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The Large Marine Ecosystem approach: Application of an integrated, modular strategy in projects supported by the Global Environment Facility ☆

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ABSTRACT

This paper describes the utility and application of a methodology for monitoring, assessing and managing Large Marine Ecosystems (LMEs) that has been applied in projects receiving financial assistance from the Global Environment Facility (GEF) over the last two decades. In particular, the paper focuses on practical integration of the methodology, known as the Large Marine Ecosystem approach (or simply LME approach), into diagnostic and strategic planning documents required by the GEF on collaborative projects to restore and manage LMEs. Examples from several successful LME projects are provided to highlight how this methodology has been adapted and integrated by countries into LME strategic programs and project operation. This paper demonstrates that the LME approach not only provides a useful framework for holistic, ecosystem-based assessment and management of transboundary marine ecosystems but also complements GEF guidance and requirements for monitoring and evaluation on projects in its International Waters focal area.

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1. Introduction

The Large Marine Ecosystem approach is a methodology for monitoring, assessing and sustainably managing marine resources whereby information reflecting the changing health and condition of a marine ecosystem's environmental and human elements guides the adoption of policy and management actions through an adaptive approach. At the core of the approach are five focal areas, referred to as modules, which provide a framework for monitoring, evaluating and integrating the environmental and human dimensions of the ecosystem. They are: (i) productivity; (ii) fish and fisheries; (iii) pollution and ecosystem health; (iv) socioeconomics; and (v) governance (Sherman and Duda, 1999). Section 3 of this paper examines the scope of the five modules, the first three of which are based upon natural sciences while the last two are based upon social sciences and human dimensions of ecosystems.

Integral to the Large Marine Ecosystem approach, developed by Kenneth Sherman of the U.S. National Oceanic and Atmospheric Administration (NOAA), is its focus on ecologically-defined, rather than politically-defined, regions of the ocean (Sherman, 1999). The regions, known as Large Marine Ecosystems (LMEs), were first delineated in 1984 by Dr. Sherman and Lewis Alexander of the University of Rhode Island, based upon four distinct characteristics: bathymetry, hydrography, productivity and trophically dependent populations (Sherman and Alexander, 1986). As the name suggests, LMEs are relatively large, on the order of 200,000 km^2 or greater, and generally extend from coastal areas to the seaward boundaries of continental shelves and the outer margins of major coastal currents (Duda and Sherman, 2002). At present, 64 LMEs are recognized globally.

LMEs include the most productive regions of the ocean and account for approximately 80% of the world's marine fisheries catch (Sherman et al., 2009). By one measure, they contribute an estimated US$12.6 trillion (1997 dollars) in market and non-market ecosystem goods and services annually to the global economy (Costanza et al., 1997). Owing to their location along the coastal margins of continents, LMEs are also heavily impacted by development, overfishing, nutrient over-enrichment, invasive species and pollution. Sixty-nine percent of all LMEs occupy the territorial waters and exclusive economic zones (EEZs) of two or more countries. As a result, problems of environmental degradation affecting LMEs frequently extend across jurisdictional boundaries and cannot effectively be addressed without multinational collaboration. To that end, the Global Environment Facility (GEF), an international financial mechanism, has provided financial assistance since the mid-1990s to collaborative, country-driven projects to restore degraded LMEs (Hume and Duda, 2012). In this context, the LME approach has been utilized by countries on GEF-assisted projects in developing comprehensive programs to assess, restore and manage marine resources. As described in Sections 5 and 6 below, the LME approach provides a useful and appropriate framework for developing diagnostics and strategic programs on GEF-supported LME projects and for monitoring and assessing the changing conditions of LMEs during implementation of agreed multi-country programs.

2. The shift to ecosystem-based management

The LME approach supports what is known as “ecosystem-based management,” also commonly referred to as “the ecosystem approach” to marine resources management. As described by Jane Lubchenco, NOAA Administrator, ecosystem-based management represents a shift from a highly focused, single species or short-term sectoral approach to a more comprehensive, longer-term, place-based approach (Lubchenco, 1994). Underlying this approach is the recognition that long-term use and enjoyment of marine resources require the maintenance of healthy and intact ecosystems. In practice, this entails consideration of the cumulative impacts of multiple uses and sectors on ecosystem functioning, and the complex interactions between different ecosystem components, which in turn necessitates intersectoral cooperation, planning and management based upon sound science.

The ecosystem approach has emerged in the last three decades as the favored paradigm for managing human activities that utilize or impact living resources, both terrestrial and marine. The first global convention to adopt the ecosystem approach was the 1980 Convention for the

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