

# **The Large Marine Ecosystem Approach to the Assessment and Governance of Ocean Coastal Resources**

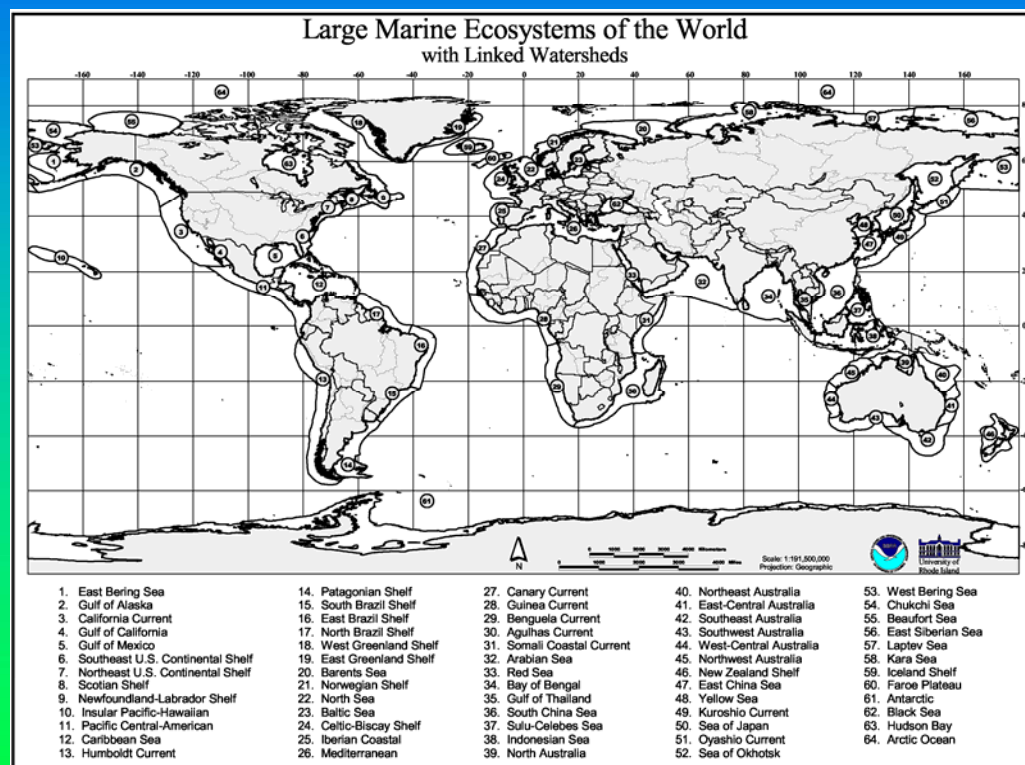
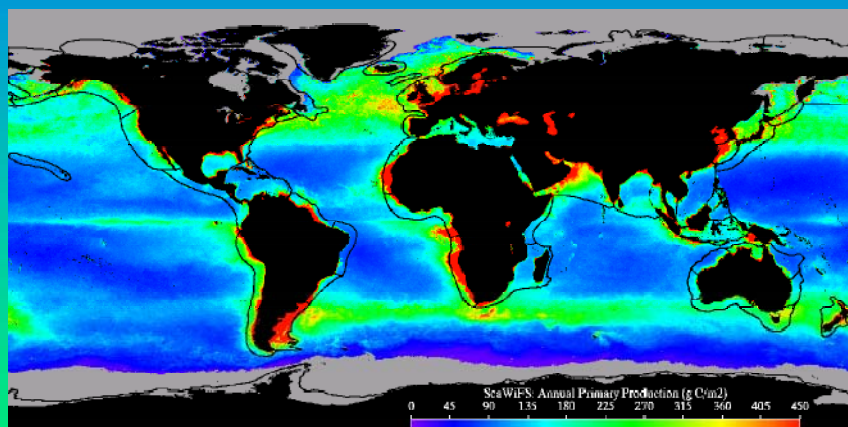
**3<sup>rd</sup> IUCN World Conservation Congress  
Bangkok, Thailand  
17-25 November 2004**

