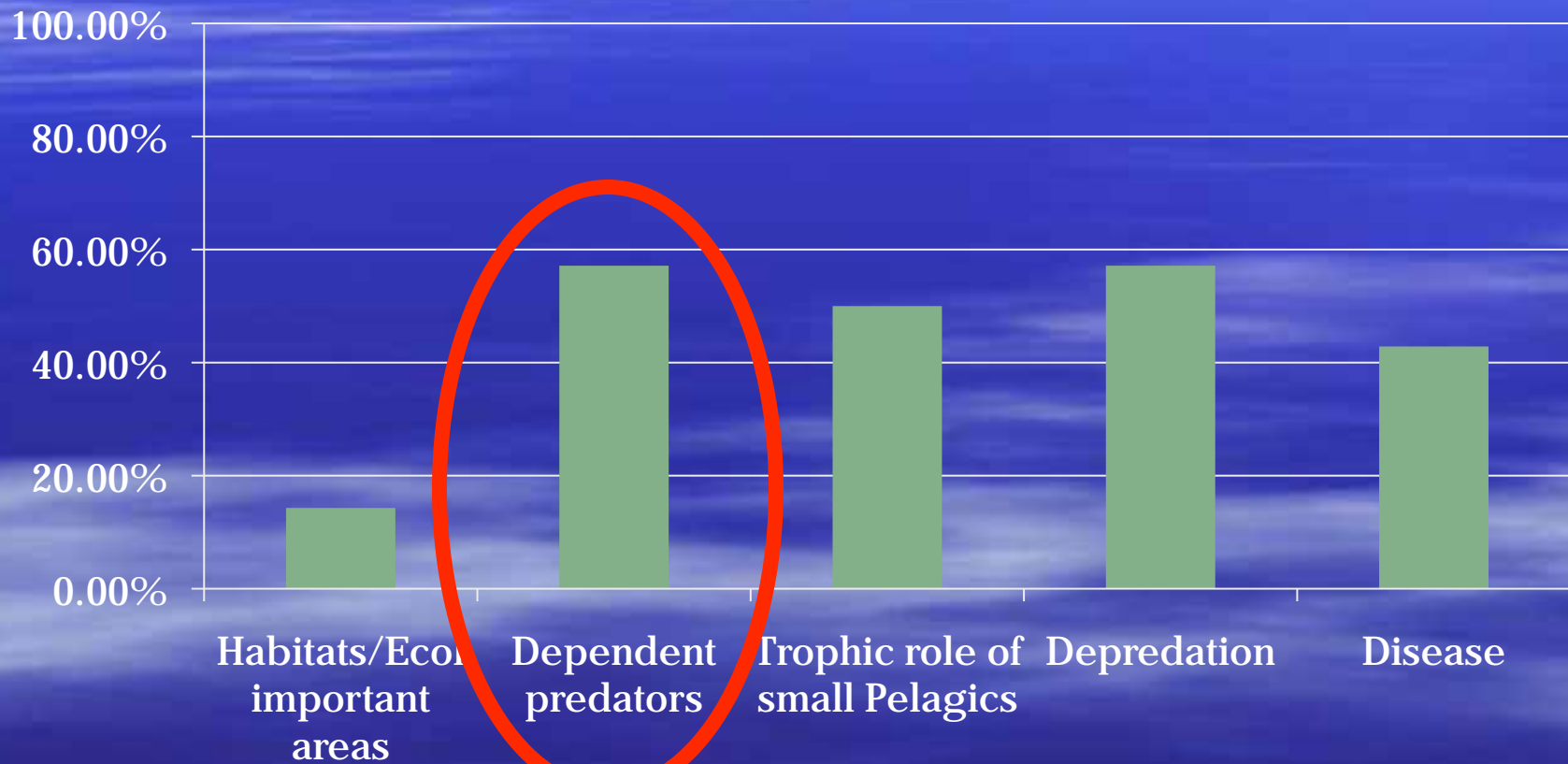
# Within objective

## Objective 1



# Within a sub-objective

