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Improving fisheries co-management through ecosystem-based spatial management: The Galapagos Marine Reserve

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ABSTRACT

Ecosystem-based spatial management (EBSM) can provide a mechanism for a strategic and integrated plan-based approach to managing human activities in the marine environment. An EBSM approach was adopted in the Galapagos Marine Reserve (GMR) at the end of the 1990s with the adoption of marine zoning. The latter was created under a co-management regime to reduce conflicts among users arising over incompatible demands for ocean space, to mitigate the impact of human activities on sensitive ecological areas, and to contribute to the sustainability of Galapagos fisheries. Unfortunately, the promise of an EBSM approach in the GMR has not been matched by effectiveness in practice, in achieving the established management objectives. The aim of this paper is to evaluate the shortcomings and lessons learned related to planning, implementation, monitoring, evaluation and adaptation of the GMR's marine zoning scheme, and to provide recommendations to better realize the potential value of the EBSM approach to co-managing the shellfisheries of the GMR.

1. Introduction

A key problem with conventional approaches to fisheries management has been its focus on production from a single target species. That single-species preoccupation has made this management approach inadequate because it did not consider the impact of fishing on non-target species and marine habitats, and neglected the human factors (social, economic, cultural and institutional) that affect fisheries management [1–3]. Recognition of the significant direct and collateral impacts that fishing imposes on marine ecosystems has encouraged adoption of ecosystem-based management (EBM, also referred to as the ecosystem approach to fisheries, EAF). This integrated approach considers the entire ecosystem, including humans, and has as a main goal maintaining an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need [4,5].

Even though EBM has been recognized as a potentially powerful approach for rebuilding depleted marine fish populations and for restoring the ecosystems of which they are part [6], several challenges to its wide implementation must be addressed. One of the most important is a lack of clear, concrete and comprehensive guidelines that outline in a practical manner how EBM can be implemented in marine areas [7].

The EBM approach interacts closely with that of integrated management, which focuses on managing the multiple human uses of spatially-designated areas, and which is typically viewed as incorporating EBM as a fundamental component [8]. The idea is that since marine ecosystems are places, and human activities affecting them (fisheries, tourism, marine transport, oil and gas exploitation, etc.) occur within those places, ecosystem-based management must be inherently place-based [9]. Hence, combining ideas of ecosystem-based management and spatial management, the integrated approach of ecosystem-based spatial management, EBSM, has emerged over the last decade as a way to apply EBM in coastal and marine environments [10].

The main aim of EBSM (which in the marine context of this paper includes marine spatial planning, MSP) is to provide a mechanism for a strategic and integrated plan-based approach to manage current and potentially conflicting uses, to reduce the cumulative effects of human activities, to optimize sustainable socio-economic development and to deliver protection to biologically and ecologically sensitive marine areas [10]. This management approach has been successfully used in several marine areas of the world, with Australia's Great Barrier Reef Marine Park (GBRMP) considered a particularly successful example of its implementation [11,12].

An EBSM approach was adopted in the Galapagos Marine Reserve (GMR, Fig. 1) at the end of the 1990s. This occurred in