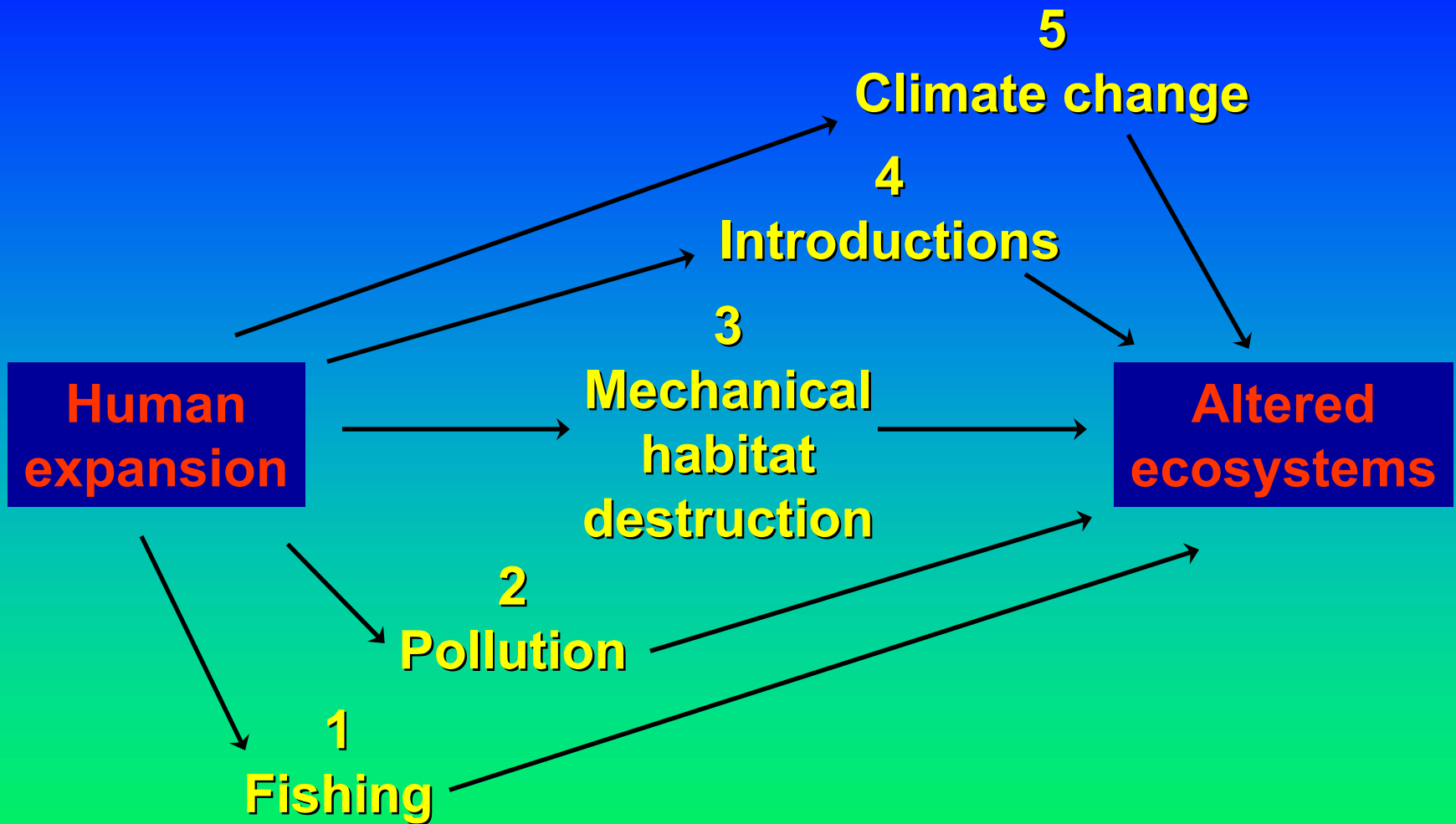
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# **ECOLOGICAL CRITERIA USED TO DETERMINE AREAL EXTENT OF LMES:**

- **Bathymetry**
- **Hydrography**
- **Productivity**
- **Trophodynamics**

## 95% of the World's Annual Marine Fishery Catches are Produced in 64 LMEs





***“Then”*** ..... ***“Now”***

# **Selected, Ecosystem Related WSSD Targets and Program of Action (POI)**

**Johannesburg, August 2002**

- **Land-based Sources of Pollution**  
**POI – Substantially reduce by 2006**
- **Ecosystem-based Approach**  
**POI – Introduce by 2010**
- **Marine Protected Areas**  
**POI - Designated Network by 2012**
- **Restoration and Sustainability of Fisheries**  
**POI – On an urgent basis and where  
possible to MSY by 2015**

# **LMEs ARE GLOBAL CENTERS OF EFFORTS TO:**

- **REDUCE** coastal pollution
- **RESTORE** damaged habitats  
(Coral reefs, mangroves, sea grasses)
- **RECOVER** depleted fishery stocks

# Collaborating International Partners

- **IOC** (Intergovernmental Oceanographic Commission)
- **UNDP** (United Nations Development Programme)
- **UNEP** (United Nations Environmental Programme)
- Global International Waters Assessment (GIWA)
- Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)
- **UNIDO** (United Nations Industrial Development Organization)
- **FAO** (Food and Agriculture Organization, Fisheries Division)
- **GEF** (The Global Environmental Facility)
- **The World Bank**
- **Non-Governmental Organizations (NGOs)**
- **IUCN** (International Union for the Conservation of nature, GEF-LME Projects)
- **WWF** (World Wildlife Fund)

# Funding support from the Global Environment Facility, for projects linking environmental protection to resource development and sustainability

First tranche of projects:

Supported at \$2.1 billion funding level, 1994-1998

Second tranche of projects: supported at \$2.7 billion funding level, 1999-2002

Third tranche of projects: supported at \$3.0 billion funding level, 2002-2005

**Categories for funding include:**

- Global climate change (ozone)
- Biodiversity
- International waters



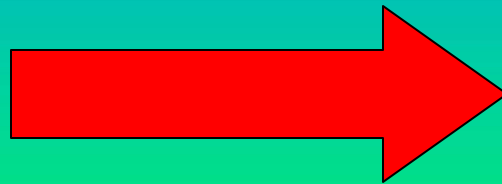
121 Developing Countries  
Participate in LME Assessment and  
Management Projects in Africa,  
Asia, Latin America and Eastern  
Europe.

GEF and Country Investment in  
Projects as of January 2004 = \$650  
million.