## General Ecosystem

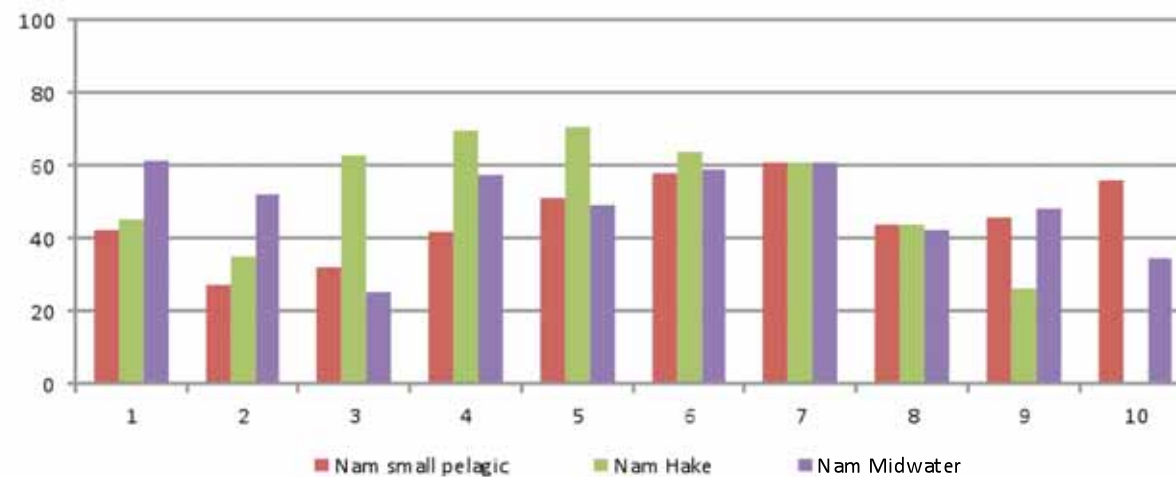
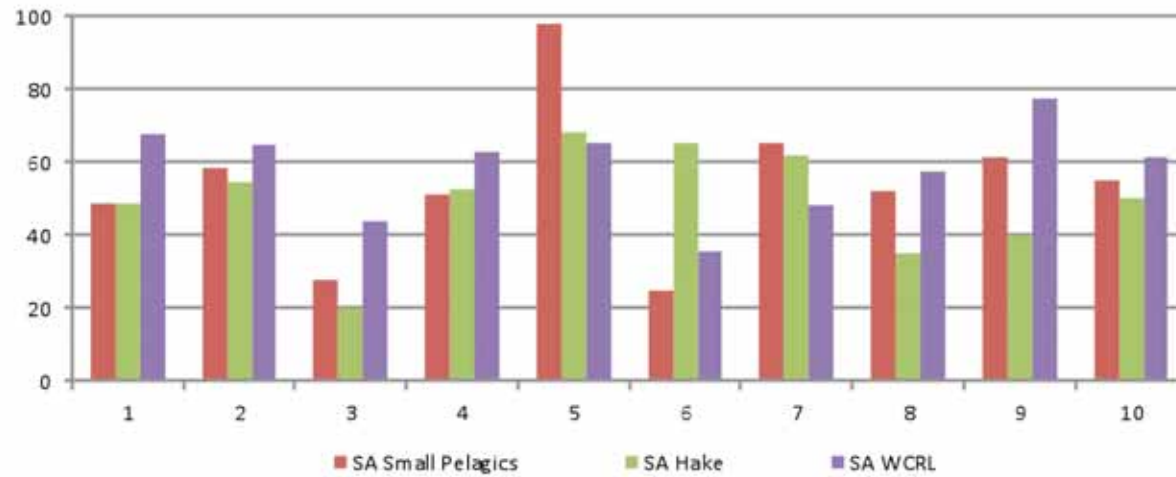




