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Governance and socioeconomics of the Gulf of California Large Marine Ecosystem

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ABSTRACT

The Gulf of California Large Marine Ecosystem (GoC-LME) is a long and narrow semi-enclosed body of water located entirely in Mexican territory, with a marine surface between 250,000 and 300,000 km^2 surrounded by 5 coastal states and 35 coastal municipalities. The population growth and economic development in the region are among the most dynamic in the country. Since 2006 the GoC-LME has been the subject of a regional ecological planning program. The approach followed in the planning process was a top-bottom one with a clear political will, a strong public participation process supported by scientific and technical information. The obtained results, methodologies, good practices and participatory processes were considered as a guide for other planning processes in Mexico. In general terms, the governance level in the GoC-LME is good at the federal scale but several challenges remain at state and county scales where the market pressures are higher and the human and economic capacities lower.

1. Introduction

Large Marine Ecosystems (LMEs) are relatively large areas of ocean spaces (>200,000 km^2), adjacent to the continents where primary productivity is higher than in open oceans. LMEs produce 80% of the world´s marine fisheries catches but they suffer the impact of pollution, habitat degradation, overfishing, biodiversity losses and climate change effects (Sherman et al., 2009; Duda, 2010; Sherman and Adams, 2010).

To improve the management of LME goods and services a particular ecosystem-based methodology has been proposed and applied in 66 LMEs around the world (Sherman, 1994; Duda and Sherman, 2002; Sherman and Hempel, 2008). This approach - the LME concept - provides a framework for understanding threats, status and trends in oceans, analyzing five fundamental dimensions or modules: productivity, pollution and ecosystem health, fish and fisheries, socioeconomics and governance (Sherman et al., 2005; IOC-UNESCO, 2011, NOAA-LME).

This paper focuses on the socioeconomics and governance of the Gulf of California Large Marine Ecosystem (GoC-LME). Some companion papers in this volume describe in detail the remaining modules of GoC-LME and no additional general information will be presented to avoid duplication.

In LMEs, governance addresses the fundamental goals, regulatory elements and the institutional processes and structures that are the basis for planning and decision-making, through three mechanisms by which the processes of governance are expressed: the
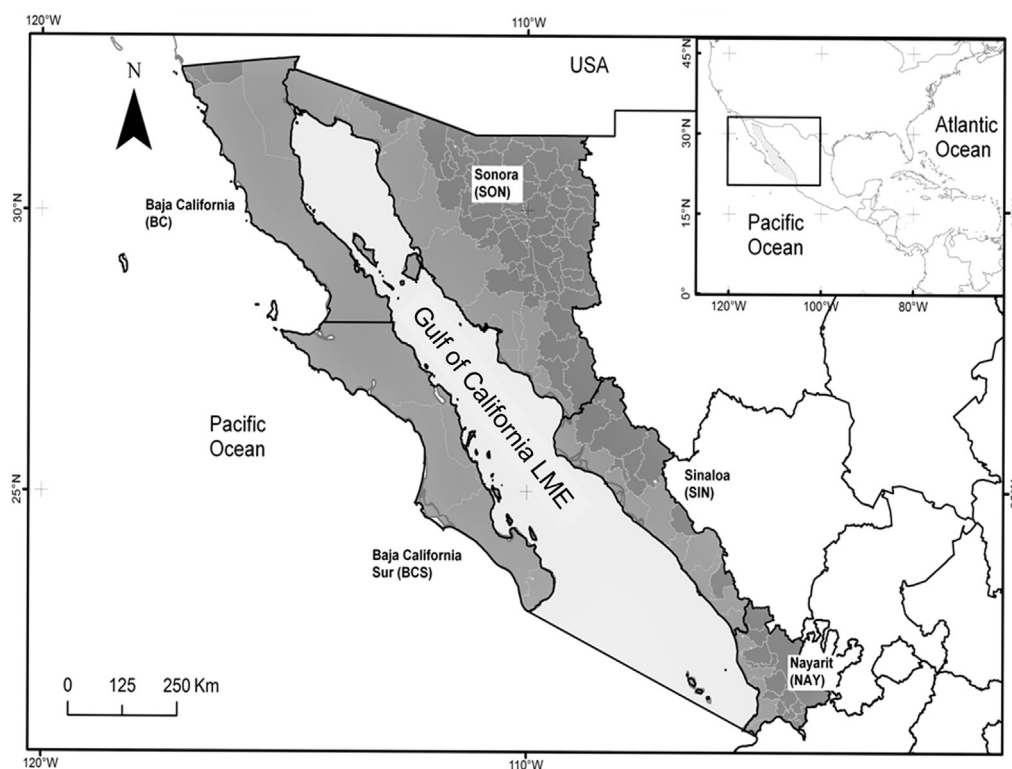