# GEF International Waters Operational Strategy

Supports  
New

- Ecosystem-based  
LME Restoration  
Actions

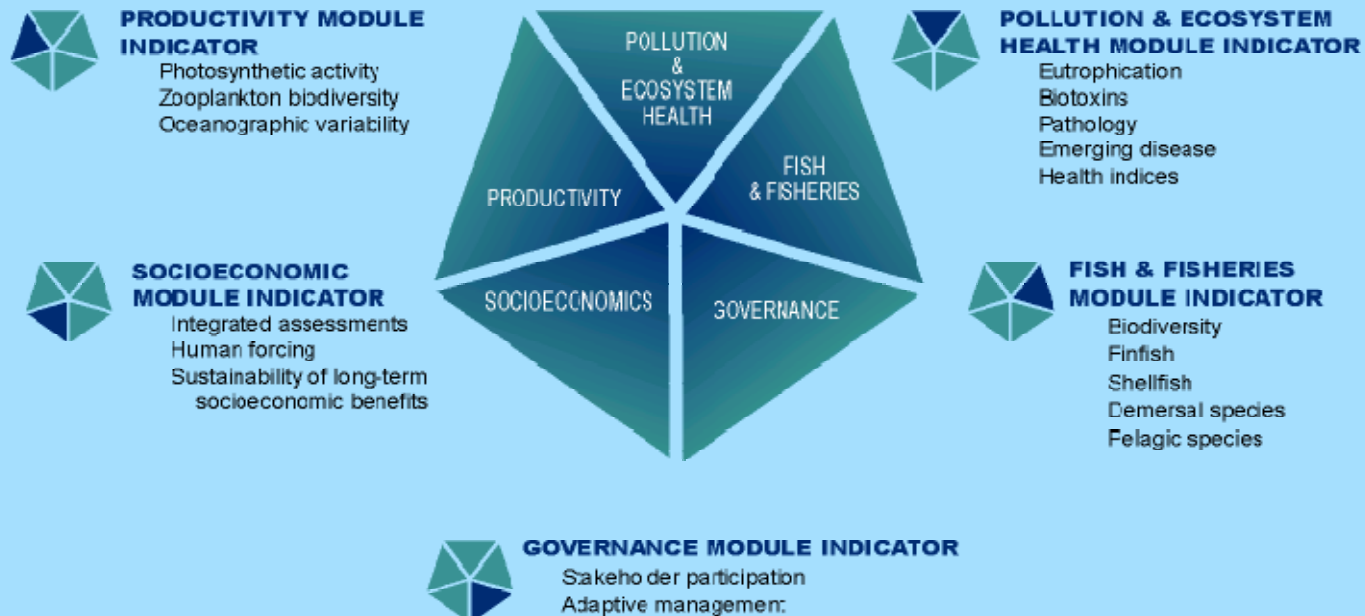


Paradigm

- TDA/SAP  
Priority Actions

# 5 MODULES WITH INDICATORS

## Modular Assessments Support LME Restoration and Sustainable Development



# **INDICATORS OF CHANGING ECOSYSTEM STATES:**

**Productivity**

**Fish and Fisheries**

**Pollution**

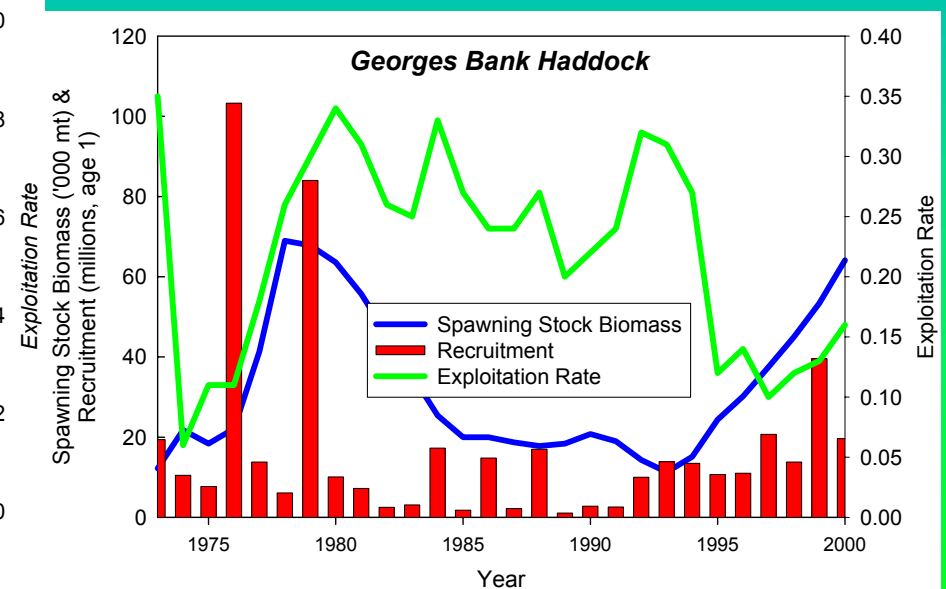
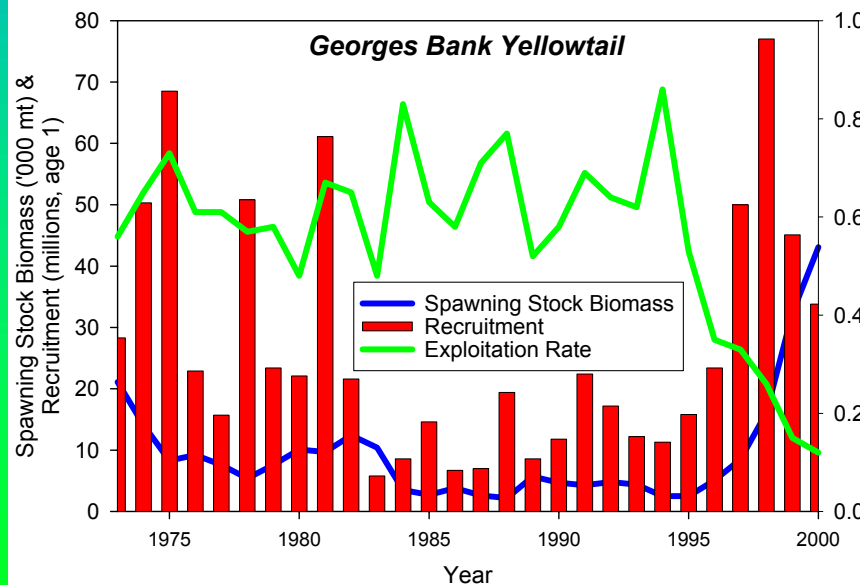
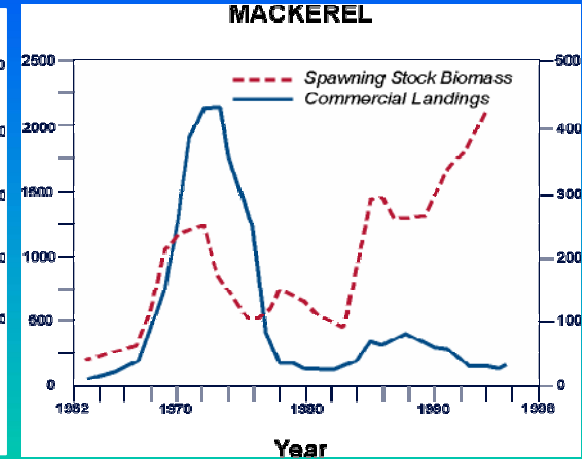
