The Global Environment Facility (GEF) is a funding agency assisting developing countries to meet ecosystem-related targets. The GEF recommends the use of LMEs as the geographic focus for ecosystem-based assessments and management strategies. In 1995, the GEF-LME process was designed to address the joint preparation of a Terrestrial-Oceanic Diagnostic Analysis (TODA) and a Strategic Action Plan (SAP), to support the implementation of GEF projects. In a GEF-LME Project TODA, the countries bordering the LME prepare a document based on consensus of the terrestrial coastal resource issues, identify and prioritize transboundary problems, analyze socioeconomic impacts, outline cost and assess potential benefits, and advance possible Remedies. On the basis of the TODA, the countries prepare a Strategic Action Plan (SAP) in the SAP, the countries prepare a document based on consensus of the terrestrial coastal resource issues, identify and prioritize transboundary problems, analyze socioeconomic impacts, outline cost and assess potential benefits, and advance possible Remedies. In 2004, a new strategic initiative was adopted by the Regional Seas Programme. Its aim is to promote ecosystem-based management. The GPA and the control of land-based sources of pollution is a key component of this initiative. The Regional Seas Programme and Large Marine Ecosystem (LME) Projects. It focuses on the assessment and management, based on the ecosystem approach, of priorities and concerns related to the coastal and marine environment. Regional Seas promotes and advances coastal programmes in developing countries. Regional Seas promotes and advances coastal programmes in developing countries. Regional Seas promotes and advances coastal programmes in developing countries. Regional Seas promotes and advances coastal programmes in developing countries. Regional Seas promotes and advances coastal programmes in developing countries.

The WSSD targets are useful criteria for evaluating the progress of GEF-LME Projects.

❖ Introduction of an ecosystems approach to marine resource assessment and management by 2010
❖ Achievement of substantial reductions in land-based sources of pollution by 2006
❖ Reduction of coastal and marine pollution by 2010
❖ Improvement of the management of large marine ecosystems (LMEs) by 2010
❖ Implementation of the strategy of the 1992 United Nations Conference on Environment and Development (UNCED) to protect and manage coastal and marine biodiversity by 2010
❖ Establishment of an ecosystem-based approach for marine resource assessment and management by 2010
❖ Strengthening of the science base for the conservation of biodiversity and the management of coastal and marine resources by 2010
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The WSSD targets are useful criteria by which to judge the progress of GEF-LME Projects:

- Achievement of substantial reduction in the levels of pollution in 2015
- Introduction of an integrated approach to marine resource assessment and management by 2010
- Maintenance and restoration of fish stocks to maximum sustainable yield levels by 2015
- Achievement of substantial reductions in land-based sources of pollution by 2006
- Introduction of an ecosystems approach to marine resource assessment and management by 2010
- Reduction and remediation of transboundary environmental damage by 2010
- Development of a science-based management framework to protect habitats, and recover depleted fisheries.

Large Marine Ecosystems (LMEs) are regions of marine space of about 200,000 km² or greater. They encompass coastal areas from river basins and estuaries out seaward to the break or slope of the continental shelf and cover the most productive areas of the marine environment, which are of coastal and marine importance. Regional Seas promotes and advances coastal programmes for the development of a common vision and integrated management of priorities and concerns related to the coastal and marine environment. Regional Seas promotes an ecosystem-based approach, in partnership with the IOC, the IUCN and United Nations agencies to assist developing coastal countries in protecting and managing their critical coastal and marine areas.

A new partnership has been developed that links the coast with the ocean, the Great Lakes, and the region’s LMEs (Large Marine Ecosystems) and freshwater systems. This new partnership is the Global Environment Facility (GEF) Large Marine Ecosystems Programme (UNEP) and the US National Oceanic and Atmospheric Administration (NOAA) Large Marine Ecosystems (LME) Assessment and management, approach. Using LMEs as operational management units for translating the Regional Seas strategic direction for GPA/Regional Seas in the coming decade is to promote ecosystem-based management. This new partnership is the Global Environment Facility (GEF) Large Marine Ecosystems Programme (UNEP) and the US National Oceanic and Atmospheric Administration (NOAA) Large Marine Ecosystems (LME) Assessment and management, approach. Using LMEs as operational management units for translating the Regional Seas strategic direction for GPA/Regional Seas in the coming decade is to promote ecosystem-based management. This new partnership is the Global Environment Facility (GEF) Large Marine Ecosystems Programme (UNEP) and the US National Oceanic and Atmospheric Administration (NOAA) Large Marine Ecosystems (LME) Assessment and management, approach. Using LMEs as operational management units for translating the Regional Seas strategic direction for GPA/Regional Seas in the coming decade is to promote ecosystem-based management.
The Transboundary Diagnostic Analysis (TDA) and a Strategic Action Plan (SAP), used to prioritize countries to meet ecosystem-related targets. The GEF recommends the use of LMEs as the geographic focus for ecosystem-based assessments and management strategies. In 2004, a new strategic initiative was adopted by the Regional Seas Programme. Its aim is to support and assist countries in preparing and implementing TDA and SAP processes for LMEs located within Regional Seas areas around the globe.

