

Accounting for Economic Activities in Large Marine Ecosystems and Regional Seas



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UNEP/RSP and NOAA LME Partnership

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Foreword

A healthy marine and coastal environment is essential for human well-being and for sustainable development. It provides many different functions linked to public health, food security, transport, recreation, and other economic and social benefits. The annual sales value of the goods and services derived from the marine and coastal environment has been estimated in the tens of billions of dollars. Some 80% of the pollution load in the oceans originates from land-based activities, adversely affecting productive areas of the environment. A thorough evaluation of the net economic value of goods and services that the oceans and coasts provide remains a challenge.

This report has been commissioned within the framework of the RS/LME partnership, which was developed to link the coastal and marine activities of the global Regional Seas Programmes (RS) coordinated by UNEP with the Large Marine Ecosystem (LME) approach. The joint initiative contributes to one of the global Regional Seas Strategic Directions, which calls to “develop and promote a common vision and integrated management, based on ecosystem approaches, of priorities and concerns related to the coastal and marine environment and its resources in Regional Seas Conventions and Action Plans, introducing amongst others proactive, creative and innovative partnerships and networks and effective communication strategies.”

The report compiles estimates of activity levels of the relevant marine sectors (e.g fisheries, aquaculture, tourism, shipping, oil etc.) of countries bordering the world’s LMEs and RSs. The authors develop an index approach to assess the extent of the human uses of regional ocean areas and regional socio-economic development. Two case studies have been included exploring the scale of economic rents (revenues minus costs) and direct output impacts (gross revenues) that could be a source of sustainable financing for conserving and managing regional marine environments. It is targeted towards government policy- and decision-makers with the aim of highlighting the potential value of goods and services provided by the marine and coastal environment.

Positive actions are required on the part of governments and the civil society to manage and sustain the marine and coastal environment and its resources. The Regional Seas Programmes provide a policy framework for the regional implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). The RS/LME partnership and the GEF/LME approach to ecosystem-based management are crucial elements in the implementation of the GPA. In addressing ecosystem approaches among other JPOI targets, the 2nd Intergovernmental Review Meeting of the GPA (IGR2) provides a step forward in international action for realistically assessing the value of goods and services provided by the marine and coastal environment and for increasing ownership and commitment in allocating sufficient resources for its conservation.

This report will be disseminated at the highest policy level to enhance the understanding of the value of marine resources and to increase financial commitment and ownership in managing and conserving the marine and coastal environment in the long-term.

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USER GUIDE

Our purpose in producing this report is to provide a decision-making tool for international financial and natural resource management institutions to use in setting priorities for allocating financial resources toward the sustainable management of Large Marine Ecosystems (LMEs) located within Regional Seas areas.

We develop an index that is a measure of the intensity of marine activities in these regions. We compare this marine activity index (MAI) with an index of socioeconomic development, the UNDP's human development index (HDI), across ocean regions. This comparison identifies regions that may be capable of achieving on their own the sustainable development of their regional marine environment and those that are less likely to do so. The latter may be candidates for international financial or management assistance. We make no predictions or normative judgments about whether these regions will or should manage for sustainability.

Our index approach is meant as a tool for setting priorities, given limited international financial and management resources for assisting regions in moving toward sustainable development. The tool should be used in conjunction with additional information, such as data and expertise on environmental conditions and ecological status. Knowledge of the national and international legal institutions and the political context of each region is obviously important as well.

The index approach is based on actual industrial and recreational activities occurring at the national level in coastal nations. We compile publicly available worldwide data on marine activities occurring in those coastal nations comprising large marine ecosystems (LMEs) and Regional Seas. Data on marine activities include fish landings, aquaculture production, shipbuilding orders, cargo traffic, merchant fleet size, oil production, oil rig counts, and tourism arrivals.

These data can be used to compare activity levels in physical units (quantities, not prices) for each individual marine activity across the coastal nations of the world. This kind of comparison is valuable for gauging relative levels of economic activity by marine industrial sector among coastal nations.

Without additional analysis or information, however, these data cannot be used to compare the **combinations** of marine activities occurring in each nation across the coastal nations of the world. Further, data in this format can provide only a very crude understanding of activity levels for **regional aggregates** of all or portions of nations that are included in LMEs and Regional Seas.