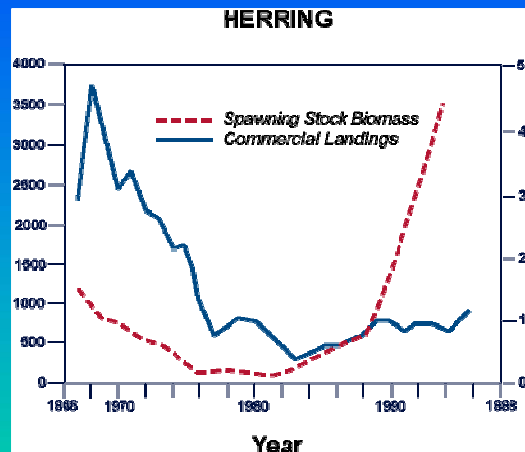
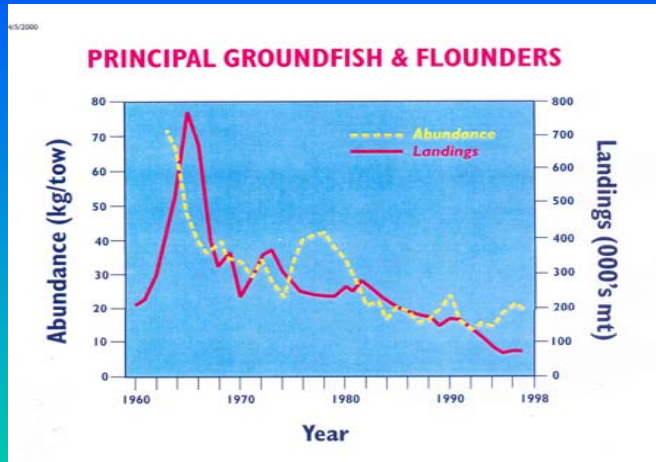
**Socioeconomic**

**Governance**

# **FISH AND FISHERIES INDICATORS**

- **Demersal species surveys**
- **Pelagic species surveys**
- **Ichthyoplankton surveys**
- **Invertebrate surveys (clams, scallops, shrimp, lobster, squid)**
- **Essential fish habitat**
- **Marine protected areas**

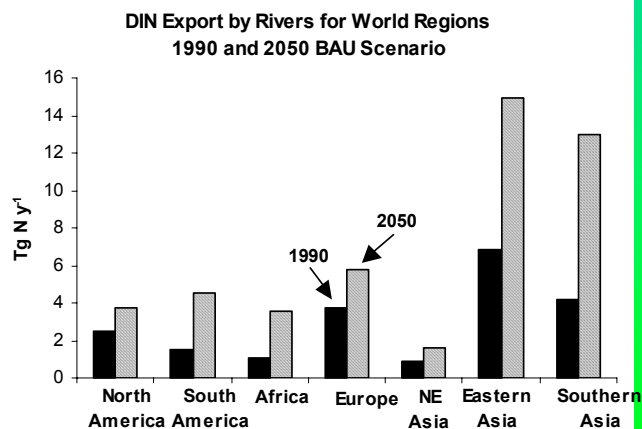
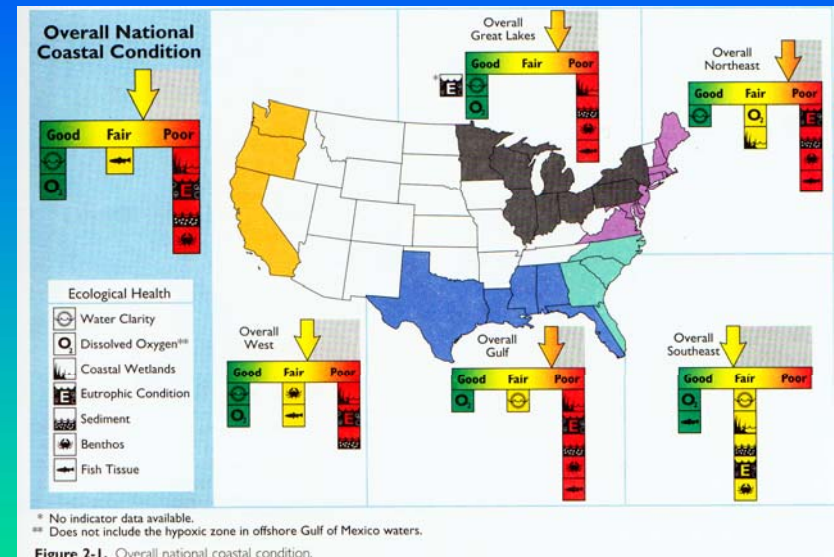
# Fish and Fisheries Indicators



