The Benguela Current Large Marine Ecosystem Programme

An ecosystem approach to ocean governance

by

Michael O'Toole

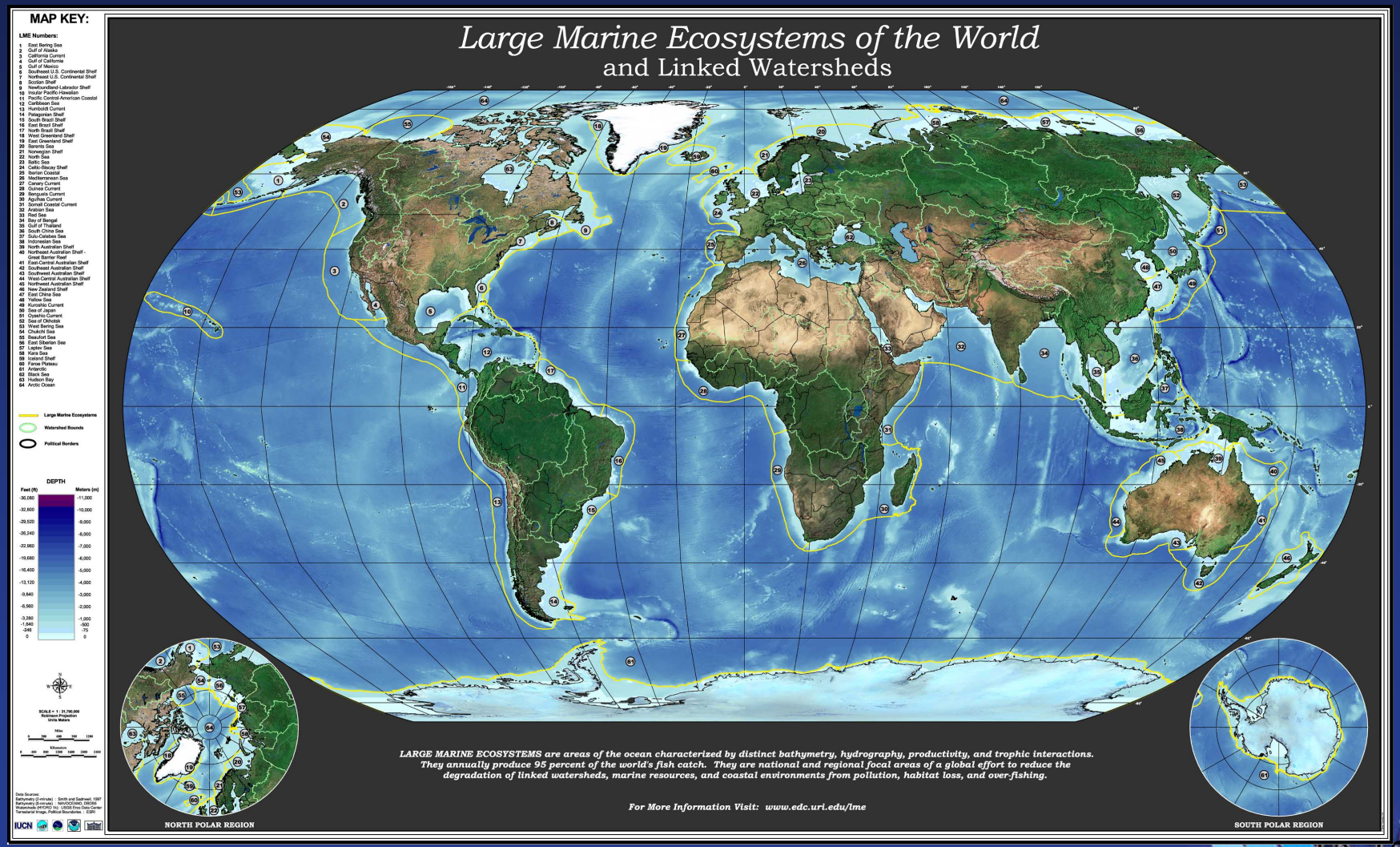
Marine Institute (Ireland)

Canary Current LME Inception Workshop

Dakar, Senegal, 2-4 November 2010

LARGE MARINE ECOSYSTEMS

LMEs – relatively large regions of coastal oceans on the order of 200,000 Km2 or greater characterised by dinstictive bathymethry, hydrograhy, productvity and trophically dependent populations



THE BENGUELA CURRENT LARGE MARINE ECOSYSTEM

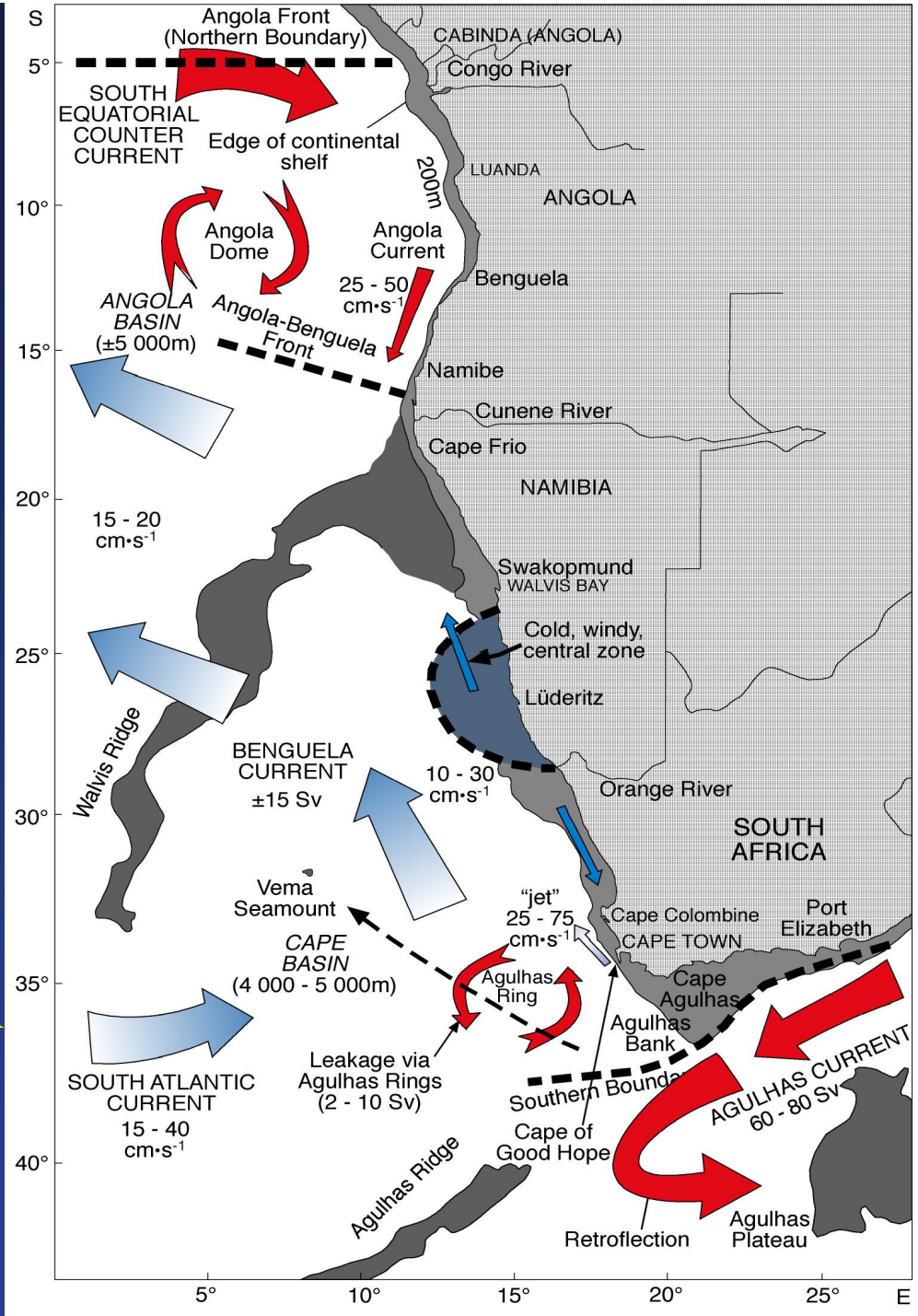
CURRENTS AND BOUNDARIES

Angolan Current (warm)

