

## **More on the Global LME Movement**

The LME movement started in the mid 1980s, when the LME approach and concept were first developed through a series of scientific symposia (including the American Association for the Advancement of Science -- AAAS) and published reports and volumes.

In a second phase, beginning in the mid 1990s, the GEF began to fund projects in Africa, Asia, Latin America and Eastern Europe that used LMEs as the geographic focus for ecosystem-based strategies to reduce coastal pollution, restore damaged habitats, and recover depleted fisheries. This came out of the 2002 World Summit on Sustainable Development (WSSD) and its targets to: (i) achieve substantial reductions in land-based sources of pollution by 2006; (ii) introduce an ecosystems approach to marine resource assessment and management by 2010; (iii) designate a network of marine protected areas by 2012; and (iv) maintain and restore fish stocks to maximum sustainable yield levels by 2015.

Today, 110 developing countries are engaged in 16 GEF funded LME projects, funded at a level of \$1.8 billion. Six of these projects are in Africa. In this phase of the movement, the focus is on the extension of new GEF supported LME projects in Asia and Latin America and on developing a global community of best practices. LME practitioners will exchange lessons and practices that have worked in ongoing LME projects. It is estimated that 10,000 LME practitioners are needed to carry the LME work into the future. Examples of projects that already provide a wealth of practices are the Benguela Current and Yellow Sea LME projects.

LMEs are based on ecological criteria and not on political considerations. In the newly published "Sustaining the World's Large Marine Ecosystems" (2009), the opening contribution, by Alfred M. Duda, is focused on the global movement underway by the LME partners to assist over 100 developing countries in operationalizing the LME approach to the assessment and management of coastal ocean goods and services.

### **GEF Support for the Global Movement toward the Improved Assessment and Management of Large Marine Ecosystems**

**By Alfred M. Duda (GEF Secretariat)**

# **GEF Support for the Global Movement toward the Improved Assessment and Management of Large Marine Ecosystems**

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While our planet's coastal and marine assets have been in trouble for a while, recent information has documented beyond a doubt the scale and severity of risks to humanity associated with depletion and degradation of near coastal oceans and their contributing watersheds. Lack of attention to policy, legal and institutional reforms has resulted in coastal freshwater depletion, pollution from sewage and industrial wastes, human health risks, coastal groundwater supply contamination, overexploitation of fisheries and their collapse, the destruction of economically important coastal habitats like coral reefs, diseases and alien species propagated by maritime transport. All these trends lead to socioeconomic losses.

The Global Environment Facility (GEF) has recognized these concerns since the early 1990s, and has responded with an ecosystem-based approach to the assessment and management of Large Marine Ecosystems (LMEs) across the world in order to stem the tide of depletion and degradation, and lead the transition to ocean security. This paper describes the approach adopted by the GEF in the last dozen years to create a movement in support of intergovernmental instruments to reverse the downward spiral of coastal and marine resources. One hundred and thirty two nations are working together in GEF International Waters projects to support this movement with improved human capacity, governance reforms, and critical investments.

The GEF approach at different scales is described, along with some early results of the type of decadal long effort needed to make real changes in human behavior. As GEF enters a phase that will invest in the LME movement, its future focus depends on the amount of GEF replenishment funding provided by industrialized countries to catalyze actions, and on the commitments coming from developing countries to adopt collective reforms and utilize available financing for investments. When industrialized countries are lukewarm in prioritizing GEF and the oceans, the world community should expect little action in return.

The collective actions of many countries are needed to cope with shifts in climate and the impacts of globalization, with its financial pressures that further stress declining coastal ecosystems. The scale of economic loss facing coastal

countries is at the level of trillions of dollars of ecosystem goods and services at risk through failures in governance. Governments failing to make progress in attaining Millennium Development Goals (MDGs) face internal social and political unrest, the loss of natural resources along with economic benefits, and human communities that cannot sustain themselves.