The WSSD targets are useful criteria for which to judge the progress of GEF-LME Projects.

Achievement of substantial reductions in land-based and marine sources of pollution by 2006.

• Maintenance and restoration of fish stocks to maximum sustainable yield levels by 2015.

• Achievement of substantial reductions in land-based sources of pollution by 2006.

• Restoration of coastal wetlands by 2015.


Bibliographical references

A new partnership has been developed that links the coast with seas, with the purpose of achieving the results of the Global Environment Facility (GEF) Urban and Coastal Ecosystems and Marine Ecosystems (UNEP) and the US National Oceanographic and Atmospheric Administration (NOAA). The joint initiative is implemented through NOAA’s Large Marine Ecosystems (LME) assessment and management approach, using LMEs as operational units for the implementation of coastal and marine Strategic Action Plans (SAPs) for transboundary LMEs. This approach, known as the UNEP-NOAA LME Partnership, involves a global assessment and management of coastal waters. Marine Ecology Progress Series, 151:1-167.

The UNEP Regional Seas Programme is focused on assisting countries in protecting their coastal and marine environments and linked watersheds.

Regional Seaboard Partnerships (GEF-LME Projects)
UNEP Regional Seas Programme Linked with the LME Approach

Regional Seas & Large Marine Ecosystems

The UNEP approach is a framework for promoting ecosystem-based management of coastal and marine resources within a network of Regional Seas. Coastal and marine assessment and management programmes are linked to the Wider North Pacific Initiative and to the UNEP Regional Seas Programme.

In 18 GEF-LME Projects (either approved or in the preparation stage), 121 countries are moving forward with the development of Science Frameworks and Action Plans for 64 LMEs of the World. This approach includes adapting the 5-Modular Assessments process to gather the best available data, with highs in red and lows in purple, and the boundaries of the 64 LMEs.

In LMEs 61, 62, 64, and the application of the 5-module approach to LME assessment and management.

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Table of country-driven GEF-LME Projects with Regional Seas that have established priorities

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<tr>
<th>Carribbean Sea (23 countries)</th>
<th>TDA in preparation</th>
<th>Wider Caribbean</th>
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<tbody>
<tr>
<td>Guinea Current (16 countries)</td>
<td>Expanding the SAP and TDA</td>
<td>West and Central Africa</td>
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<tr>
<td>Humboldt Current (2 countries)</td>
<td>TDA in preparation</td>
<td>South-East Pacific</td>
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<td>Bay of Bengal (8 countries)</td>
<td>TDA and preliminary SAP</td>
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<td>Baltic Sea (9 countries)</td>
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<td>Baltic Sea</td>
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<td>Gulf of Guinea (6 countries)</td>
<td>TDA and SAP</td>
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<td>Red Sea (7 countries)</td>
<td>TDA and SAP</td>
<td>Red Sea and Gulf of Aden</td>
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<td>Mediterranean Sea (14 countries)</td>
<td>TDA and SAP</td>
<td>Mediterranean Sea</td>
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<tr>
<td>Gulf of Mexico (2 countries)</td>
<td>TDA and preliminary SAP</td>
<td>Gulf of Mexico and Yucatan Peninsula</td>
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<tr>
<td>Gulf of California (1 country)</td>
<td>TDA in preparation</td>
<td>West and Central Asia</td>
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<tr>
<td>Guayas Current (1 country)</td>
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<tr>
<td>Caribbean Sea (12 countries)</td>
<td>TDA in preparation</td>
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Need for Prescriptive Approaches

Prescriptive approaches to management operate in the context of an established goal or target. A national government issues policies for the protection of a marine ecosystem. The government must determine whether these policies are effective or if the ecosystem has improved. If the ecosystem has improved, the government can continue with the same policies. If the ecosystem has not improved, the government can adjust the policies and try again. This process continues until the ecosystem is healthy.

Need to curb excessive nitrogen loading:
Model predictions of nitrogen affecting LMEs show that excessive levels of nitrogen contributing to coastal eutrophication in 64 LMEs of the World. The development of a Global Ocean Ecosystem Health Index (GOEI) for the assessment of health and status of 64 LMEs of the World and the development of a Global Marine Ecosystem Health Index (GMHI) for the assessment of health and status of 64 LMEs of the World.