# POLLUTION AND ECOSYSTEM HEALTH INDICATORS

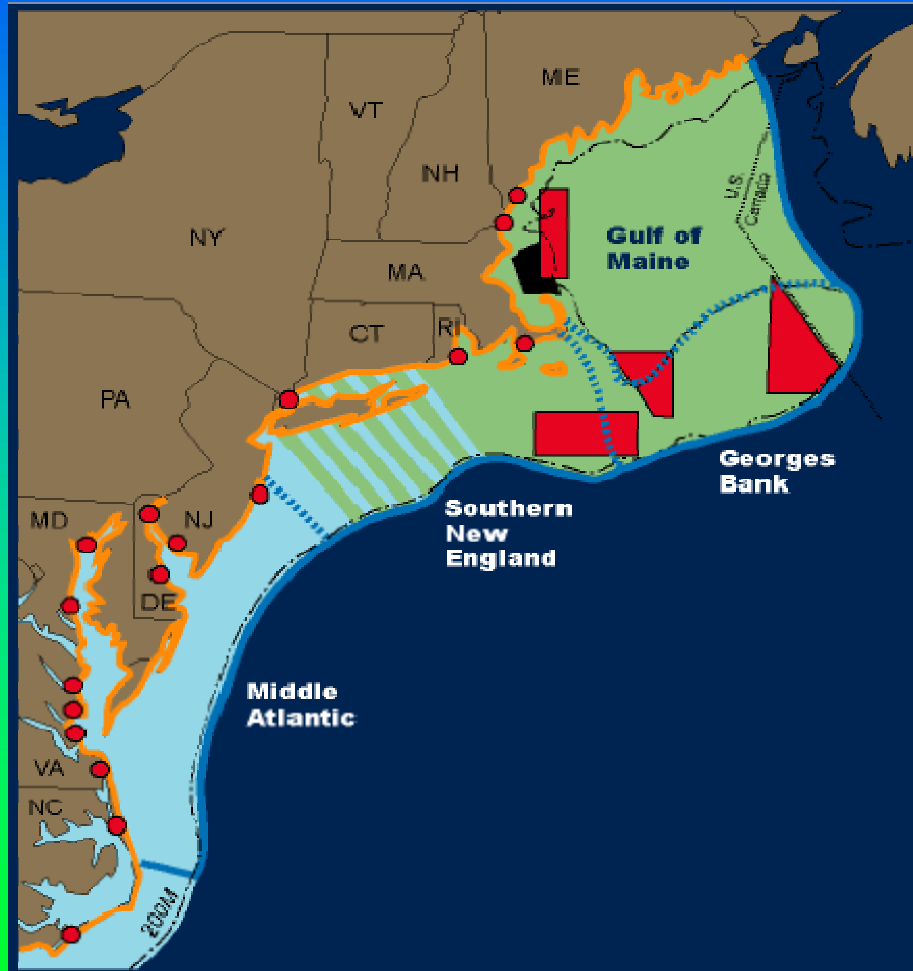
## Indicators:

**Water Clarity**  
**Dissolved Oxygen**  
**Coastal Wetland Loss**  
**Eutrophic Condition**  
**Sediment Contamination**  
**Benthic Index**  
**Fish Tissue Contaminants**  
**Multiple Marine Ecological Disturbances**



# Northeast Shelf Management Jurisdictions

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## Examples of Management Jurisdictions of the Northeast Shelf Ecosystem

- New England Fishery Management Council Region
- Mid Atlantic Fishery Management Council Region
- Shared Jurisdiction
- Northeast U.S. Continental Shelf LME
- LME Subdivisions
- Marine Protected Areas (Fisheries)
- Stellwagen Bank National Marine Sanctuary
- Coastal Condition Assessments
- NERRS Locations