Benguela Current (cold)

Aghulas Current (warm)

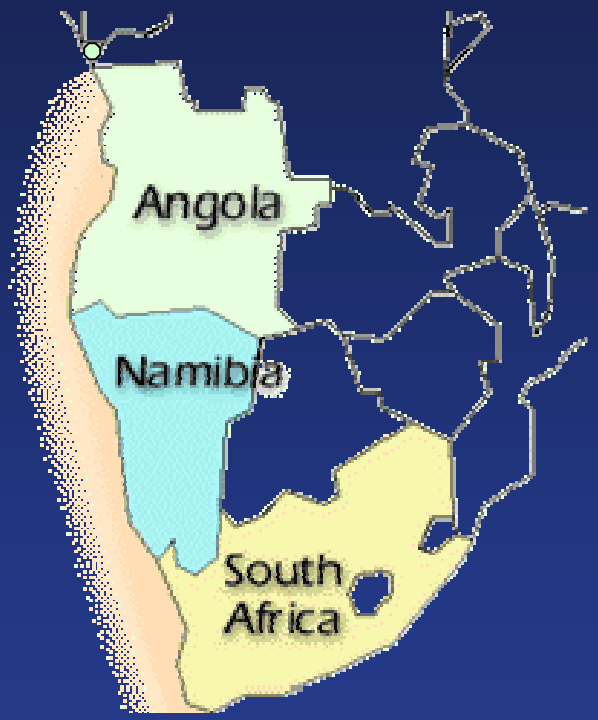
EEZ's of Angola, Namibia an South Africa

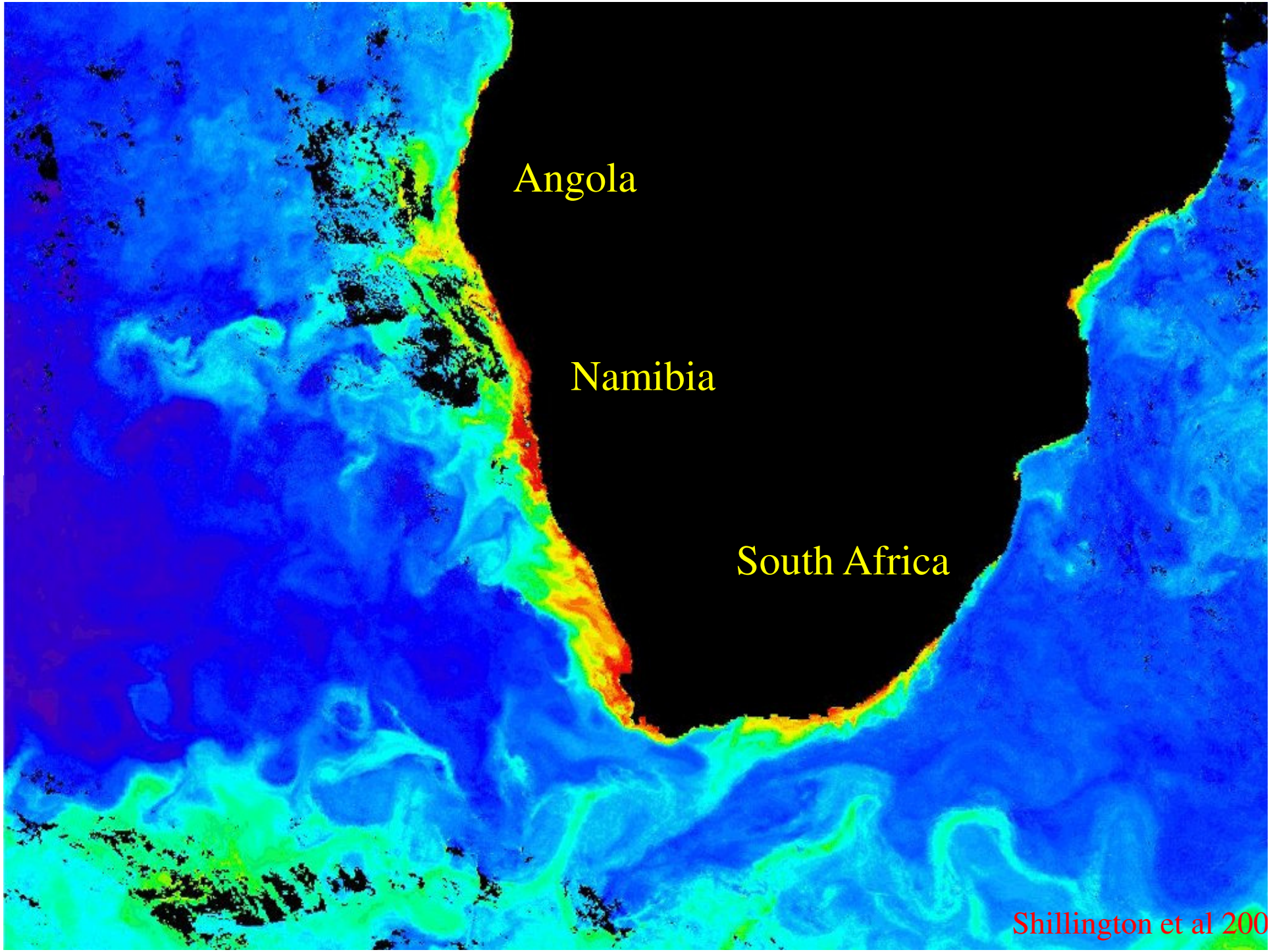


Benguela Current LME Programme

- Countries: Angola, Namibia and South Africa
- PDF Phase: 1997-2000
- Implementation Phase:

  2002-2007
- UNDP - UNOPS
- GEF: US$ 15,000,000.00
- In-kind: US$ 18,000,000.00
- GOAL: Integrated management, sustainable use and protection of the BCLME (MANAGEMENT)

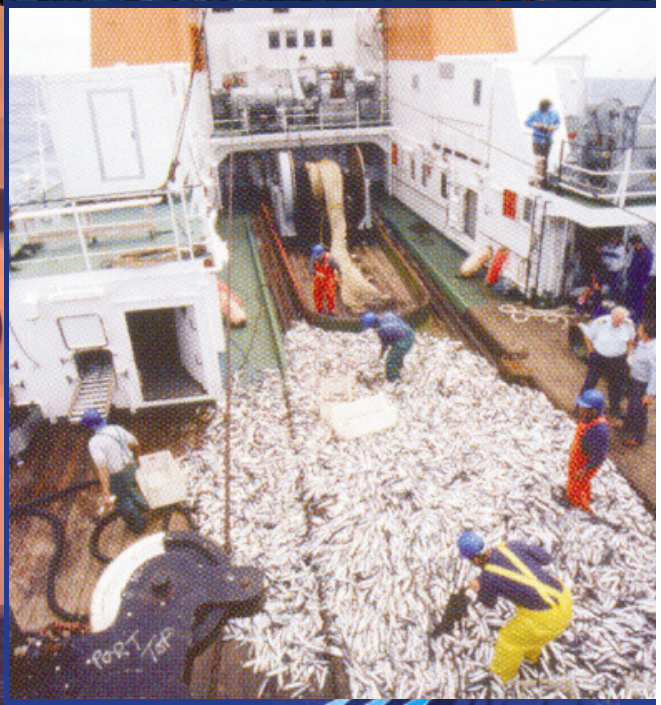



Angola
Namibia
South Africa
Shillington et al 200

BCLME MARINE ECONOMY

US$15 billion (2006)

