1.2.7 The Socioeconomic Environment of the Gulf of Mexico

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1.2.7.1 Abstract

Within the Gulf of Mexico, region socioeconomic science has been characterized by fits and starts. This trajectory has limited the understanding of how Gulf societies are responding to social, economic, and environmental change. BOEM has addressed some of these gaps through targeted research efforts. Still, significant opportunities exist for developing a socioeconomic research program that can enhance biophysical efforts and demonstrate the societal impact of current work.

1.2.7.2 Introduction

Socioeconomic science within the GOM region has been characterized by fits and starts leaving many gaps to fill and opportunities for researchers. Take for example the 1992 National Research Council report on social and economic studies undertaken by the Minerals Management Service (MMS). While the Gulf accounted for the majority of the MMS's oil and gas revenue, "the panel found no documentation of a systematic program for identifying and analyzing important socioeconomic issues for study in the Gulf of Mexico Region" (NRC 1992). Only 11 studies had been conducted in a 15-year period at the time of the panel's report. The MMS—now BOEM—changed course and, in the 16 years since the report, has conducted 87 studies in the Gulf (BOEM 2017).

The effort and funding around socioeconomic science in the Gulf still falls far behind the bio-geo-physical sciences. A number of organizations and individuals have called for specific actions. The 2013 "Gulf of Mexico Research Plan" (MASG 2013) highlights two particular needs:

- Examine the public's perception of sea-level change by evaluating hazard-related communications and changes in behavior in relation to hazard mitigation and identify approaches that local governments are employing to adapt to sea-level change.
- Determine how storm surge, subsidence, and sea-level change affects ecosystems, native coastal habitat, wetland composition, saltwater intrusion, coastal flooding, cultures, agriculture, and human health.

The National Academies of Science, Engineering, and Medicine's Gulf Research Program has set goals that specifically address human and community needs (NRC 2014):

- Improve understanding of the connections between human health and the environment to support the development of healthy and resilient Gulf communities; and,
- Advance understanding of the Gulf of Mexico region as a dynamic system with complex, interconnecting human and environmental systems, functions, and processes to inform the protection and restoration of ecosystem services.

Similar needs are identified for Mexico. Ramos et al. (2015) noted the lack of communication between municipalities and higher institutions (e.g., researchers, community organizations) that needs to be addressed and that many of the indicators for climate change monitoring are vague, hard to measure, and don't connect with people in the community. Soares and Sandoval-Ayala (2016) suggest that:

- More research is needed on long-term impact of climate change on low resilience and marginalized communities.

- There is a need to examine how communities think about climate change, keeping in mind that it is not always the immediate (hurricane) changes but the gradual change that is important.
- There needs to be the development of techniques to reach "into" the communities and have more informed decision making at the local level (not just high-level stakeholders).

1.2.7.3 Socioeconomics Characteristics of "One Gulf"

This section relies exclusively on some of the analyses described in "Gulf 360: State of the Gulf of Mexico" (Yoskowitz et al. 2013), unless otherwise noted, to effectively convey the socioeconomic connections between the three countries in the Gulf region and between people and coastal and marine resources.

Geopolitical divisions and governmental structures deal only with portions of the landscape, fractions of a watershed, and with pieces of a habitat, but muc,h of our economic activity and ecology goes beyond borders. This section will focus only on a few of the important human dimensions of our coasts: political boundaries and population, fisheries extraction, transportation, and protected areas.

There are three key elements that define this geographic "space" called the GOM: the land-ocean interaction, the human activities that occur, the shape of the landscape/seascape, and the natural resources that feed the needs of the population. As was aptly said in *Gulf at a Glance: A Second Glance* (NOS 2011) about the US portion of the Gulf, which is relevant for the entire region:

> The well-being of the Gulf of Mexico region depends on a suite of benefits that flow from healthy coasts: food, clean water, jobs, recreation, and protection from hurricanes. But the ability of the Gulf coast to deliver these benefits is being eroded by the extensive environmental alterations we have made to the region's coastal ecosystems. In some cases, these benefits are further eroded by changes in climate. Whatever the cause, these changes threaten to compromise the health and economic well-being of our coastal communities . . .

1.2.7.3.1 Political Boundaries and Population

The administrative divisions of Mexico and the United States are states, while in Cuba its administrative divisions are designated as provinces. In the United States, the states are further divided into counties, or in the case of Louisiana, parishes. In Mexico, the states are divided into *municipios* or municipalities, which are equivalent to counties.

The number of municipalities in the Mexican GOM coastal region is extremely dense compared to the United States and Cuba. For example, along the GOM coastline, Mexico has four times more municipalities than the United States has counties and parishes even though the land area in Mexico is only about 20% larger (442,000 km^2 for Mexico and 370,000 km^2 for the United States).

Pockets of intense density and areas that are sparsely populated characterize GOM coastal population distribution, and there are more than 50 million people living along the coastal margins within the region (Figure 21). In Mexico, states such as Veracruz report population densities of 106 per square kilometer, whereas densities in Tamaulipas and Quintana Roo are 41 and 30 individuals per square kilometer respectively (INEGI 2015). In Cuba, the population density in Pinar del Río province is very low compared to provinces like Havana. The coastal municipalities of María La Gorda have a total population of 588,272 inhabitants (ONEI 2016). Densities in Havana province exceed 2,900 individuals per square kilometer.