Fig. 1. Gulf of California Large Marine Ecosystem. In gray the surrounding coastal states and in light gray the coastal municipalities.

marketplace; the government; and the institutions and arrangements of civil society (Olsen et al., 2006). Since the early stages of LMEs conception and development, regulatory, institutional and decision-making aspects have been considered as a managerial element for coastal and marine ecosystems (Sherman, 1994), and actually, governance as well as socioeconomics are fundamental modules of analyses for LMEs.

The Gulf of California Large Marine Ecosystem (also known as the Sea of Cortes) is located entirely in Mexican territory but is influenced by the LME California Current. The GoC-LME is a long (1350 or 1714 km according with its natural or administrative planning limits) and narrow (226 km average width) semi-enclosed LME, with a surface marine area between 250,000 and 300,000 km^2 and maximum depths of 3000–3500 m, surrounded by the Baja California Peninsula and the Northwest section of Mexico´s mainland (see Fig. 1). There are 898 islands, islets and cays of all sizes within the GoC-LME (Heileman, 2008), 97 of them large enough to be represented at nautical chart scale (ISLA, A.C., 2016) and two of them the largest in Mexico: Tiburón and Ángel de la Guarda islands (1200 and 931 km^2 respectively).

The coastal states around the GoC-LME represent 21% of Mexico´s continental surface, the marine surface corresponds to 9.2% of the national total and the coastline length 52%. According to Brusca (2010) and Wehncke et al. (2015), GoC-LME is one of the most diverse and productive seas in the world, with an extraordinary environmental heterogeneity. The flora contains 30% of endemic species, 11 strictly endemic species of birds; 4900 known invertebrate species; 911 marine fish species (10% endemic); 271 known reef fish species (19% endemic); and 36 marine mammal species, one of them "vaquita marina" a highly endemic cetacean specie.

2. GoC-LME socioeconomic profile

Administratively the GoC-LME is surrounded by five coastal states: Baja California (BC), Baja California Sur (BCS), Sonora (SON), Sinaloa (SIN) and Nayarit (NAY), and 35 coastal counties (municipalities) with limits connected to the Gulf of California; one of them Ensenada in Baja California, the largest of the country (53,000 km^2). In 2010 the total population in GoC-LME surrounding states was 10.3 million inhabitants (9.1% of the national population) of which, 6.7 million (65% of the GoC-LME population) were living in coastal municipalities surrounded by the GoC-LME. Excluding Nayarit State, most of the inhabitants live in urban cities (population ≥15,000) with percentages ranging from 84.6% (in Baja California) to 59.2% (in Sinaloa). For the period 2000–2010, the population growth rate in four states was above the national mean (1.4): Baja California (2.3), Baja California Sur (4.0), Sonora (1.8) and Nayarit (1.6); only Sinaloa (0.9) presents a low value due to internal migration, possibly related with security issues or work opportunities. Table 1 presents the historical evolution of the total population in the GoC-LME region.

Not only the total population, but also the geographic distribution of the population inside the coastal counties, the population density and the cities' location along the coastal area of the GoC-LME are important factors to prevent deterioration and preserve its