## **Why Large Marine Ecosystems?**

The depletion of fisheries resources in coastal oceans is but one symptom of mismanagement, along with land practices, the pollution of freshwater systems, and wasteful energy use that loads our atmosphere with climate changing carbon. The lack of attention to policy, legal, and institutional reform, low priority given to public investments, and lack of enforcement of many regulations now place at risk not only coastal and marine ecosystems but also human communities that depend on them for economic security and social stability.

Traditional sector-by-sector approaches to economic development have created this global crisis. Calls to establish environment programs focused solely on marine systems are doomed to fail if they do not incorporate the policies and programs of other economic sectors. Rather, an ecosystem-based approach to coastal and marine systems that can operate at multiple scales and harness stakeholder support for integrated management in synchrony with the improved management of other sectors is needed in both Northern and the Southern countries.

Marine ecosystems and their contributing freshwater basins are transboundary in nature by virtue of interconnected currents, pollution, and movement and migration of living resources. Eighty percent of the global marine fisheries catch comes from 64 Large Marine Ecosystems (LMEs) delineated along the continental shelves and coastal currents, that represent multi-country, ecosystem-based management units for reversing fisheries depletion (Duda and Sherman, 2002; Sherman et al.s, 2009, this volume). LMEs are natural regions of ocean space encompassing coastal waters from river basins and estuaries to the seaward boundary of continental shelves and the outer margins of coastal currents. They are relatively large regions of 200,000 km<sup>2</sup> or greater, the natural boundaries of which are based on four ecological criteria: bathymetry, hydrography, productivity, and tropically related populations (Sherman 1994).

## **The Role of the GEF**

The GEF was established in 1991 as a pilot multilateral financial mechanism to test new approaches and innovative ways to respond to global environment challenges, in its four focal areas of climate change, biodiversity

conservation, ozone depletion, and international waters. Following 18 months of negotiations, agreement was reached in 1994 to transform the GEF from its pilot phase into a permanent financial mechanism. The restructured facility, with its multi-billion dollar trust fund, is open to universal participation, with 176 countries currently serving as members. It builds upon a partnership with the United Nations Development Program (UNDP), the United Nations Environment Program (UNEP), the World Bank, and seven other agencies with expanded opportunities such as the four regional development banks, FAO, and UNIDO. These agencies can access funding on behalf of developing countries and those in economic transition for activities consistent with the GEF Operational Strategy.

The only new funding source to emerge from the 1992 Earth Summit, the GEF has allocated \$US 7.6 billion in grants supplemented by more than \$US 31 billion in additional financing, for 2000 projects in 165 developing countries and countries in economic transition. For the International Waters focal area, 132 transboundary water projects, at a level approaching \$6 billion in total cost and \$1.2 billion in GEF grants, have been funded with 147 different GEF-recipient countries.

Late in 1995, the GEF Council issued its Operational Strategy on the use of GEF funding (GEF, 1995). Chapters 17 and 18 of Agenda 21 provided a guide for Council discussions in the International Waters (IW) focal area, which addresses transboundary concerns of shared river basins, groundwater systems, coasts, and oceans. The Operational Strategy recognized that special international collaboration was needed among sovereign states to reverse the decline of large multi-country water systems and help resolve conflicting uses leading to resource depletion, degradation, conflicts, and loss of socioeconomic benefits. For coasts and oceans, the Strategy uses LMEs as the unit of assessment and management (Duda, 2005).

### **The Serious Nature of Coastal Depletion and Degradation**

Fishing down food webs, destructive fishing gear, habitat conversion to aquaculture, and the associated pollution loading have all been shown to contribute to the decline of marine ecosystems across the globe (Pauly et al. 1998). The depletion of ocean fisheries` and the destruction of coastal habitats through damage caused by aquaculture constitute globally significant environmental problems. Recent estimates suggest that 90% of the large fish have been removed from the oceans (Myers and Worm 2003), and that three quarters of fish stocks are fished at their maximum yield level, overfished, or depleted (FAO, 2007). Jackson et al. (2001) noted that ecological extinction caused by historical over-fishing is the most important cause of marine biomass and biodiversity depletion around the world, with existing populations being only a fraction of historical levels. Habitat loss from destructive trawling and “slash

and burn” coastal aquaculture have made matters much worse, with wild fisheries losing habitats for spawning and nursery grounds.