UNEP Regional Seas Programme is Linked to the LME 5-Module Suite of Ecosystem Condition Indicators to Support Management Actions

LMEs: Marine Ecosystems are components of a larger system with a network of interacting components. This network is the ecosystem. The ecosystem is composed of physical, chemical, and biological components. The physical components are the atmosphere, oceans, and land. The chemical components are nutrients and gases. The biological components are plants and animals. The ecosystem is composed of the interactions between these components and the processes that occur within the ecosystem.

UNEP Regional Seas Programme is Linked to the LME 5-Module Suite of Ecosystem Condition Indicators to Support Management Actions

UNEP Regional Seas Programme is Linked to the LME 5-Module Suite of Ecosystem Condition Indicators to Support Management Actions

Seabirds

Policy makers, conservationists, and stakeholders use the results of the 5-module assessments to support management actions. The results of the 5-module assessments are used to identify areas that need additional protection, to develop management plans, and to evaluate the effectiveness of management plans.

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The LME approach is a tool for promoting ecosystem-based management of coastal and marine resources within a framework of sustainable development. Central to the LME approach is the recognition of the close interconnections between land and sea, which necessitates the involvement of stakeholders in all stages of the process. The LME approach is based on the principles of community participation, integrated assessments, and adaptive management by recognizing the basic linkages between scientific assessments, protection of the marine environment, sustainability of development and marine resources, and poverty alleviation.

This LME approach has developed indicators to assess productivity, fish and fisheries, pollution, and ecosystem health, as well as social and economic conditions at various levels of analysis, and to address the issues identified in the TDA. The SAP addresses the need to promote the use of ecosystem management approaches to follow-up the TDA process. For one LME, improved forecasts of climate-driven fishery productivity fluctuations are required. This LME, the Humboldt Current, is the world’s largest upwelling system and a productive marine ecosystem, providing about 15-20% of the world’s annual marine catch. The local and far-reaching effects of climate-driven fishery productivity fluctuations are already evident. High and frequent El Niño-Southern Oscillation (ENSO) events can cause for concern for future sustainability (the expected climate increases in population and biodiversity indicators will be affected). LMEs will be subjected to similar climate-driven fluctuations in the future, and understanding the potential impacts on the socio-economic well-being of communities in these areas is critical for sustainable social-economic development.

The 5-module LME approach has developed indicators of productivity, fish and fisheries, pollution, and ecosystem health, as well as social and economic conditions at various levels of analysis, and to address the issues identified in the TDA. The SAP addresses the need to promote the use of ecosystem management approaches to follow-up the TDA process. For one LME, improved forecasts of climate-driven fishery productivity fluctuations are required. This LME, the Humboldt Current, is the world’s largest upwelling system and a productive marine ecosystem, providing about 15-20% of the world’s annual marine catch. The local and far-reaching effects of climate-driven fishery productivity fluctuations are already evident. High and frequent El Niño-Southern Oscillation (ENSO) events can cause for concern for future sustainability (the expected climate increases in population and biodiversity indicators will be affected). LMEs will be subjected to similar climate-driven fluctuations in the future, and understanding the potential impacts on the socio-economic well-being of communities in these areas is critical for sustainable social-economic development.
The LME approach was first formalized through ecosystem-based management of coastal and marine resources within a framework of sustainable development. Central to this approach is the monitoring and management of activities that degrade the health of the marine environment, including the activities that contribute to the degradation of habitat and accelerated nitrogen export.

In the United Nations (UN) Millennium Development Goals (MDGs), the biodiversity and ecosystem services of the marine environment provide food, nutrition, income, and livelihoods for billions of people. The UN’s Sustainable Development Goals (SDGs) recognizes the importance of the marine environment to achieving the SDGs.

The United Nations Environment Programme (UNEP) Global Littoral Monitoring (GLOM) programme is an initiative to promote and support a range of programmes and projects that are focused on understanding and managing the health of the marine environment. The GLOM programme is linked to the LME approach and is a tool for understanding the status and trends of marine ecosystems.

UNEP Regional Seas Programme Linked to the LME M-Module Suite of Ecosystem Condition Indicators to Support Management Actions

The UNEP Regional Seas Programme is linked to the LME M-Module Suite of Ecosystem Condition Indicators to Support Management Actions.

Module Assessments for Sustainable Development

PRODUCTIVITY MODULE

Phytoplankton productivity
Zooplankton productivity
Omnivorous zooplankton
Diverse omnivorous organisms

POLUTATION & ECOSYSTEM HEALTH MODULE

Pathogens
Endocrine disruptors
Health indicators
Multiple stressors and ecological disorders

HEALTH

Large marine ecosystems

FEEDING

Sustainability of long-term productivity

Demersal species
Shellfish
Finfish

INDICATORS

Evolution of trawling effort in the Ghanaian demersal fisheries, by decade

Sustainability of long-term productivity of pelagic and demersal fish stocks of LMEs

Need for Precautionary Approach

Identifying ecosystem-based management opportunities is critical for maintaining the health of the marine environment. The LME approach provides a framework for the ecosystem-based management of coastal and marine resources, including the activities that contribute to the degradation of habitat and accelerated nitrogen export.