- Offshore oil and gas 69%
- Diamond mining 15%
- Coastal tourism 11%
- Fisheries 5%

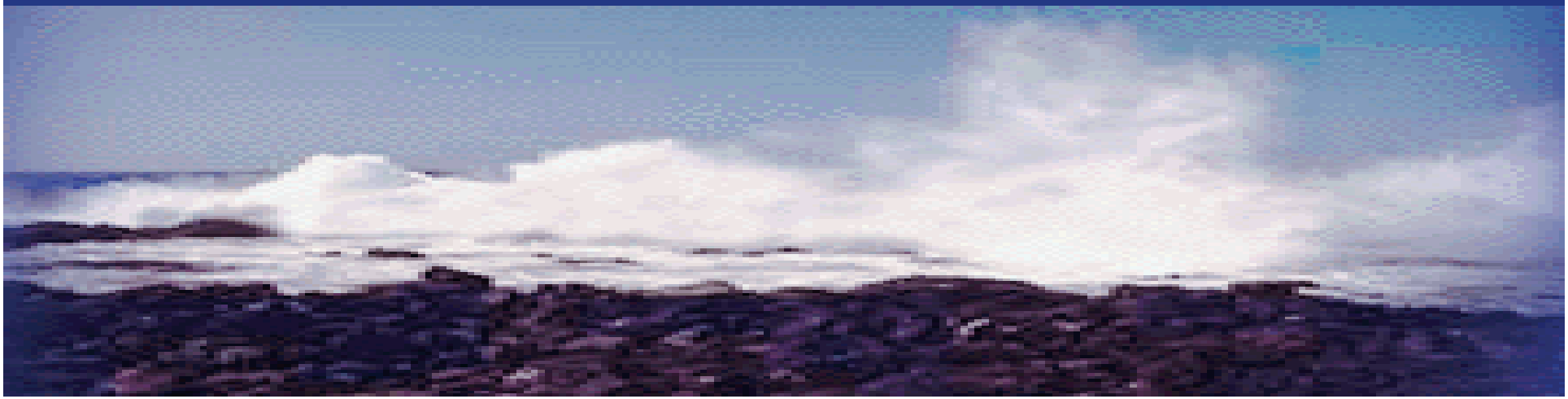


BCLME

Our Partner Ministries

Angola	Namibia	South Africa
Fisheries	Fisheries and Marine Resources	Environmental Affairs and Tourism
Urbanism and Environment	Mines and Energy	Minerals and Energy Affairs
Petroleum	Environment and Tourism	

Transboundary Diagnostic Analysis



TDA – Background and Introduction

- A Unique Environment
- Fragmented Management
- Need for International Action
- The Emerging LME project
- What Has Been Achieved
- Towards a Sustainable Future

TDA – Definition

- A scientific and technical assessment where environmental issues of the LME are identified and quantified
- Causes, impacts, risks, uncertainties, socio-economic consequences
- Transboundary issues
  - regional e.g. fisheries
  - national e.g. 2+ countries pollution
  - practices e.g. fishery practice /biodiversity

TDA - Objectives

- Provide structured information relating to degradation and changing state of the LME
- Prioritise importance of the causes and sources of the transboundary problems
- Propose practical, preventative and remedial actions to ensure sustainable integrated management of the LME
- TDA is technical basis for development of the policy -Strategic Action Programme (SAP)

Design of TDA

- **Level 1 – Synthesis**

  A broad based analysis of the issues, perceived TB problems, root causes and areas where action were proposed

  A matrix with three generic areas where actions were proposed

  - utilisation of resources

  - environmental variability

  - pollution and ecosystem health

Design of TDA

- **Level 2 – Specific Action Areas (comprehensive)**
  - **issues / sub-issues**
  - **problems / challenges**
  - **causes**
  - **impacts**
  - **uncertainties**
  - **socio-economic consequences**
  - **priorities, outputs and costs**

Benguela Current LME
Major Transboundary Problems

- Decline in commercial fish stocks
- Uncertain ecosystem status and yield
- Inadequate capacity to assess ecosystem
- Deterioration in water quality
- Habitat destruction and alteration
- Loss of biotic integrity and biodiversity
- Harmful algal blooms

Benguela Current LME
Root Cause of Problems

- Inadequate capacity development and training
- Complex and variable ecosystem
- Poor legal frameworks
- Inadequate application of regulations
- Inadequate planning at all levels
- Inadequate finance and support mechanisms
- Insufficient public involvement

TDA Action Areas

- Sustainable management and utilisation of resources
- Assessment of environmental variability, ecosystem impacts and improvement of predictability
- Maintenance of ecosystem health and management of pollution

Optimal Harvesting of Living Marine Resources

- **Problems**

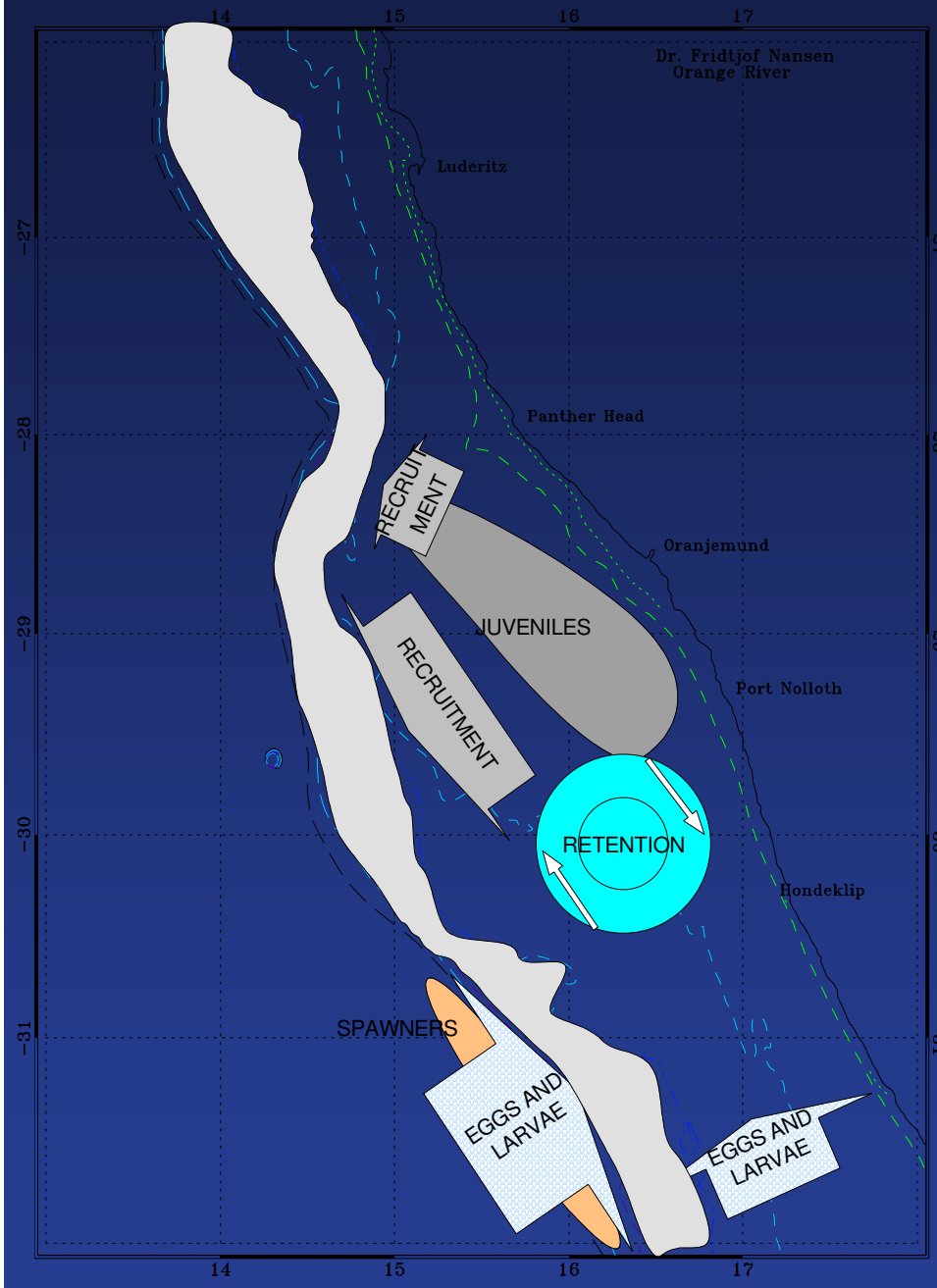
- overfishing, dumping of by-catch, poor compliance etc…