One method of creating a single metric that combines all marine activities is to express the levels of each activity in units of a common monetary measure. There are several possible monetary measures. The preferred monetary metric is "total economic value" (TEV). TEV measures the **net benefits** (the sum of consumer and producer surpluses) that derive from a nation's marine activities.

A readily available compilation of TEVs for marine activities in coastal nations does not exist. TEVs would need to be calculated on activity- and location-specific bases, and there are few studies that do so. In some cases, estimates of the producer surplus component of TEV can be compiled. In particular, resource rents, or those producer surpluses (revenues in excess of all costs) attributable to the exploitation of marine resources, may be estimated. If captured by governments, resource rents provide a potential basis for financing the sustainable

management of the marine environment. We present an application of the resource rent approach in the case of the Benguela Current LME in Annex I.

A second possible monetary metric is known as “direct output impact” (DOI). DOI measures the **gross revenues** or **sales** that derive from a nation’s marine activities. As the product of price times quantity, DOI represents the sum of benefits to producers (producer surplus) **and** the costs of production. Because it includes costs and excludes benefits to consumers, DOI is not an accurate measure of economic value. DOI can be conceptualized as an upper bound on producer surplus, which again is only one component of TEV.

Despite the fact that a DOI metric can be readily calculated for some activities (*e.g.*, offshore oil and natural gas production), it is problematic to calculate such an index for other activities (*e.g.*, tourism visits). As in the case of the resource rent approach, a DOI metric would need to be calculated on an activity- and location-specific basis. We present an application of the DOI approach in the case of the Yellow Sea LME in Annex II.

An alternative method for creating a single metric is the index approach that we present in this report. The marine activity index (MAI) does not rely upon monetary values; it relies instead on physical values. Each physical value is converted into an index that ranges from zero to one. These indexes have no dimension; in other words, they are not measured in specific units of any kind. Decision makers must make assumptions about the weights that each activity is to be accorded when compiling an aggregate MAI from its individual activities. Further assumptions must be made to combine each nation’s MAI with others’ from the relevant region to produce a regional MAI. We present and rank regional MAIs for both LMEs and Regional Seas.

Finally, we compare regional MAIs with a socio-economic index. This comparison is presented in tables and in figures in our report. We classify ocean regions by low, moderate, and high levels of both marine activity and socio-economic development. We expect that nations involved in ocean regions characterized by high levels of socio-economic development and moderate to high levels of marine activity are probably capable of sustainably managing their marine environments themselves. Alternatively, we expect that nations involved in ocean regions characterized by low to moderate levels of socio-economic development and moderate to high levels of marine activity may need assistance in sustainable management. Special opportunities may exist to place ocean regions that embody low levels of both socio-economic development and marine activity on a sustainable path.

The framework developed in our study serves as a first step toward more detailed analyses of socio-economic issues associated with LMEs and UNEP Regional Seas. Thus, the index approach is a useful first cut at prioritizing regions that deserve closer attention as candidates for international financial assistance to promote sustainable marine environmental management. An important next step is to carry out detailed case studies designed to improve our understanding of any specific ocean region, including its environmental circumstances, its ecological conditions, its economic value, and the political feasibility of organizing a collaboration among nations participating in the region to share the costs of sustainable management.

EXECUTIVE SUMMARY

Sixty-four large marine ecosystems (LMEs) have been identified around the world's coastal margins. The LMEs are located within the boundaries of 18 Regional Seas. The large ecological zones of these LMEs are economically important, producing 95 percent of the world's marine fisheries biomass, among other goods and services valued at many trillions of dollars each year. Counterbalancing these economic benefits is the fact that pollution is more severe in LMEs than in other ocean areas, and some LME coastal habitats are among the most seriously degraded on earth. It is in the world's interest to ensure that those marine resources and habitats at risk are protected and managed sustainably for both present and future generations.

A pragmatic approach to the sustainable management of LMEs is now being implemented by nations in Africa, Asia, Latin America, and Eastern Europe, supported by \$650 million in start-up funds from the Global Environment Facility (GEF) and other international donors. This approach uses suites of environmental indicators to assess the physical, biological, and human forcings on ecosystem productivity, fish and fisheries, pollution and ecosystem health, economic development, and governance.

Over the past several years, a rapidly growing literature on LME studies has emerged, focused mostly on issues of biological conservation; the sources, transport

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