LMEs are large marine ecosystems that cover a network of national and international marine areas that are subject to the influence of anthropogenic activities. The LME approach is a tool for understanding the status and trends of marine ecosystems.

UNEP Regional Seas Programme Linked to the LME M-Module Suite of Ecosystem Condition Indicators to Support Management Actions

Need for Precautionary Approach

The UNEP Regional Seas Programme is linked to the LME M-Module Suite of Ecosystem Condition Indicators to Support Management Actions.

Table of country-driven GEF-LME Projects with Regional Seas that have established priorities

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Need to curb excessive nitrogen loading: Model predictions of nitrogen affecting LMEs along China’s east coast

Excessive levels of nitrogen contribute to coastal eutrophication, which can lead to a decrease in water quality and a reduction in the productivity of coastal and marine ecosystems. The UNEP Regional Seas Programme is linked to the LME M-Module Suite of Ecosystem Condition Indicators to Support Management Actions.

Figure 6

Figure 6: Module-predicted averaged nitrogen fluxes from 1990 to 2050 (Scenario 1990 and BAU Scenarios). The model-predicted nitrogen fluxes from 1990 to 2050 show that the highest nitrogen fluxes are predicted for the BAU Scenario, followed by the 2010 Scenario. The model-predicted nitrogen fluxes from 1990 to 2050 show that the highest nitrogen fluxes are predicted for the BAU Scenario, followed by the 2010 Scenario. The model-predicted nitrogen fluxes from 1990 to 2050 show that the highest nitrogen fluxes are predicted for the BAU Scenario, followed by the 2010 Scenario. The model-predicted nitrogen fluxes from 1990 to 2050 show that the highest nitrogen fluxes are predicted for the BAU Scenario, followed by the 2010 Scenario. The model-predicted nitrogen fluxes from 1990 to 2050 show that the highest nitrogen fluxes are predicted for the BAU Scenario, followed by the 2010 Scenario.
The LME approach is a tool for promoting ecosystem-based management of coastal and marine resources within a harmonized framework of regional and global nature. The Global Marine Assessment and management meeting includes the Wider Caribbean Regional Seas Program (WCRP), the African Regional Seas Initiative (ARSI), and the Regional Seas Programme of the UNEP. The Wider Caribbean Regional Seas Programme is linked to the LME approach through the elaboration of ecosystem-based adaptive management for the basin boundaries between significant areas of the marine environment, sustainable development of coastal and marine resources, and poverty alleviation.

In the case of the Mediterranean Sea, adaptive management is still in an early stage, but efforts are being made to improve the effectiveness of the LME approach. The Mediterranean Sea has been divided into several sub-regions, each with its own set of challenges and opportunities. The Eastern Mediterranean, for example, is facing severe threats to its marine biodiversity and ecosystem health due to overfishing, pollution, and climate change. The Western Mediterranean, on the other hand, is facing challenges related to tourism and industrial activities. The Southwestern Mediterranean is characterized by high levels of coastal development and pollution, while the Northwestern Mediterranean is facing challenges related to the management of marine resources in the Mediterranean Sea.

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The Global Environment Facility (GEF) is a funding agency assisting developing coastal countries to meet ecosystem-related targets. The GEF recommends the use of LMEs as the geographic focus for ecosystem-based assessments and management strategies. In its GEF-LME Project TDA, the countries prepare a document based on criteria that coastal resource issues, waterbirds and priority transboundary problems, analyzes socioeconomic impacts, outlines cost and benefits and provides possible solutions.

On the basis of the TDA, the countries prepare a Strategic Action Plan (SAP) in the SAP, the countries prepare operational/management units for translating the Regional Seas Convention into concrete actions. This will assist governments and the European Commission, to adopt a strategic direction for GPA/Regional Seas in the coming years.

Network of United Nations Organizations and NGOs participating in GEF-LME Projects

INTERNATIONAL PARTNERS

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UNEP and GEF-LME Projects

Regional Seas Partners with GEF-LME Projects

Large Marine Ecosystems (LMEs) are regions of ocean space of about 200,000 km² or greater. They are defined by the functional relationship of adjacent coastal and marine environments, including estuaries and near-shore coastal waters. LMEs are defined by ecological and other processes, such as bottom depth contours, well-defined current system (e.g. Guinea Current LME). Global assessments of LMEs are underway to assess the changing conditions and status of LMEs and their catchments.

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