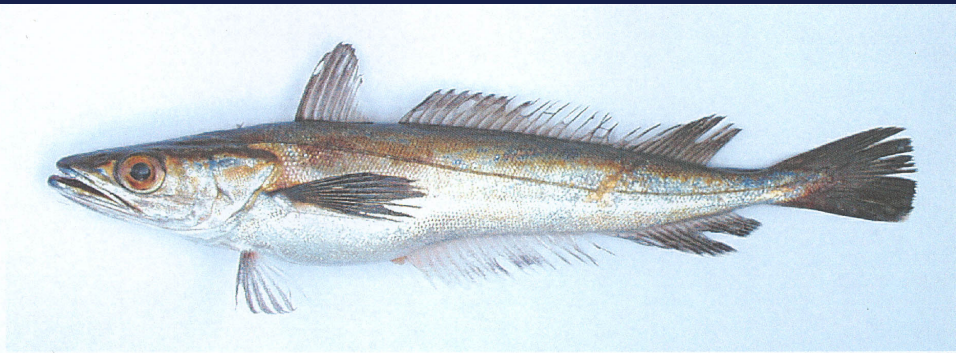
- **Causes**

- Fishing over-capacity, lack of collaborative assessment and monitoring, inadequate management and control, etc….

- **Impacts**

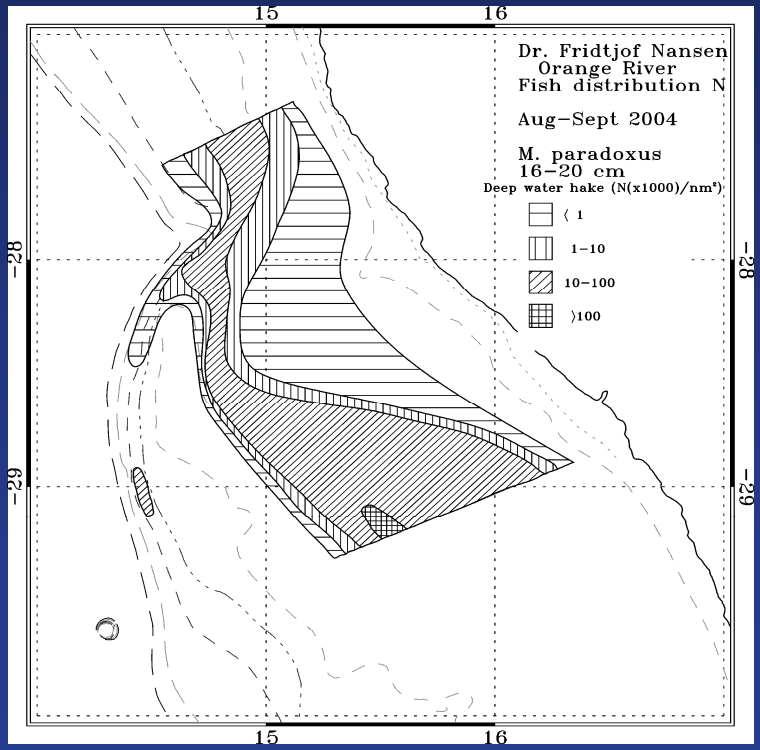
- High by-catch, resource depletion, ecosystem change, population movement, conflict between groups, variation in food supply, change in productivity etc…





MERME092 *Merluccius paradoxus* TL 17.4 cm South Africa SA

Tr. st. 452 S 31° 36' E 17° 51' Fishing/bottom depth: 118/118 m 29.01.2002 OA



Conceptual model for hake in South Africa – Namibia

Optimal Harvesting of Living Marine Resources

- **Risks/Uncertainties**

- Irreversible ecosystem change / regime shift
- Biodiversity loss
- Habitat destruction
- Degraded ecosystems / altered food-web
- Collapse of commercial stocks

Artisanal fisheries and food security: Sardinella important in Angola

✓Socio-economic surveys and review of institutional arrangements

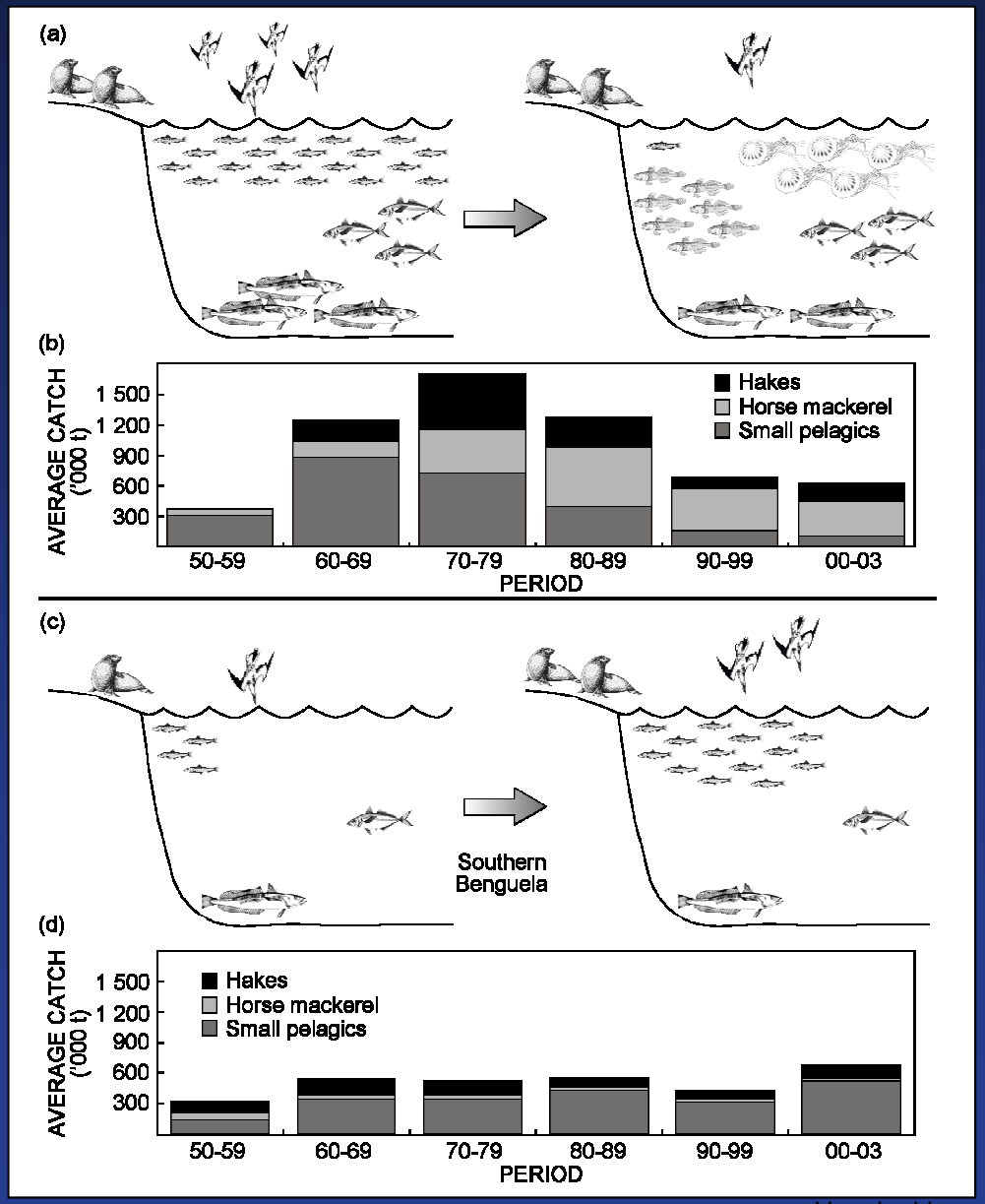
Optimal Harvesting of Living Marine Resources