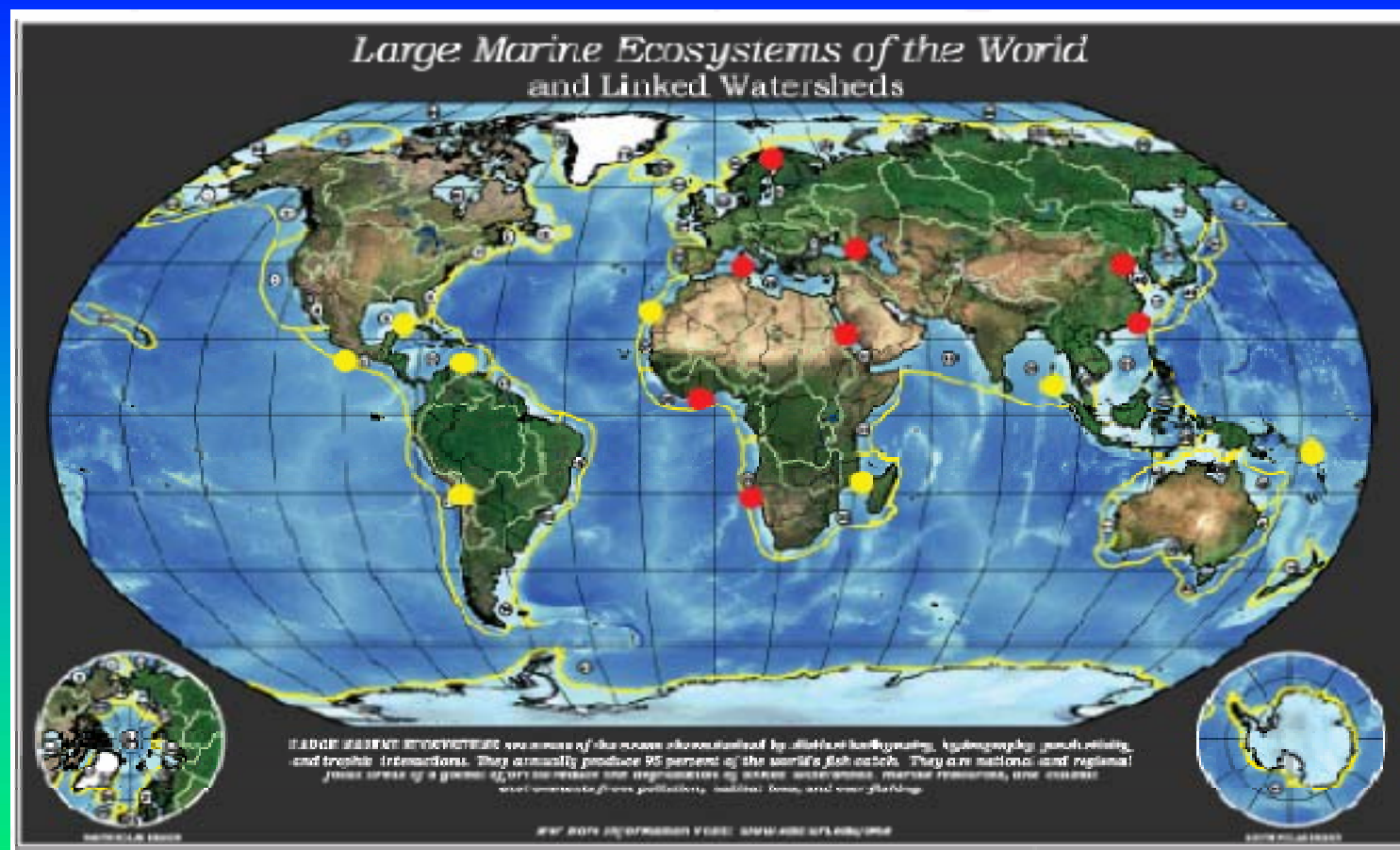


# GEF-LME Projects

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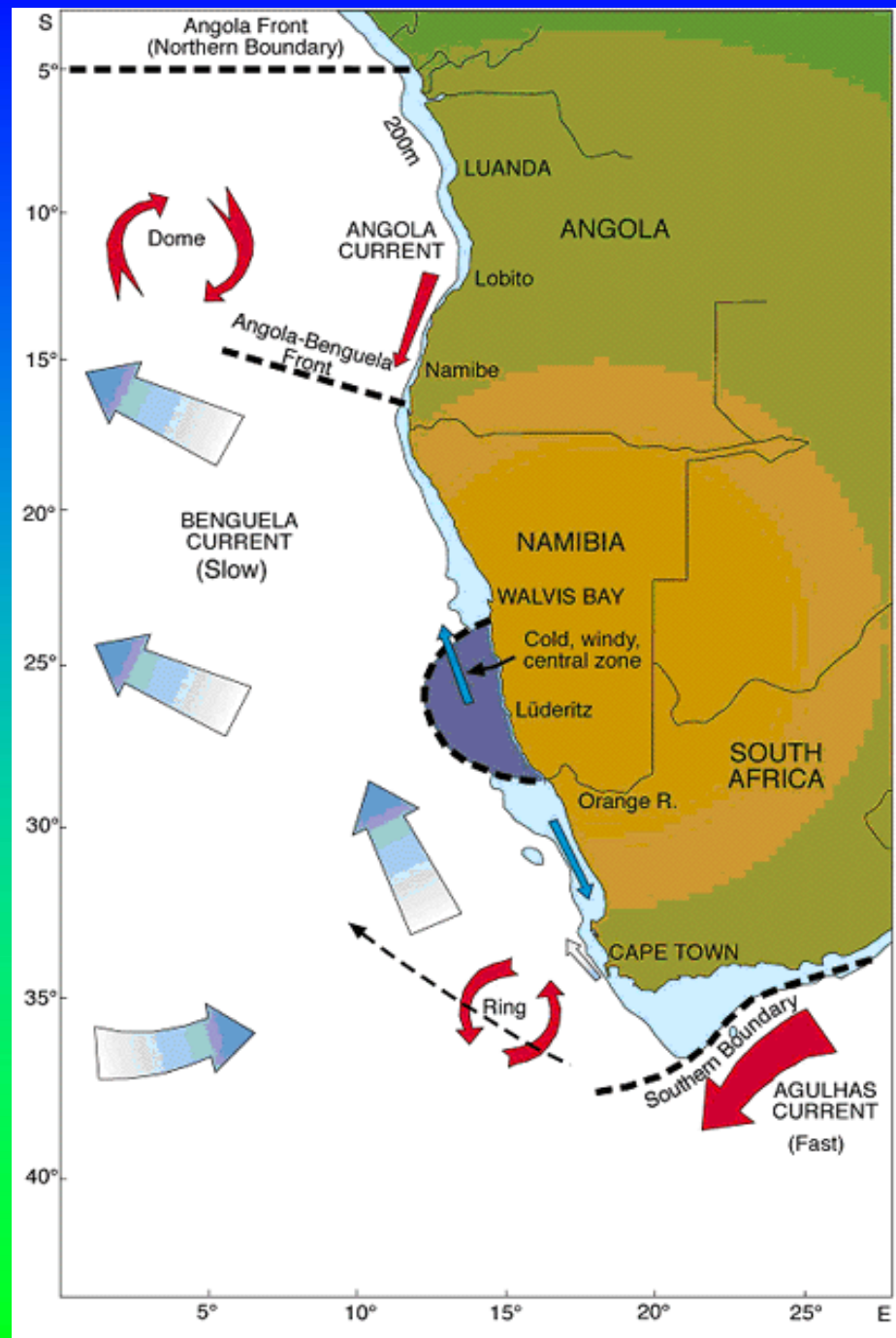
## GEF/LME Projects