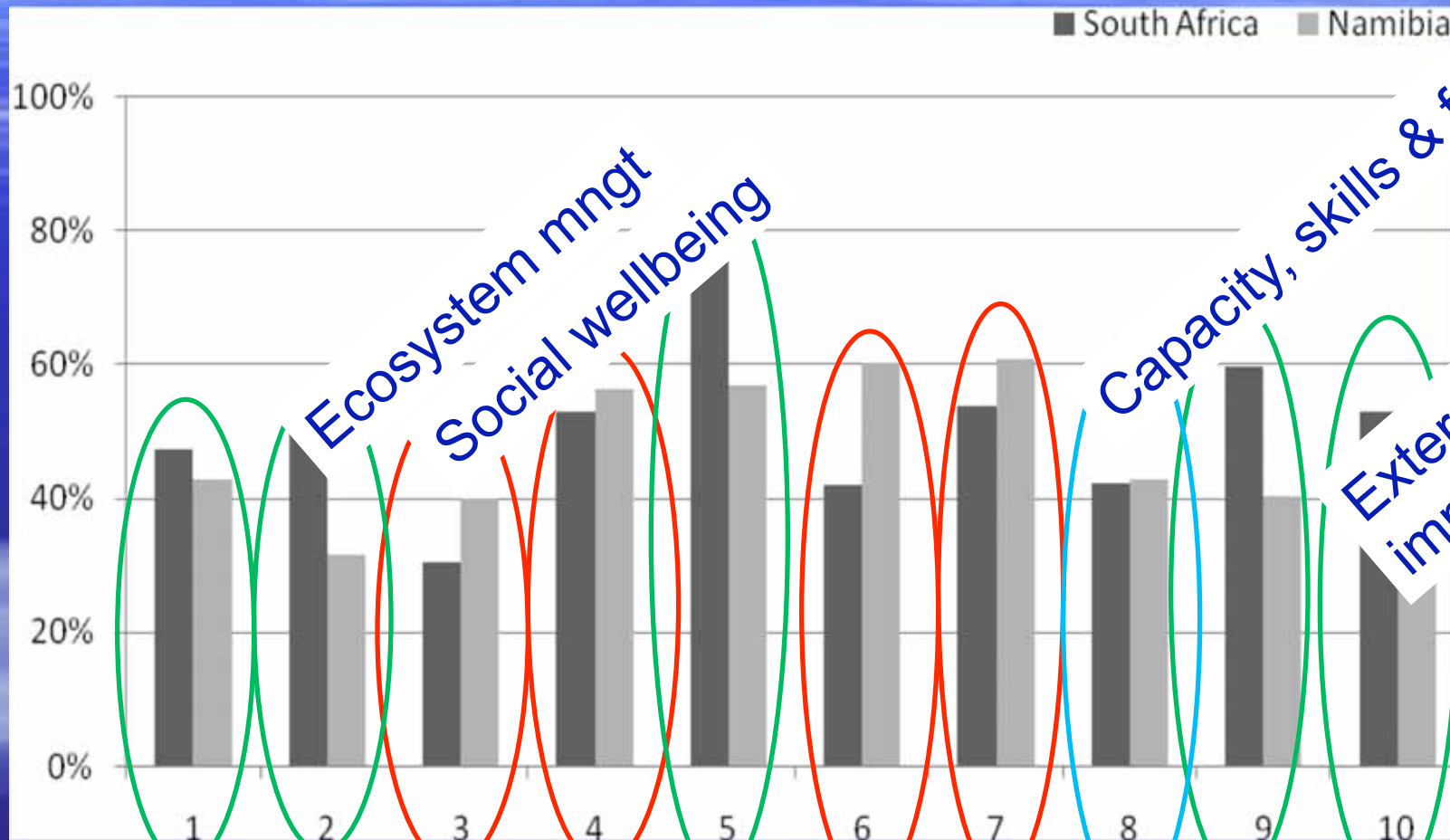
# Even more detail...dependent predators

Objective	Issues	Priority	Step	Description of step	Comments (incl details of progress, barriers etc)	Next steps (to be undertaken within the next 18 months)	Responsibility
There is good understanding of the trophic role, diets and foraging behaviour of predators that are dependent on small pelagic species.	31,32,33	Extreme	4	Preliminary data available, but not yet analysed	A comprehensive project on moult counts, breeding success, diet sampling, tracking etc for penguins and gannets is underway. Feasibility study underway to assess impact of closed areas on penguins....	Continue monitoring of seabirds (penguins, gannets & cormorants) on offshore islands. Analyses on how natural mortality in small pelagic fish attributable to cape gannets varies in relation to small pelagic biomass....	Small Pelagic SWG/ EAF SWG

# Progress between fisheries



# Across fisheries:



Ecosystem mngt

Social wellbeing

Capacity, skills & funding

External impacts

# Summary

1. Stimulates implementation with stakeholder input and support
2. Facilitates a common understanding and way forward
3. Allows for tracking and reviewing
4. Easy reporting at operational and strategic levels – within an Objective, across Objectives, across fisheries and cross-cutting objectives

# Conclusions

1. Good progress has been made....but we are not there yet
2. Platform for stakeholders to grapple with an EAF
3. Improved stakeholder communications
4. Stimulated implementation
5. Follow-up after workshops has been slow
  1. Lack of clarity on roles
  2. Lack of capacity
  3. Lack of will

# Recommendations

1. Better understanding of food web implications of fisheries
2. Bycatch management
3. Improved understanding of the human wellbeing components
4. Transparent and participatory management structures
5. Improved follow through of non-compliance and a review of penalties
6. Incentives for voluntary compliance
7. Limited capacity to implement an EAF
8. Improvements to the observer programme
9. Marine protected areas
10. Improved understanding of external factors

# Has implementation of EAF really been a success story?

- Strengths

- Good historical and current science base
- Relatively good single-species fisheries management to build on
- BCC is relatively well-funded
- Excellent co-operation between partners
- Strong in-principle political support

# Has implementation of EAF really been a success story?

- Challenges

- National institutions are not well-funded
- Political will to implement EAF measures at regional and national level not always strong
- Involvement of a wider range of stakeholders needed
- Compliance is the biggest challenge



# Has implementation of EAF really been a success story?

- Opportunities

- To be an example to other developing countries
- National Institutions benefitting from lessons in BCC
- The basis for maximising equitable and sustainable benefits

**There's reason for optimism, but there's hard work ahead!**