- **Socio-economic consequences**

- Variable and uncertain job market
- Loss of national revenue
- Lack of food security / artisanal and industrial
- Erosion of sustainable livelihoods
- Missed opportunities (under-utilisation /waste)
- Loss of competitive edge on global markets

Ecosystem-level change has been documented in the BCLME, e.g.

Northern Benguela



Change from anchovy-sardine to goby-jelly dominance;
much reduced seabirds and reduced fishery catches

Southern Benguela

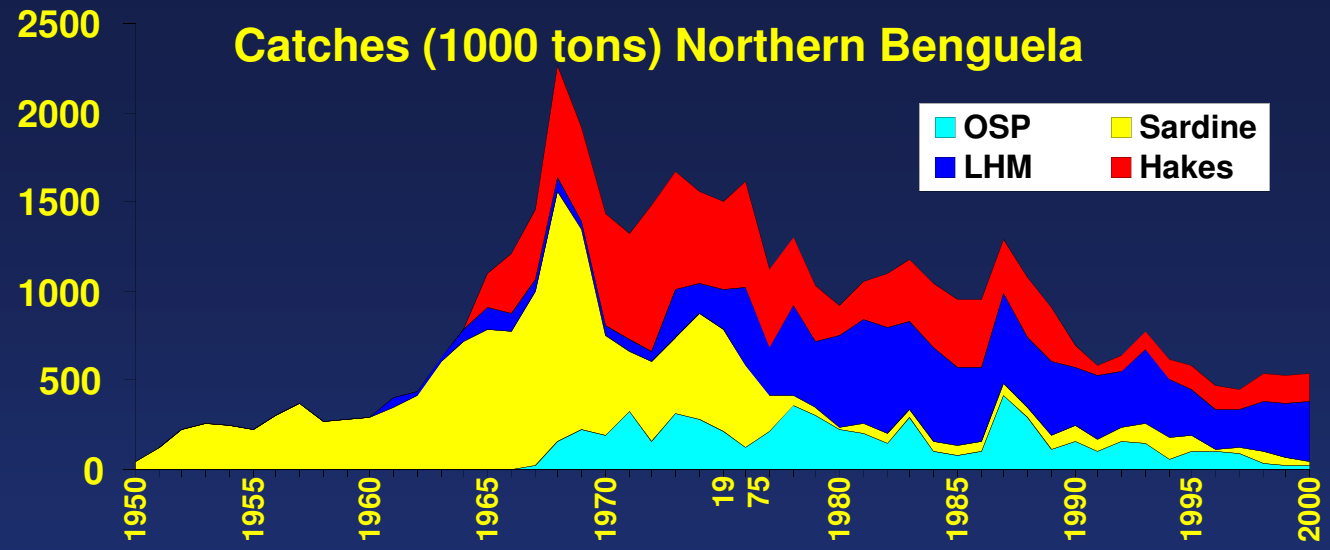
Change to abundant small pelagics, seals and seabirds.

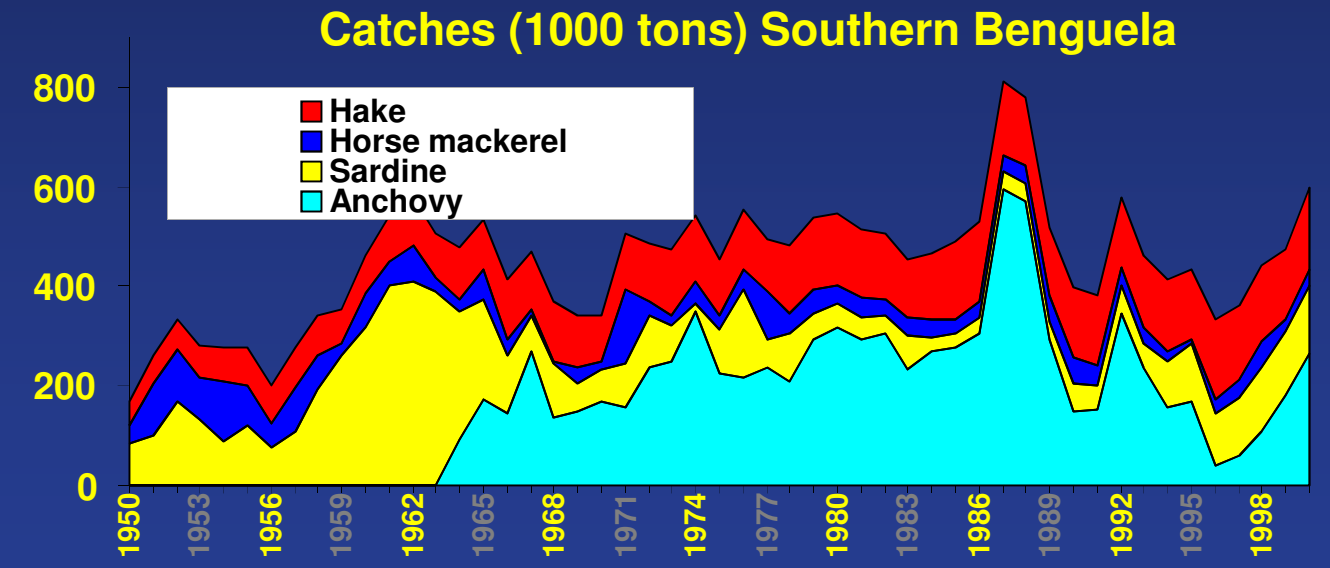
Van der Lingen et al. 2006, Chap. 8, Benguela LME book

Optimal Harvesting of Living Marine Resources

- **Transboundary consequences**

- Over-fishing in one country causes depletion of stocks in another
- Inadequate resource management leading to collapse of resource, loss of jobs, dependency of foreign aid
- Common problems between countries
- Shared solutions


Catches (1000 tons) Northern Benguela
2500
2000
1500
1000
500
0
OSP
Sardine
LHM
Hakes
1950
1955
1960
1965
1970
19
75
1980
1985
1990
1995
2000


Catches (1000 tons) Southern Benguela
800
600
400
200
0
Hake
Horse mackerel
Sardine
Anchovy
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998