Recently, Worm et al. (2006) have concluded that cumulative catches within the world’s LMEs have declined by 13% (10.6 million metric tons) since passing a cumulative maximum in 1994. They argue that species average catches in non-collapsed fisheries were higher in species rich systems, and that species robustness to overexploitation was enhanced in LMEs with high fish species diversity. They further argue that sustainable fisheries management, pollution control, the maintenance of essential habitats, and the creation of marine reserves will prove to be good investments in the productivity and value of the goods and services that the ocean provides to humanity. The oceans have been depleted of their largest fish. And species loss, declines through by-catch, and fishing down food webs threaten the food security of hundreds of millions of poor people globally.

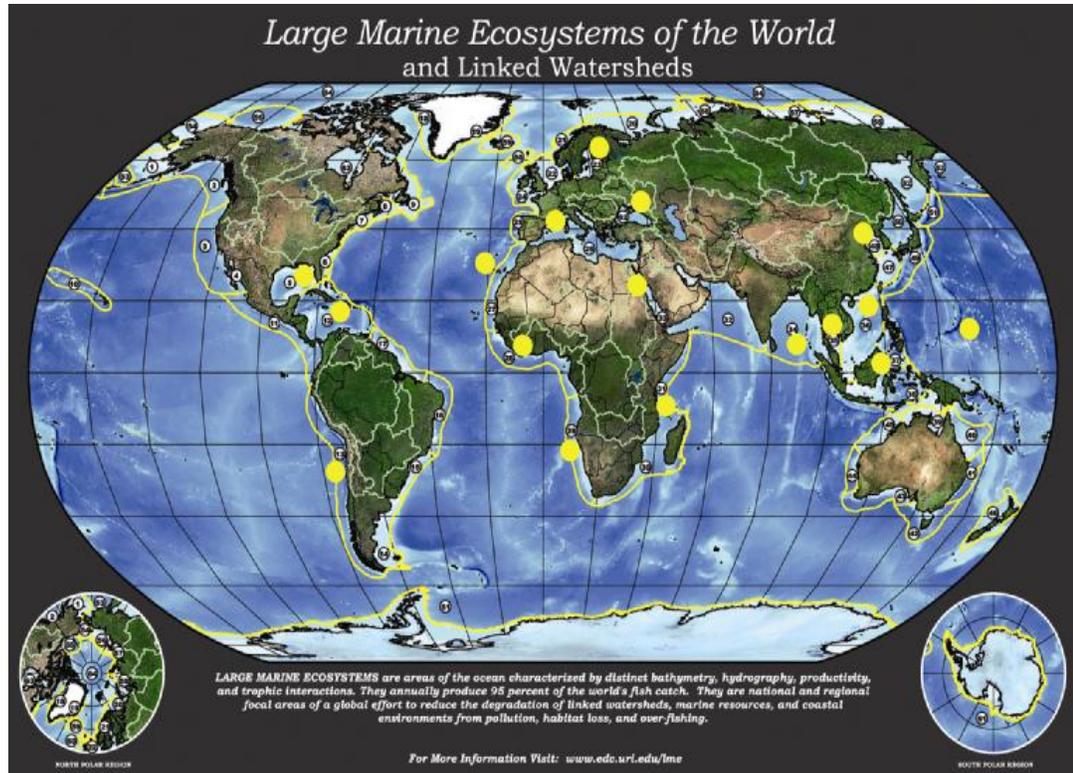
Overfishing and lack of regulation are also costing governments valuable foreign exchange revenues. A World Bank analysis released in 2008 revealed that poor management, inefficiencies, pirate fisheries, and overfishing cost governments a conservative \$US 50 billion in lost revenues annually (World Bank, 2008). The cumulative loss in the last 3 decades has been over \$US 2 trillion. If a loss of 1 percent of this was associated with a terrorist attack, the world would be outraged. With global trade in fisheries at \$70 billion, and all coastal and marine ecosystem goods and services valued at US\$ 12.6 trillion annually (Costanza et al. 2001), it is time to act to reverse this depletion.