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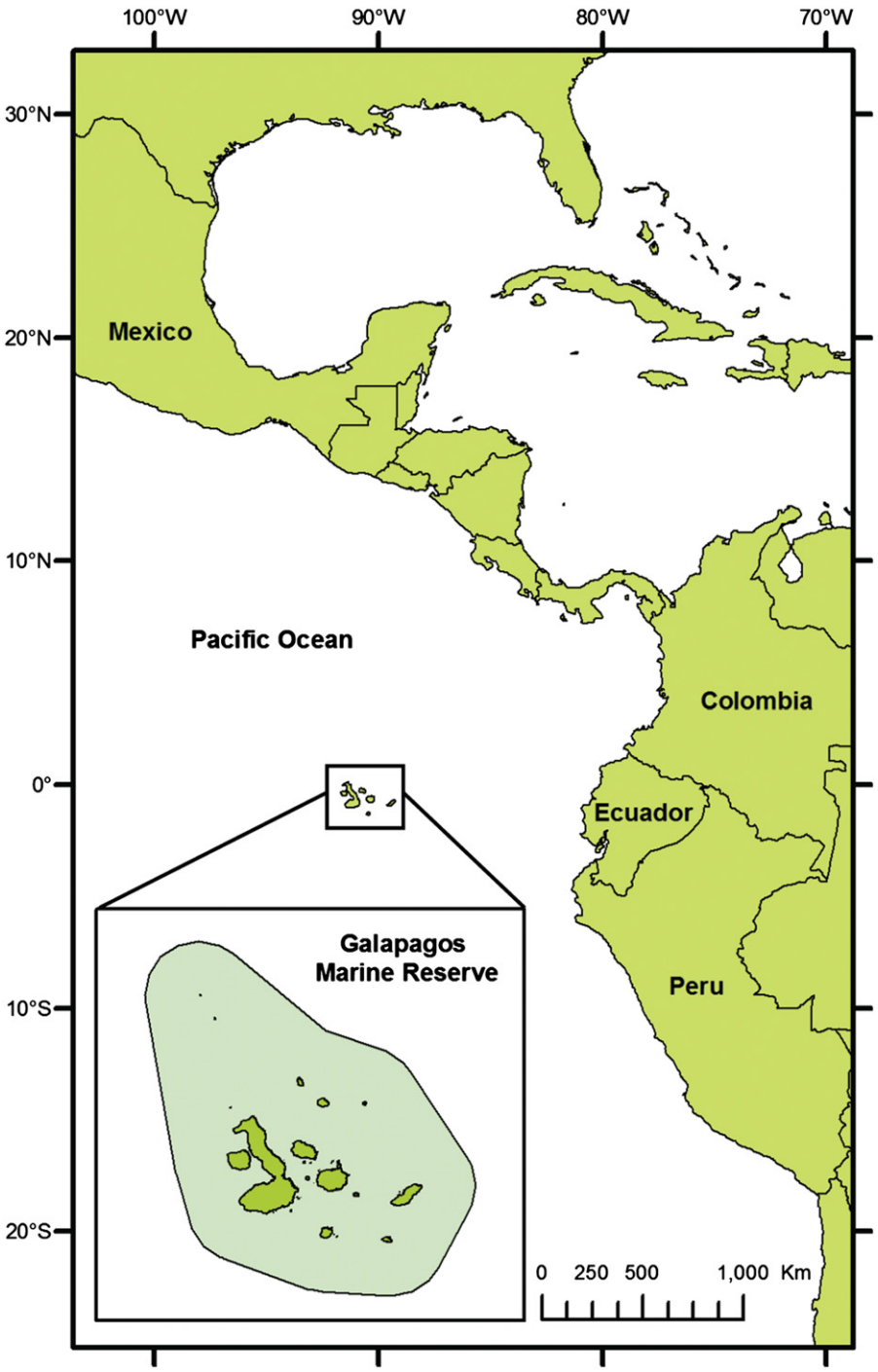

Fig. 1. Location of the Galapagos Marine Reserve.

order to deal with several ecological, socioeconomic and political challenges strongly related to the rapid growth of fishing and tourism activity in the archipelago [13,14]. The cornerstone for the application of an EBSM approach in the GMR was the adoption of marine zoning, a spatially explicit management tool that was designed, planned and implemented by a consensus-based participatory process between 1997 and 2006 [15,16].

The GMR's marine zoning was brought forward, under a co-management regime, in order to [17]: (1) contribute to the sustainability of Galapagos fisheries by providing potential areas from which fishery stocks can recover and spillover over fishing ground; (2) reduce conflicts among users as a result of incompatible demands for ocean space (e.g., tourism vs. fishing; small-scale vs. large-scale fishing); and (3) mitigate the impact of uses on sensitive ecological areas of the archipelago, which are critical to the functioning of marine ecosystems and the conservation of threatened species [18].

This paper examines the effectiveness of GMR's marine zoning approach, as an illustration of EBSM, based on a set of evaluation criteria widely seen as essential to successful marine management, including EBSM: effective planning, monitoring, implementation, evaluation and adaptation [11,12]. The paper explores the extent to which GMR's marine zoning has achieved these five basic components since its inception, and on the other hand, highlights shortcomings in implementation of EBSM that limit its potential to improve GMR's shellfisheries co-management.