Optimal Harvesting of Living Marine Resources

- **Activities and Solutions**

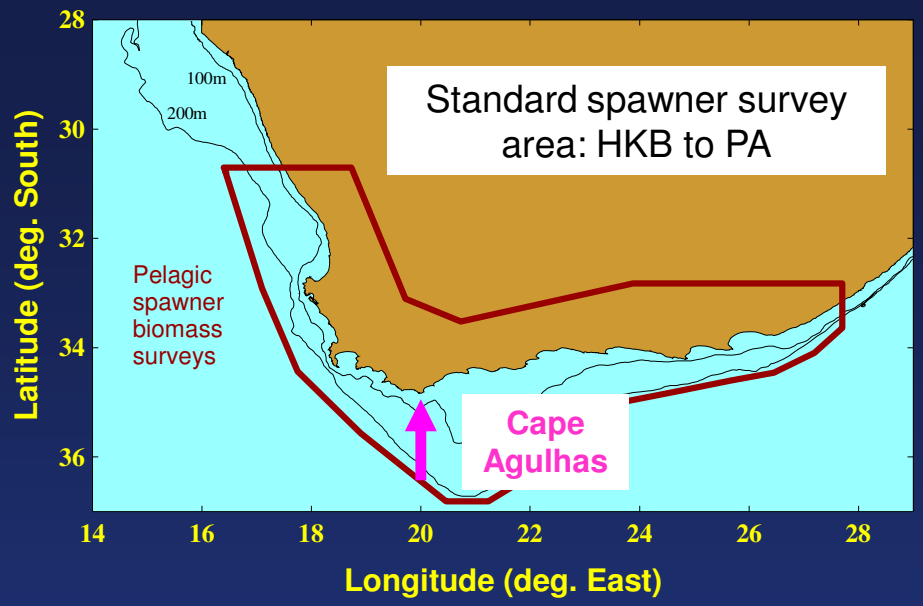
- Regional assessment of shared resources and ecosystem impacts
- Joint surveys and assessments
- Gathering and calibration of baseline information
- Analysis of socio-economic consequences for whole ecosystem
- Regional assessment of fish stocks and LME and annual advice through regional forum
- Assessment of potential for new resources

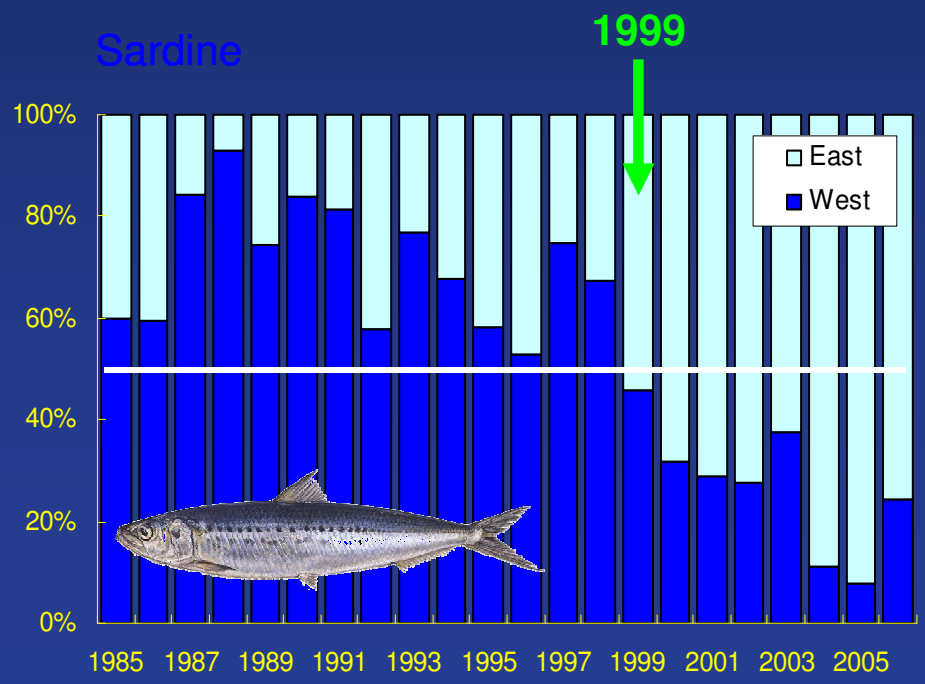
Variability in distribution (spawners):

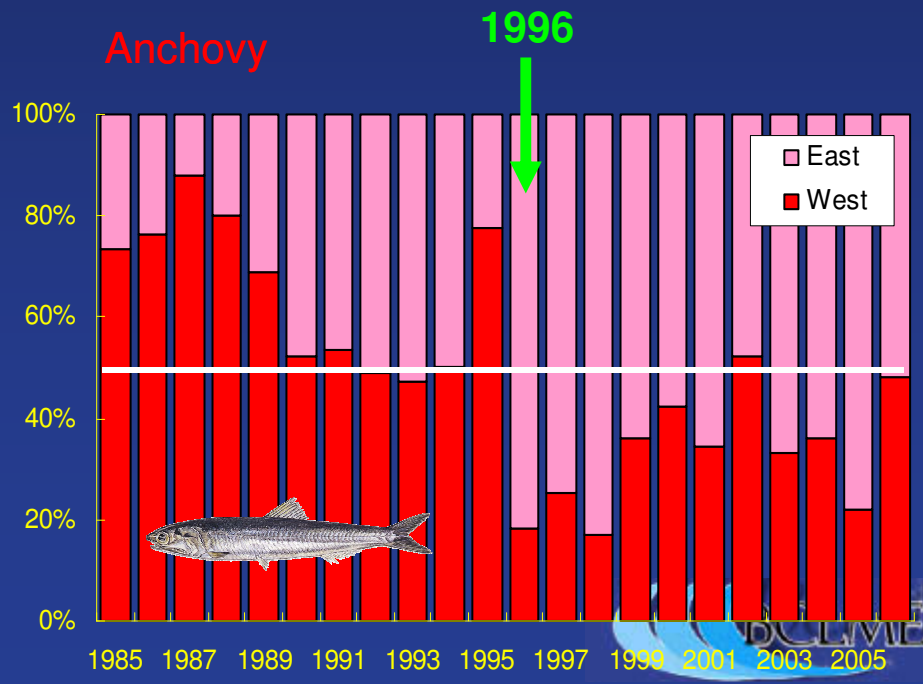
- Decadal-scale changes in the relative (% of total) distribution of sardine and anchovy, with both species showing an eastward shift in spawner distribution

- Sardine - steady change in distribution, with %B east of CA > %B west from 1999

- Anchovy - abrupt shift from W>E to E>W in 1996







Optimal Harvesting of Living Marine Resources

- **Priority**
- Rated 1
- **Costs**
- $ ……. (5 years)
- **Anticipated outputs**
- Optimal sustainable resource utilisation
- Improved forecasting
- Established regional forum
- Prevention of irreversible ecosystem change

Improvement of Water Quality

- **Problems**

- Deterioration in coastal water quality
- Rapid expansion of coastal cities / pollution hotspots
- Aging or no water treatment infrastructure
- inadequate policies, monitoring and enforcement