### **The GEF Support for Country-driven Action at Different Scales**

The GEF-supported LME projects are piloting and testing ways to implement integrated management of oceans, coasts, estuaries, and freshwater basins through an ecosystem-based approach. Since 1995, the Global Environment Facility has provided substantial funding to support country-driven projects for introducing multi-sector, ecosystem-based assessment and management practices for LMEs located around the margins of the oceans. At present, 116 developing countries and 16 industrialized countries are partnering in GEF Council approved LME projects. **Figure 1** identifies 16 LME projects and one LME-equivalent (the Warm-water Pool of the Western and Southern Pacific), where countries have requested and received funding for GEF-LME projects.

A five-module indicator approach to the assessment and management of LMEs has proven useful in ecosystem-based projects in the United States and elsewhere (Duda and Sherman, 2003). The modules are adapted to LME conditions through a Transboundary Diagnostic Analysis (TDA) process to identify key issues, and a Strategic Action Program (SAP) development process for the groups of nations or states sharing an LME to remediate the issues.

These processes are critical for integrating science into management in a practical way, and for establishing appropriate governance regimes to change human behavior in different sectors.



**Figure 1.** Global Distribution of Large Marine Ecosystem Projects Funded by the GEF. The yellow dots on the map represent the location of the 16 operational LME projects approved by the GEF Council and with GEF International Waters funding. These are (from left to right and top to bottom): the Caribbean, Gulf of Mexico, Humboldt Current, Baltic Sea, Black Sea, Mediterranean Sea, Canary Current, Guinea Current, Benguela Current, Agulhas and Somali Current, Red Sea, Bay of Bengal, Gulf of Thailand, Yellow Sea, South China Sea, and Sulu Celebes LMEs. Also represented with a yellow dot is a 17<sup>th</sup> project in the Pacific Ocean, the Pacific Warm-Water Pool LME Equivalent.

The SAP translates the shared commitment and vision into action, a process that has proven essential in GEF projects for developing and sustaining partnerships. Countries cooperate in establishing adaptive management structures for monitoring and evaluation and for establishing indicators. This has led countries to adopt their own LME-specific ecosystem targets in response to the Johannesburg Summit, and to establish partnerships with bilateral, multilateral, and UN agencies for better coherence by the development assistance community.

The GEF in support of LMEs also works at other scales, to catalyze integrated coastal management (ICM) at the scale of municipalities, coastal provinces, contributing river basins, and at the community level to promote

sustainable resource use and habitat protection. One example of the provincial and municipal scale of action is the successful GEF-funded and UNDP-supported PEMSEA program with its focus on ICM. Tools similar to those used in LME projects are utilized at a smaller scale to foster the integration, participation, and reforms needed for implementing ICM. ICM programs can have a cascading effect in transforming governance, improving people's awareness of important ecosystem assets and social values, and spurring additional private sector involvement.

GEF also works at the scale of river basins draining to coasts in order to improve water flow regimes and reduce pollution loading. Consistent with the targets of the UNEP Global Programme of Action (GPA) for the protection of the marine environment from land based activities, and with paragraph 33 of the WSSD Program of Implementation, over US\$1 billion has been allocated by GEF to focus on projects related to the GPA and land-based activities. The GEF-supported Hai Basin initiative led by China with World Bank assistance is an example. Another is the large scale GEF-supported Danube and Black Sea Basin Strategic Partnership with UNDP and the World Bank that aligns the World Bank policy with the 15 countries of the Black Sea basin to include pollution reduction reforms, habitat restoration, and pollution reduction investments. The two basin projects create a bridge between land and sea, with GEF combining projects to link the improved management of freshwater basins with coastal zones and large marine ecosystems.