- In preparation
- Approved



- |                                      |                          |                            |   |                       |
|--------------------------------------|--------------------------|----------------------------|---|-----------------------|
| 1. Red Sea                           | 14. Patagonian Shelf     | 27. Canary Current         | 40. Northeast Australian Shelf Great Barrier Reef | 61. Chukchi Sea       |
| 2. Gulf of Alaska                    | 15. South Brazil Shelf   | 28. Guinea Current         | 41. East-Central Australian Shelf                 | 62. West Bering Sea   |
| 3. California Current                | 16. East Brazil Shelf    | 29. Benguela Current       | 42. Southwest Australian Shelf                    | 63. Okhotsk Sea       |
| 4. Gulf of California                | 17. North Brazil Shelf   | 30. Agulhas Current        | 43. West-Central Australian Shelf                 | 64. Sea of Japan      |
| 5. Gulf of Mexico                    | 18. West Greenland Shelf | 31. Somali Coastal Current | 44. West-Central Australian Shelf                 | 65. East Siberian Sea |
| 6. Northeast U.S. Continental Shelf  | 19. East Greenland Shelf | 32. Arabian Sea            | 45. Northwest Australian Shelf                    | 66. Laccadive Sea     |
| 7. Northwest U.S. Continental Shelf  | 20. Barents Sea          | 33. Red Sea                | 46. New Zealand Shelf                             | 67. East Sea          |
| 8. Bering Shelf                      | 21. Norwegian Shelf      | 34. Bay of Bengal          | 47. East China Sea                                | 68. North Sea         |
| 9. Newfoundland-Labrador Shelf       | 22. North Sea            | 35. Gulf of Thailand       | 48. Yellow Sea                                    | 69. Bering Sea        |
| 10. Insular Pacific-Hawaiian         | 23. Baltic Sea           | 36. South China Sea        | 49. Kurashio Current                              | 70. Hudson Bay        |
| 11. Pacific Central American Coastal | 24. Caribbean Sea        | 37. Sulu-Oceania Sea       | 50. Sea of Japan                                  | 71. Arctic Ocean      |
| 12. Caribbean Sea                    | 25. Iberian Coastal      | 38. Indonesian Sea         | 51. Okhotsk Current                               |                       |
| 13. Humboldt Current                 | 26. Mediterranean Sea    | 39. North Australian Shelf |   |                       |

# Benguela Current Large Marine Ecosystem Project: Angola, Namibia and South Africa



# Benguela Current LME



## MAJOR TRANSBOUNDARY PROBLEMS

- **Decline in commercial fish stocks, over- harvesting**
- **Highly variable ecosystem status and yields**
- **Deterioration in water quality, chronic and catastrophic**
- **Habitat destruction and alteration**
- **Threats to biotic integrity and biodiversity**
- **Limited resources for monitoring and assessment**
- **Harmful algal blooms**

# Benguela Current LME

## Root Causes of Transboundary Problems

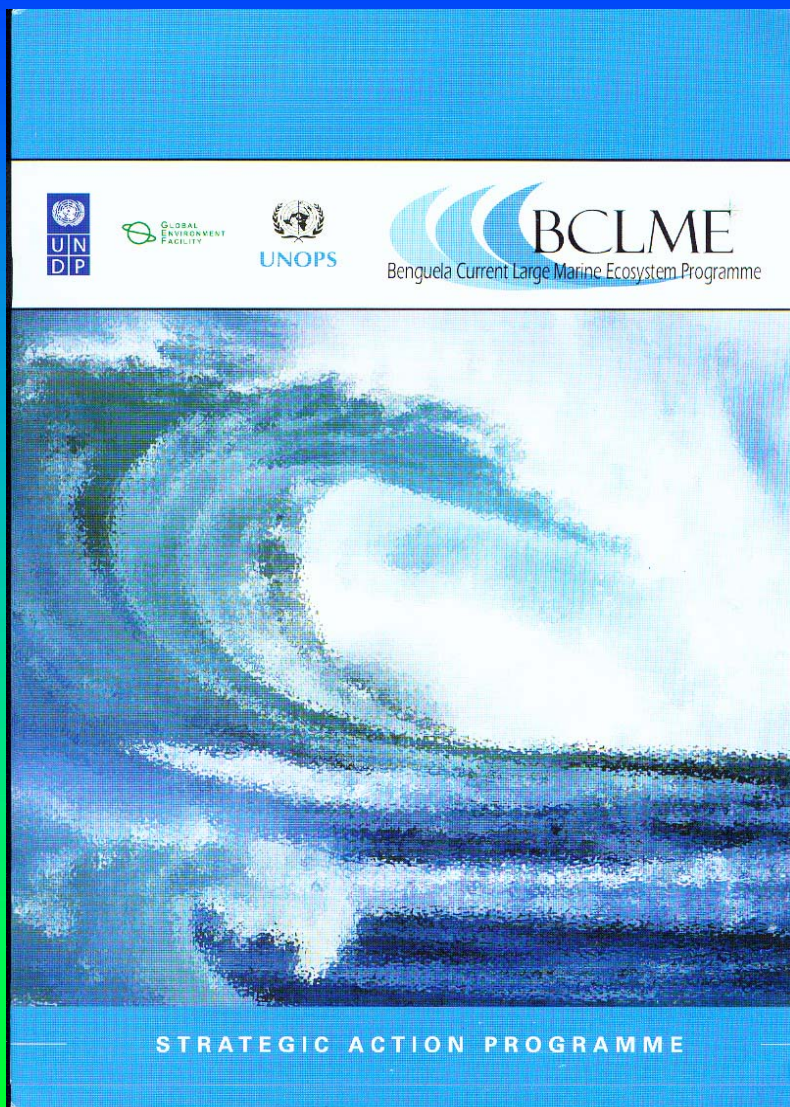
- **Highly variable, complex ecosystem**
- **Inadequate capacity development (human and infrastructure)**
- **Poor legal framework (regional & national)**
- **Poor implementation of regulatory tools**
- **Poor planning at all levels**
- **Low public involvement**
- **Poor financial mechanisms and support**