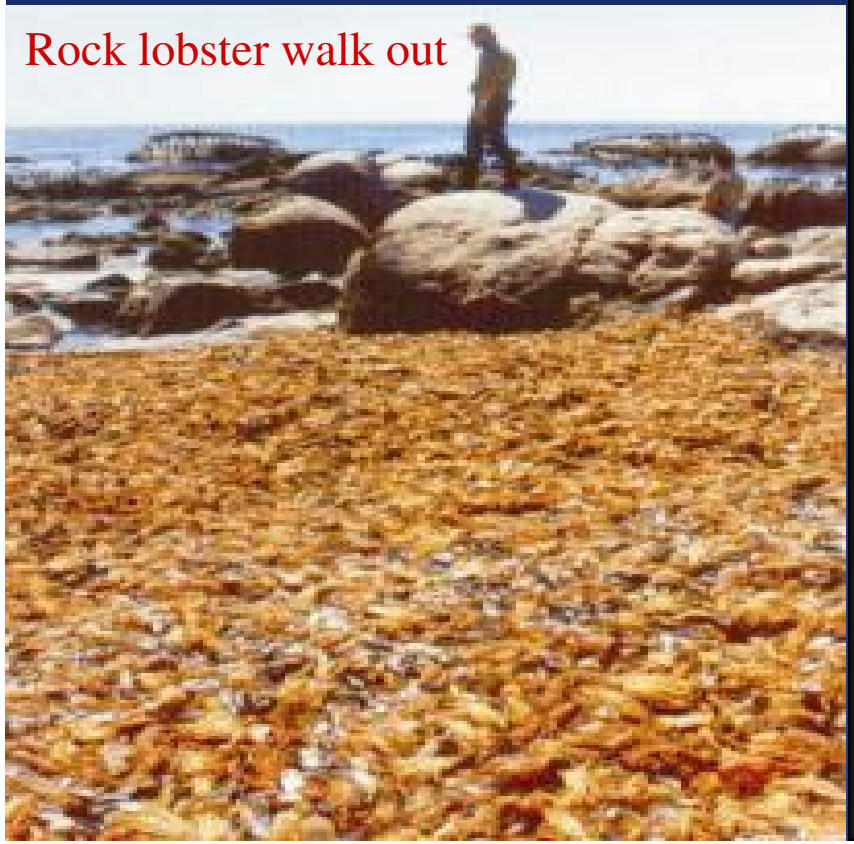
Improvement of Water Quality

- **Causes**

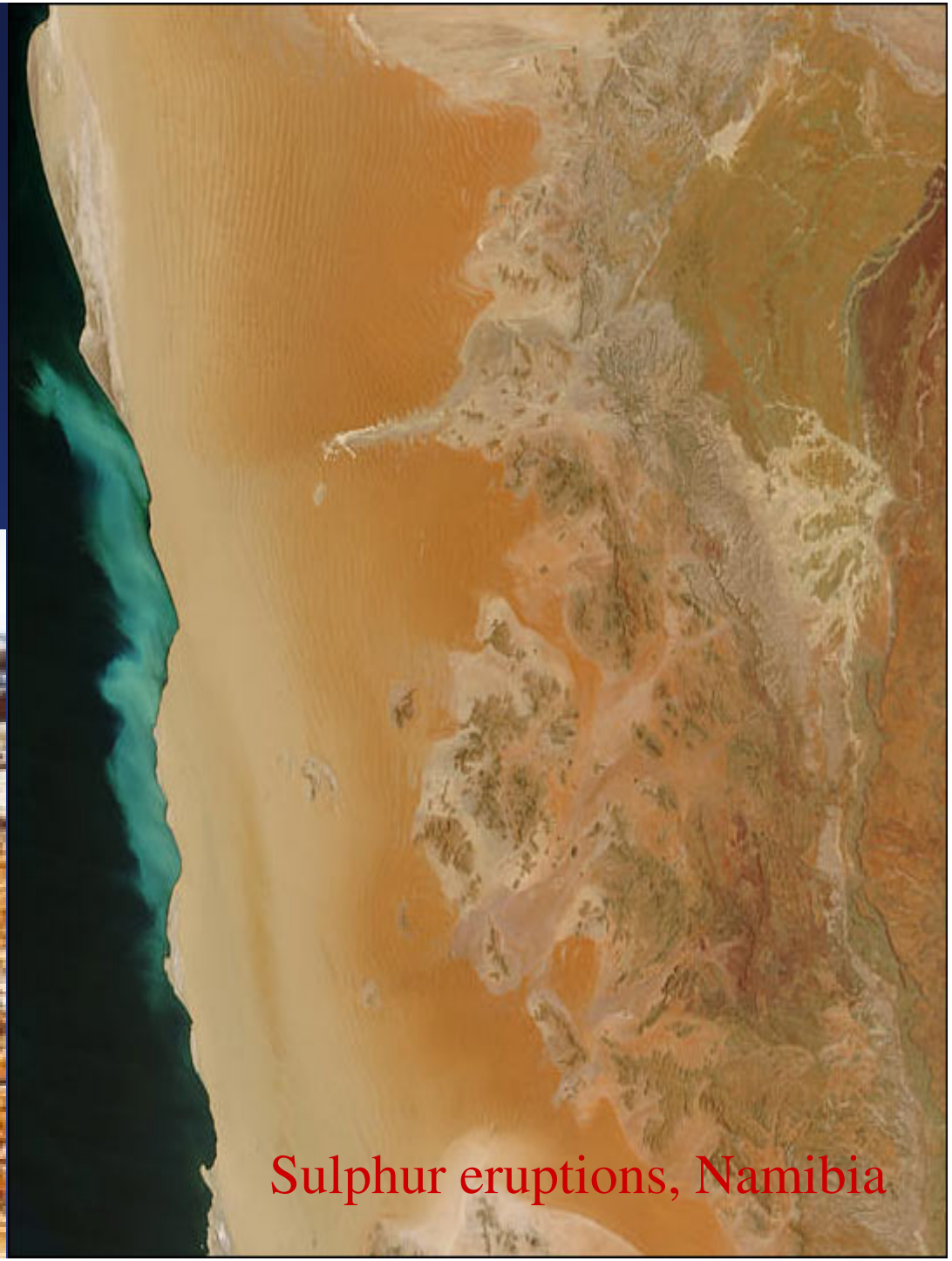
- Unplanned coastal developments
- Chronic oil pollution
- Industrial pollution
- Sewage pollution
- Air pollution
- Lack of policy on waste and oil recycling
- Growth in coastal informal settlements

EXTREME EVENTS

Benguela Nino's
Harmful Algal Blooms
Low oxygen water
Sulphur eruptions



Rock lobster walk out



Sulphur eruptions, Namibia

Improvement of Water Quality

- **Impacts**

- Public health
- Reduced yields
- Unsafe seafood / contaminated
- Changes in species dominance
- Ecosystem health and resilience
- Loss of jobs at national / regional level

Improvement of Water Quality

- **Risks / uncertainties**
- Few or no baseline data
- Performance standards and thresholds
- National commitment to capacity building
- Cause and effect relationships

MANAGING IMPACTS OF OFFSHORE OIL AND GAS ON ECOSYSTEM

- ✓Assessment of cumulative effects of offshore oil exploration and production on the ecosystem

