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Latin American and Caribbean regional perspective on Ecosystem Based Management (EBM) of Large Marine Ecosystems goods and services



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ABSTRACT

Large Marine Ecosystems located around the margins of the continents provide a countless number of goods and services that sustain and fulfill human life and activities: seafood; habitats; energy sources; nutrient cycling and primary production; weather and climate regulation; coastal protection; water detoxification; sediments trapping; and cultural and economic services, among others. Of 66 Large Marine Ecosystems, ten LMEs are located along the coasts of Latin America – California Current, Gulf of California, Gulf of Mexico, Pacific Central American Coastal, Caribbean Sea, Humboldt Current, Patagonian Shelf, South Brazil Shelf, East Brazil Shelf and North Brazil Shelf. Each one possesses different characteristics that make it unique and essential for local populations. Unfortunately, these Large Marine Ecosystems are threatened by several factors such as coastal population growth, pollution, overexploitation and climate change, but most of all poor governance practice. The concept of Ecosystem Based Management aims to consider ecosystems health and importance in all aspects of the recovery and sustainability of LME goods and services. This chapter introduces a general description of the Large Marine Ecosystem approach to sustainable development of coastal ocean resources, presents the concept of Ecosystem Based Management, describes some goods and services provided by Large Marine Ecosystems and draws a picture of each Latin American Large Marine Ecosystem.

1. Introduction

Why do oceans matter?

Oceans mean different things for different people: 'life, passion or wonderment; vastly important; a very important source of life and energy; an incredible source of food and amazing source of biodiversity; it's wild, exciting, terrifying and exhilarating; means a lot to me, if something happens I will not have the fun I'm used to; it's a livelihood, it's been there for generations and hopefully will be there for generations to come.' (Adapted from video excerpt, [Plymouth Marine Laboratory, 2011](#))

Oceans cover around three quarters of the earth's surface and contain more than 90% of living species on our planet. Only recently we have begun to put attention to the valuable ocean that provides food for billions of people worldwide, the vast majority of life on earth, maritime transport carrying more than 90% of world trade, renewable energies such as wind, wave and tidal power and a reservoir for fuels such as oil.

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Nevertheless, the ocean is not indestructible, and our footprint is very large. Overfishing, toxic pollution, invasive species, nutrient over-enrichment, habitat degradation and destruction, biodiversity loss, dependence of a growing global population on its goods and services, and coastal development, all threaten the sustainability of coastal ocean ecosystems (Vanderweerd in [Sherman and McGovern, 2011](#)). Ocean acidification is also a growing threat that may be more important than warming, pollution and overfishing ([Roberts, 2011](#)).

The ocean is our life support system, it connects every one of us, you can think of the ocean as the blue heart of this planet, but then we look after that heart and we know how we are damaging it and it needs intensive care. We know that scientists, politicians and stakeholders are talking to each other, but it isn't just up to them, each and every one of us can make the difference, even if the difference might be small, after all individual small drops of sea water can make up the vast ocean. (Adapted from video excerpt, [Plymouth Marine Laboratory, 2011](#))

To identify areas of the oceans for conservation purposes, a global system of Large Marine Ecosystems (LMEs) has been developed ([Sherman and Alexander, 1986](#) and [Sherman et al., 2005](#)).

2. General description of Large Marine Ecosystems (LMEs)

Large Marine Ecosystems (LMEs) are regions of ocean space encompassing coastal areas from river basins and estuaries to the seaward boundaries of continental shelves and the outer margins of the world's major current systems. They are relatively large regions characterized by distinct bathymetry, hydrography, productivity and trophically-dependent populations ([Sherman, 1993](#); [Duda and Sherman, 2002](#)). The world's coastal areas encompass 66 LMEs, which are coastal areas of 200,000 km² or greater ([IOC-UNESCO and UNEP, 2016](#)).

The Global Environment Facility initiated the Transboundary Waters Assessment Program (TWAP) in 2009, recognizing the value of the LMEs and other transboundary water systems, their continued degradation, the fragmented approach to their management and the need for better prioritization. The objective was to undertake global assessments of the five transboundary water systems – Ground Water, Lakes, Rivers, Large Marine Ecosystems, and the Open Ocean.

The LMEs' assessment is an indicator-based global and comparative baseline assessment of the 66 LMEs and is focused on five modules with suites of indicators: (i) productivity, (ii) fish and fisheries, (iii) pollution and ecosystem health, (iv) socioeconomics and (v) governance ([Sherman and McGovern, 2011](#)). Why is such a program important? Here are some considerations ([IOC-UNESCO and UNEP, 2016](#)):

- Several millions of people around the world depend on the natural living resources of LMEs for food, income, recreation and other less tangible benefits such as spirituality and inspiration.
- Changes in natural global processes, human use of natural resources in LMEs, and activities on land and in the sea put LME health and productivity at risk, compromising the sustainability of the natural benefits LMEs provide.
- The wide range of human and natural stressors experienced by marine and coastal ecosystems lead to interacting and cumulative environmental impacts, with potentially severe consequences for humans.
- Policy responses include protecting marine habitats, improving LME governance, and integrating consideration of the natural benefits humans derive from marine ecosystems into policy.
- Management of LMEs can be considerably ameliorated by improving the quality of data and information by assessments at sub-LME scales.

The main objective of the system of LMEs is to provide an ecological framework for enabling ecosystem based management beginning with a collaborative approach to management of resources within ecologically-bounded transnational LME domains.

3. Concept of ecosystem based management (EBM)

Actually, we don't have a single and unique definition for Ecosystem Based Management (also known as Ecosystem Approach or Holistic Management Approach). The concept of EBM has been used by scientists managing fisheries that consider Ecosystem Based Fisheries Management (EBFM) as "a new direction for fishery management, essentially reversing the order of management priorities to start with the ecosystem rather than the target species to sustain healthy marine ecosystems and the fisheries they support" ([Pikitch et al., 2004](#)). EBFM should avoid degradation of the ecosystem, minimize the risk of irreversible change to natural assemblages of species and ecosystems, obtain and maintain long-term socioeconomic benefits without compromising the ecosystem and generate knowledge of ecosystem processes sufficient to understand the likely consequences of human actions.

Rachel D. [Long et al. \(2015\)](#) specify that a typical definition of EBM "acknowledges the complexity and interspecies relationships within ecological systems", but many definitions also account for social and governance objectives.

We can register other definitions like the ones from the Commission for the Conservation of Antarctic Marine Living Resources ([CCAMLR, 2001](#)), describing the ecosystem approach as "management that takes into account all the delicate and complex relationships between organisms (of all sizes) and physical processes that constitute the Antarctic marine ecosystem."

For the [Convention on Biological Diversity \(2016\)](#), the ecosystem approach is "a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way."

Communications Partnership for Science and the Sea ([COMPASS, 2005](#)) defines ecosystem based management for the oceans as:

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