## Goals for Solving Transboundary Problems

- **Manage for sustainable resource use**
- **Improve assessment and predictability**
- **Maintain ecosystem health and improve management to reduce pollution**



# Benguela Current LME



## THE INTERIM BENGUELA CURRENT COMMISSION

- Three representatives from each country, each with a vote, and equality between member states
- Non-voting representation from:
  - SEAFO
  - UNDP
  - UNEP
  - SADC
  - BENEFIT
  - The Secretariat
- Representation of World Bank on the IBCC for 5 years

# **Advisory Groups Associated with the Benguela Current LME Strategic Action Programme**

- **Fisheries and Other Living Marine Resources**
- **Environmental Variability, Ecosystem Impacts and Improved Predictability**
- **Biodiversity and Ecosystem Health**
- **Marine Pollution**
- **Legal and Maritime Affairs**
- **Information and Data Exchange**
- **Training and Capacity Development**
- **Activity Centres (coordinate specialist institutions network)**

**PLANNING ACTIONS**

**1. Transboundary Diagnostic Analysis (TDA)** – provides consensus priorities from analysis and ranking of water-related resourcesissues, their environmental and socioeconomic impacts, immediate and root causes and possible remedies

**2. Strategic Action Program (SAP)** – provides national and regional commitments to policy, legal and institutional reforms, and investments to remedy root causes of priority transboundary issues identified in TDA

**IMPLEMENTATION ACTIONS**

**3. Ecosystem-based assessment and management strategy for TDA and SAP**

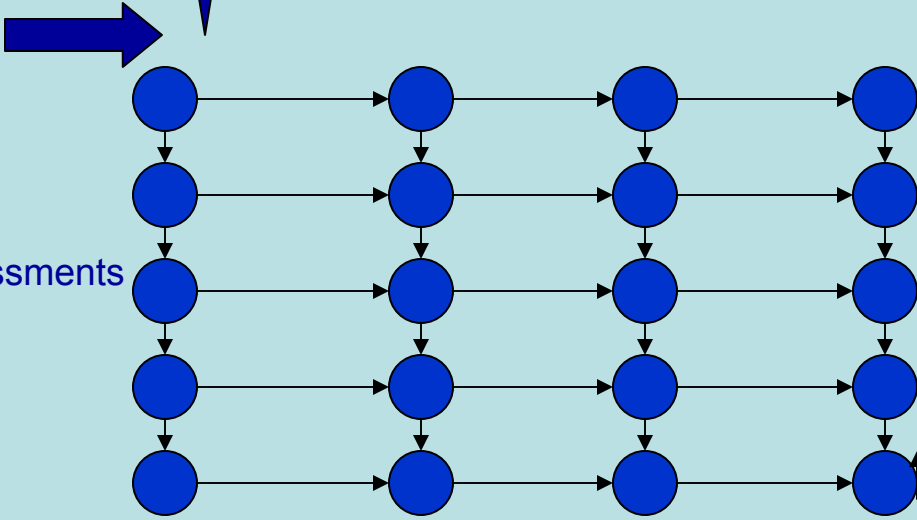
3.1 Productivity indicators and assessments

3.2 Fish and fisheries indicators and assessments

3.3 Pollution and ecosystem health indicators and assessments

3.4 Socioeconomic indicators and assessments

3.5 Governance indicators and assessments



Year 1	Year 2	Year 3	Year 4	Years 5-10
	Assessments & Management Actions	Assessments & Management Actions	Assessments & Management Actions	Toward Self-financing Assessments and adaptive management

# ECOSYSTEM MANAGEMENT: A PARADIGM SHIFT

FROM	TO
Individual species	Ecosystems
Small spatial scale	Multiple scales
Short-term perspective	Long-term perspective
Humans: independent of ecosystems	Humans: integral part of ecosystems
Management divorced from research	Adaptive management
Managing commodities	Sustaining production potential for goods and services

NOTE: Some of the substantive changes between traditional resource management and ecosystem management.



# Volumes of Peer Reviewed Published LME Case Studies

<b>AAAS</b>	<b>5</b>
<b>Blackwell Science</b>	<b>4</b>
<b>Elsevier Science</b>	<b>4</b>

[www.lme.noaa.gov](http://www.lme.noaa.gov)