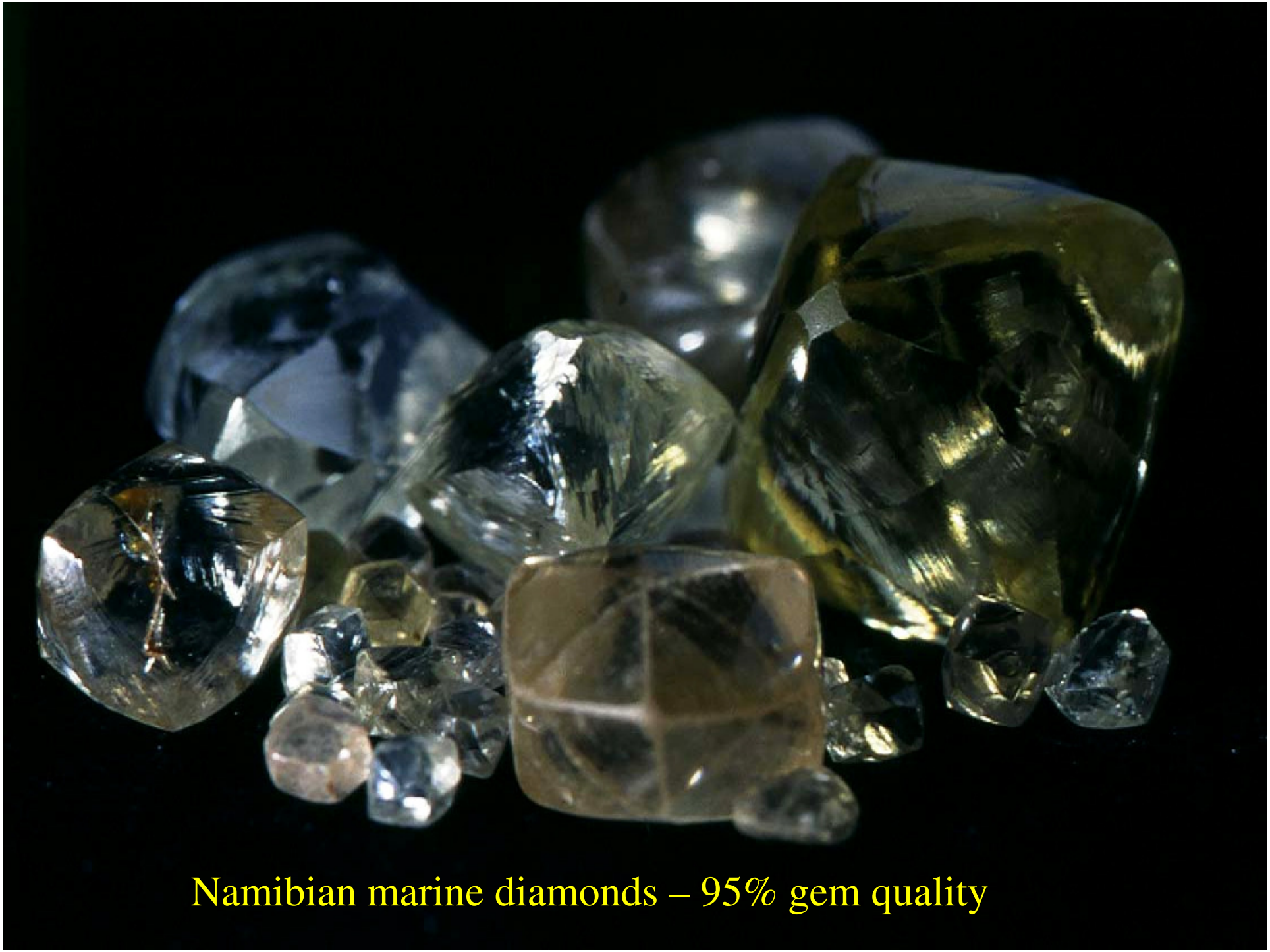
MANAGEMENT OF MARINE POLLUTION

- ✓ Regional water quality guidelines developed
- ✓ Assessment of regional oil spill contingency and response
- ✓ Assessment of land-based sources of marine pollution
- ✓ Marine litter demonstration project (Luanda, Walvis Bay)

Improvement of Water Quality

- **Socio-economic consequence**
- Loss of tourism revenue
- Higher health costs
- Altered yields
- Reduced resource quality
- Aesthetic impacts
- Lower quality of life
- Loss of employment

- ✓Assessment of cumulative impacts of offshore and coastal diamond mining on the marine ecosystem and mitigation of effects



Namibian marine diamonds – 95% gem quality

Improvement in Water Quality

- **Transboundary consequences**
- Transboundary pollution transport
- Migration of species out of areas
- Negative impacts of straddling stocks
- "Hotspots" – shared solutions

Improvement of Water Quality

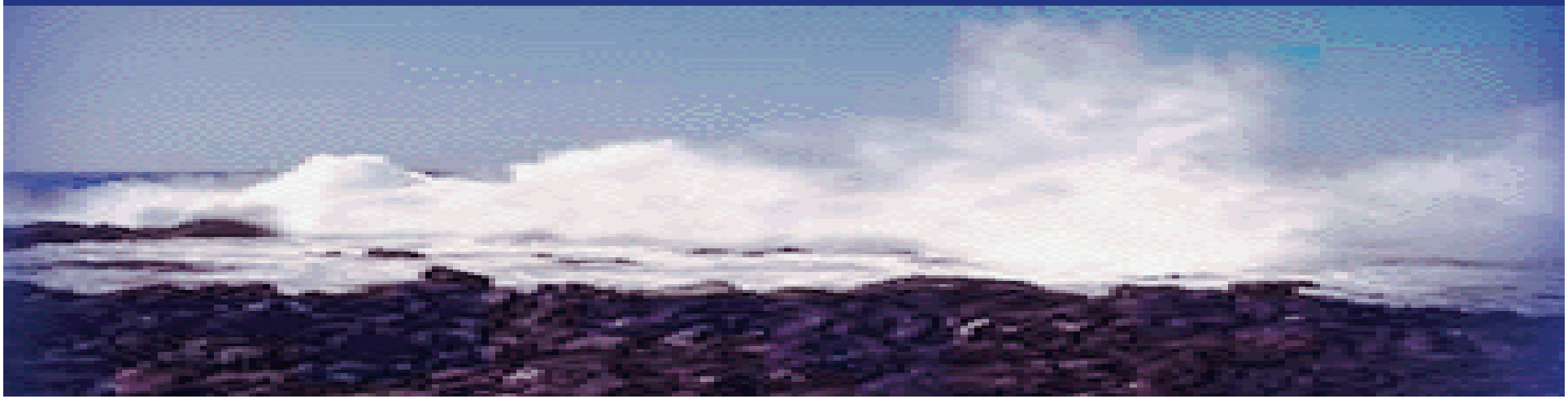
- **Activities / solutions**

- Develop standard environmental quality indicators / criteria
- Training in marine pollution
- Establish regional working groups
- Establish regional pollution monitoring
- Effective enforcement / joint surveillance
- Demonstration project - pollution control and prevention

Improvement of Water Quality

- **Priority**
- Rated 1-2
- **Costs**
- $..... (5 years)
- **Anticipated Outputs**
- Shared solutions for water quality management
- Regional protocols / agreements
- Improved pollution control
- Socio-economic uplift

Strategic Action Programme



Strategic Action Plan

- SAP agreement and declaration (signed by Ministers)
- The Challenge – implementing sustainable integrated management of the Benguela Current Large Marine Ecosystem
- Principal Policy Actions for implementation
- Institutional arrangements
- Wider cooperation
- National Action Plans

Agreed Principles

- Ecosystem integrity / future generations
- Precautionary principle
- Anticipatory action
- Polluter Pays principle - clean technologies
- Environment and health
- Transparency and public participation
- Co-financing with industry and donors

Strategic Action Programme
Some Key Policy Actions

- Joint surveys and assessments of shared fish stocks
- Develop ecosystem approach to fisheries management (EAF)
- Develop early warning system for extreme events
- Develop capacity for monitoring harmful algal blooms
- Assess impacts of oil and gas / diamond mining
- Guidelines of water quality / responsible seabed mining
- Assess land based sources of marine pollution
- Develop contingency plans (HAB's, oil spills)
- Establish regional management structure (BCC)

Institutional Arrangements

- **Programme Steering Committee (PSC)**
- **Programme Co-ordinating Unit (PCU)**
- **Activity Centres (AC's)**
- **Advisory Groups (AG's)**
- **(1) LMR (2) Environmental Variability, (3)Biodiversity and Ecosystem Health (4) Marine Pollution (5) Legal and Maritime Affairs (6) Information and Data Exchange (7) Training and Capacity Building**
- **Benguela Current Commission (BCC)**

Activity Centres

Luanda, Angola
Biodiversity ecosystem health and marine pollution

Swakopmund, Namibia
Fisheries and other living marine resources

Cape Town, South Africa
Environmental variability

100 projects contracted to regional institutions, agencies consultancy companies and universities (US$7.0 million)

BCLME

BCLME – CCLME
Similarities

- Eastern boundary upwelling systems
- Physical drivers –environmental variability
- Fisheries species / small pelagics /sardines / horse mackerel
- Climate Change impacts and adaptation
- TDA issues similar in many cases

  - biodiversity, threats, habitats, pollution
- SAP actions and principals similar