GEF also utilizes support at other appropriate geographic scales for securing valuable habitats for livelihood of communities and food security. Community level work has led to the establishment of fish refugia. First developed in the GEF/UNEP South China Sea and Gulf of Thailand LME projects, the concept for securing habitats builds on community knowledge of fish reproduction and co-management and limits gear and fishing at critical periods of lifecycles to sustain fisheries (Paterson and Pernetta, 2008).

### **The Benguela Current LME Project**

In the mid 1990s, the governments of South Africa, Namibia and Angola requested GEF's assistance for a project focusing on the sustainable management and utilization of living marine resources, the reduction of mining impacts, predicting environmental variability and improving ecosystem forecasting, managing land-based pollution, protecting biological diversity, and strengthening capacity to adapt to fluctuating climatic conditions that threaten fisheries. During a 12-month project development period, the three countries reached consensus on a strategic approach for the project, based on GEF procedures for developing a TDA and SAP, which was signed in 2000 by three ministers from each nation. As the first GEF project to successfully complete this initial work, the BCLME serves as a successful model for other LME projects.

Especially significant were the national dialogues fostered in inter-ministerial committees. They proved to be an important factor in aligning different ministries related to land and water activities to work in an integrated, ecosystem-based fashion.

This early success led to the establishment of the new, ecosystem-based, interim Benguela Current Commission (BCC). The Commission was an illustration of how the political commitment of 3 countries can secure ecosystem sustainability. As a result, a second and final GEF LME project was funded to operationalize the BCC and support negotiations for a legal agreement among the 3 countries to sustain its work (Duda, 2008). The BCC marries the advice of science-based groups with the advice of management institutions to improve decision-making in fisheries, coastal management, mining and energy. With an ever warming and fluctuating marine environment in which the fish stocks move, the science-based advice and forecasting tools can provide sound recommendations to the joint management institutions so that stakeholders at all levels can adapt to fluctuating and changing climate.

### **The Danube/Black Sea Basin under the GPA**

Seventeen countries rely on the Danube River Basin, the Black Sea LME, and its various tributaries for economic, social, and environmental services. These important waters have been degraded by pollution and other human influences, and have been over-fertilized by nitrogen and phosphorus from agricultural, municipal, and industrial sources.

Since 1992, the GEF has supported an array of projects aimed at improving ecosystem quality in the region, designed to bring Danube basin and Black Sea coastal states together in the TDA and SAP process and in national inter-ministry committees. In order to fund the *Strategic Partnership for Nutrient Reduction in the Danube River and Black Sea*, the World Bank, UNDP, and UNEP mobilized more than \$US 450 million in co-financing that supplemented the \$US 100 million from GEF to make policy, legal, and institutional reforms, invest in the agriculture, municipal, and industrial sectors, and restore wetlands to reduce nitrogen pollution in the Black Sea watershed.

The Strategic Partnership of the 17 watershed states, the GEF, the UN agencies, and donors now brings coordinated support and benefits to the Black Sea Basin under the Bucharest and Istanbul Conventions and is taking an adaptive management approach. The GEF International Waters partnership has served as a test of whether a greater and more comprehensive participation of the GEF and a streamlined process for sub-project approvals can leverage significant environmental improvements in a large, damaged, transboundary Large Marine Ecosystem. The approach has proven successful and is now being

replicated to support three emerging partnerships of significant importance to the coastal and marine environment.

**Table 1** provides a list of nutrient reduction investment projects supported by the GEF. The mid-term report on the Danube River and Black Sea partnership shows progress and recovery in the Black Sea environment (GEF, 2005).

<u>Country and Sector Operation</u>	<u>Status</u>	<u>\$ Mil</u>
<b>Romania: Agricultural Pollution Control</b>	<b>Completed</b>	<b>5.15</b>
<b>Bulgaria : Wetland Restoration and Pollution Reduction</b>	<b>Approved</b>	<b>7.50</b>
<b>Moldova: Agricultural Pollution Control</b>	<b>Approved</b>	<b>4.95</b>
<b>Turkey: Anatolia Watershed Rehabilitation</b>	<b>Approved</b>	<b>7.00</b>
<b>Serbia and Montenegro: Reduction of Enterprise Nutrient Discharges</b>	<b>Approved</b>	<b>9.02</b>
<b>Bosnia-Herzegovina : Water Quality Protection</b>	<b>Approved</b>	<b>4.25</b>
<b>Hungary: Reduction of Nutrient Discharges</b>	<b>Approved</b>	<b>12.50</b>
<b>Moldova: Wastewater, Environmental Infrastructure</b>	<b>Approved</b>	<b>4.56</b>
<b>Romania: Integrated Agriculture Nutrient Pollution Control</b>	<b>Approved</b>	<b>5.00</b>
<b>Croatia: Agricultural Pollution Control</b>	<b>Approved</b>	<b>4.81</b>
<b>Ukraine: Odessa Wastewater Treatment (est. Jan 2009)</b>	<b>Pending</b>	<b>5.00</b>

**Table 1.** List of Nutrient Reduction Projects Funded by GEF in the Danube/ Black Sea Basin Partnership Investment Fund

### **GEF Support for the LME Movement**

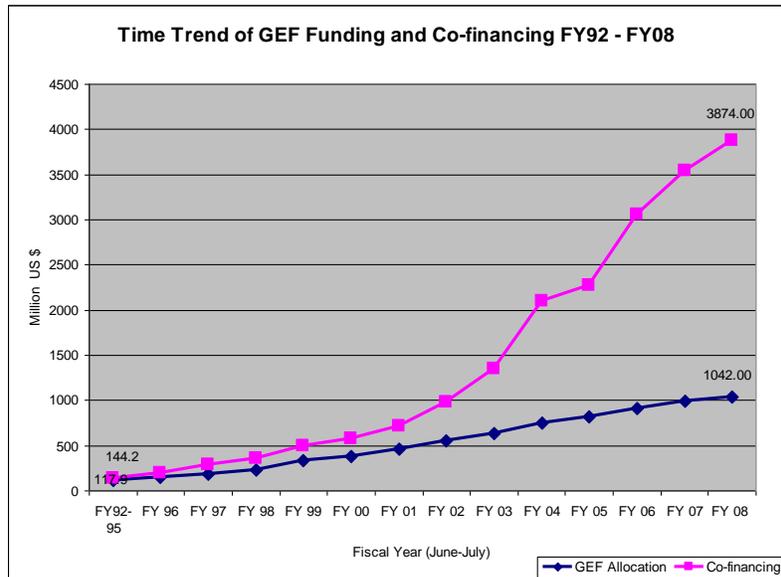
The GEF supported, ecosystem-based approach is centered on LMEs and participative processes that build political and stakeholder commitment and action. The inter-ministerial buy-in sets the stage for the world community to invest in capacity building and technology. This collective response to global conventions and other instruments can be achieved in a practical manner. The iterative framework for adaptive management can address new issues or unexpected ecological developments.

Ultimately, each nation must find a way to balance capture fisheries, fishmeal fisheries, aquaculture, and biodiversity, with support for the poor and public, regulatory, and program reforms. Removing subsidies, improving global trade policies, establishing safety nets for poor coastal communities, undertaking management reforms, securing property rights, and conserving marine biodiversity through protected areas and limited use zones are all part of the reform picture to reverse the decline of marine fisheries. GEF LME projects show that a place-based approach helps focus the attention of competing nations and competing ministries on the multiple benefits to be derived from global instruments. Instead of establishing competing programs and duplicating efforts, LME projects address priority transboundary issues in an integrated manner—in accordance with UNCLOS, Chapter 17 of Agenda 21, the Jakarta Mandate of the CBD, the GPA, and under the Climate Change Treaty.

Whether undertaken in LMEs or at an equivalent LME level as in the GEF/UNDP/IMO PEMSEA project, the place-based participatory process generates political solutions and commitments to reverse marine degradation and resource depletion. Sound science informs policy-making when an ecosystem-based approach to management can be developed and stakeholders can be engaged. The place-based participatory process engages governments and stakeholders to understand what is needed for implementing integrated management and capacity building. Marine science has all too often remained confined to the science community and has not embraced policy-making.

The shared commitment and vision embodied in the SAP has proven essential in GEF-LME projects for developing partnerships that can sustain commitment to action. Participating countries cooperate in establishing adaptive management structures and indicators. The countries in adopting their own LME-specific ecosystem targets collectively track their progress on-the-ground and enact conventions or protocols to existing treaties to express their joint commitment. Establishing partnerships with bilateral, multilateral, and UN agencies is resulting in a realignment of priorities toward WSSD targets, as these agencies assist countries in making policy, legal, and institutional reforms in different economic sectors.

For 2006-2010, GEF will likely commit over US \$230 million in grants to LME-related projects, which will likely leverage over US \$1 billion in co-financing. As of October 2008, GEF funding support has achieved 75% of that expectation, with funding expected in 9 LME projects. The investment will ramp up further support. **Figure 2** illustrates the time-trend of GEF support in the International Waters focal area. Co-financing barely kept up with GEF funding in the early years; more recently, countries in entering the investment phase of the 10-year project span have received co-financing that greatly exceeds the GEF allocations. This shows the commitment of countries and the leverage that these GEF-LME projects can produce when governments realize the critical actions that need to be undertaken.



**Figure 2.** Time trend of GEF funding and co-financing for International Waters Focal Area Projects in FY92-FY08.

GEF intends to deepen its support for LME projects and focus more attention on management and learning in support of the LME network. The UNDP, UNEP, NOAA, UNESCO-IOC and GEF have worked together in the past to enhance capacity building, learning, cooperation, and the sharing of experiences among the GEF LME projects through the GEF IV:LEARN Program. Institutes and governments with marine-related programs in the Northern and South need to be linked together if real progress is to be made in reversing coastal and marine degradation. There is an important future place for GEF assistance in linking these leading institutions together, given the multiple causes of degradation in coastal and marine ecosystems and the progress that can be made with minimal, cost-effective improvements.

### **The LME Movement: the Imperative for Securing Livelihoods**

The multi-country, participatory process developed by the GEF and utilized by at least 132 sovereign nations in 20 LMEs over the last decade has built trust and confidence to work jointly on shared areas of sea space, coasts and adjacent freshwater basins to reverse natural resource depletion and degradation. The activities generated are being balanced among multiple nations, sectors, and communities. This is just a start.

The warming planet and warming oceans, changes in currents and salinity decreases are placing coastal economies and communities at great risk. Ocean

security is at stake. With more than 200 million people around the world depending on fisheries for food security, with international trade of marine fisheries valued at \$70 billion annually, and \$50 billion lost every year in rents to governments, it is easy to see why ocean security must be placed higher on the political agenda if poverty reduction goals, security and stability are to be achieved. GEF embraced this challenge in the early 1990s by being the first agency operating in the developing world to use ecosystem-based approaches to managing LMEs. The pragmatic, science-based, joint management approach piloted by the GEF funded Benguela Current LME project and other GEF LME projects must succeed—nothing less than the future of our coastal oceans and coastal communities is at stake.

Planning is underway for a GEF-LME Community of Practice among LME projects and related GEF coastal and marine initiatives in the GEF portfolio, to focus cost-effective support on learning and experience-sharing. Networking, learning, capacity building, personnel exchange and dialogue are needed to accelerate global progress so that the livelihood of coastal communities, food sources, and drinking water supplies can be secured as communities make the transition to sustainability. Responsibility for action still rests with governments from the South and the North: in removing trade barriers, providing assistance, fully funding the GEF so it may play its role, carrying out needed reforms to sustain coastal and marine systems, and reducing vulnerability to a changing climate. Annual goods and services from coasts and oceans are valued at \$12.6 trillion. The international trade in fisheries products is valued at \$70 billion annually, and \$50 billion is lost annually through lack of enforcement and because of corruption. These figures alone are enough to push us forward.

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