Figure 21. Population density by counties and municipalities.
From Yoskowitz et al. (2013).

In the United States, the coastal population of the five Gulf States is projected to increase from 44.2 million in 1995 to 61.4 million in 2025. This increase will significantly affect the natural infrastructure of the GOM and potentially stress already overburdened governance structures charged with meeting the demands of a growing population while also assuring the health and productivity of the region.

According to the "Human Development Report" (2011), at country level, Cuba is ranked fifty-first and Mexico is ranked fifty-eight; both are within the "High Human Development" group. The United States is ranked fourth and is within the "Very High Human Development" group. However, the GOM is not a homogeneous region and inside each state and country it is possible to find varying levels of quality of life including educational attainment (Figure 22).

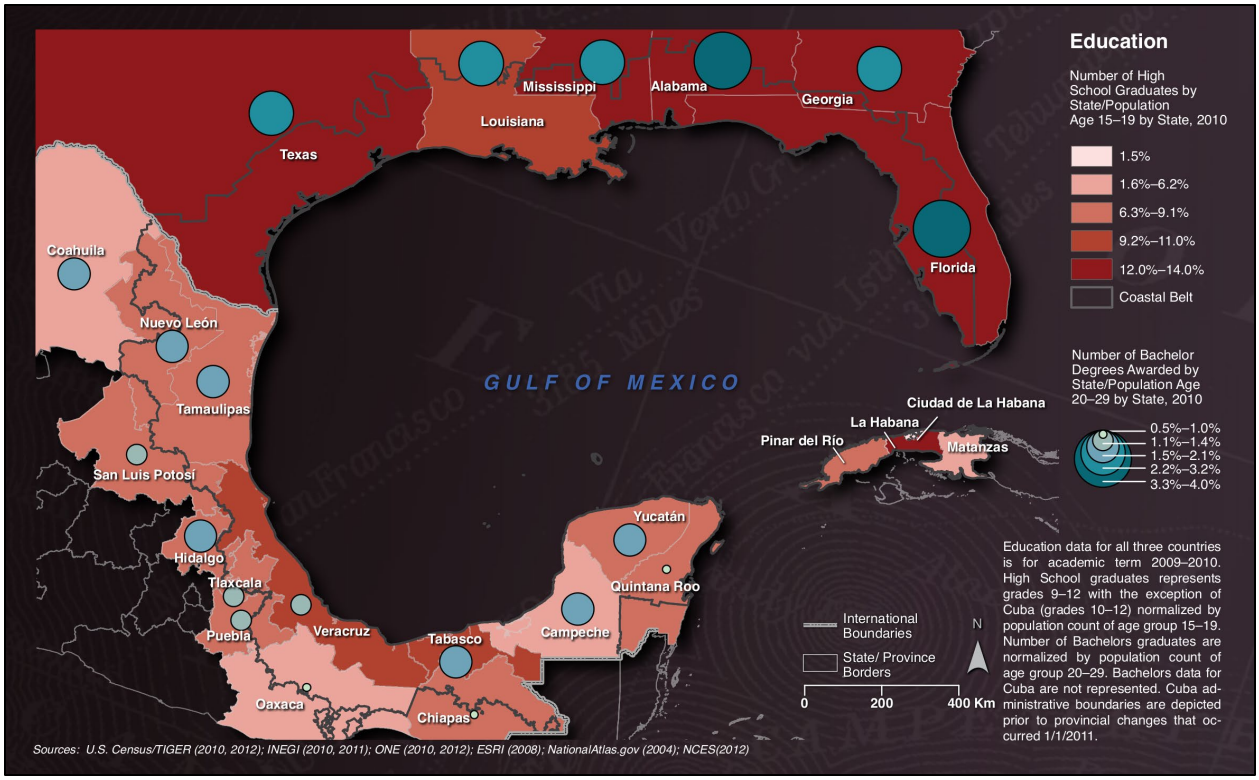

Figure 22. Educational attainment statistics.
From Yoskowitz et al. (2013).

1.2.7.3.2 Fisheries

Commercial, artisanal, and subsistence fishing are an important part of life in the GOM (Figure 23). From the coast of Louisiana to the lagoons of Veracruz and the mangroves of Cuba, the attachment to the sea for sustenance is universal. In the United States, red snapper (*Lutjanus campechanus*) is one of the most commercially and recreationally valuable fisheries, with reported landings of 8,598 thousand pounds in 2015. Mullets (family Mugillidae) are also harvested by commercial and recreational sectors showing captures exceeding 11,600 thousand pounds in the same year (NMFS 2015). In Cuba, lobsters (*Panulirus argus*) provide the largest contribution to commercial landings, followed by thread herring (*Opisthonema oglinum*), mangrove oyster (*Crassostrea rhizophorae*), and lane snapper (*Lutjanus synagris*) (Baisre 2017).

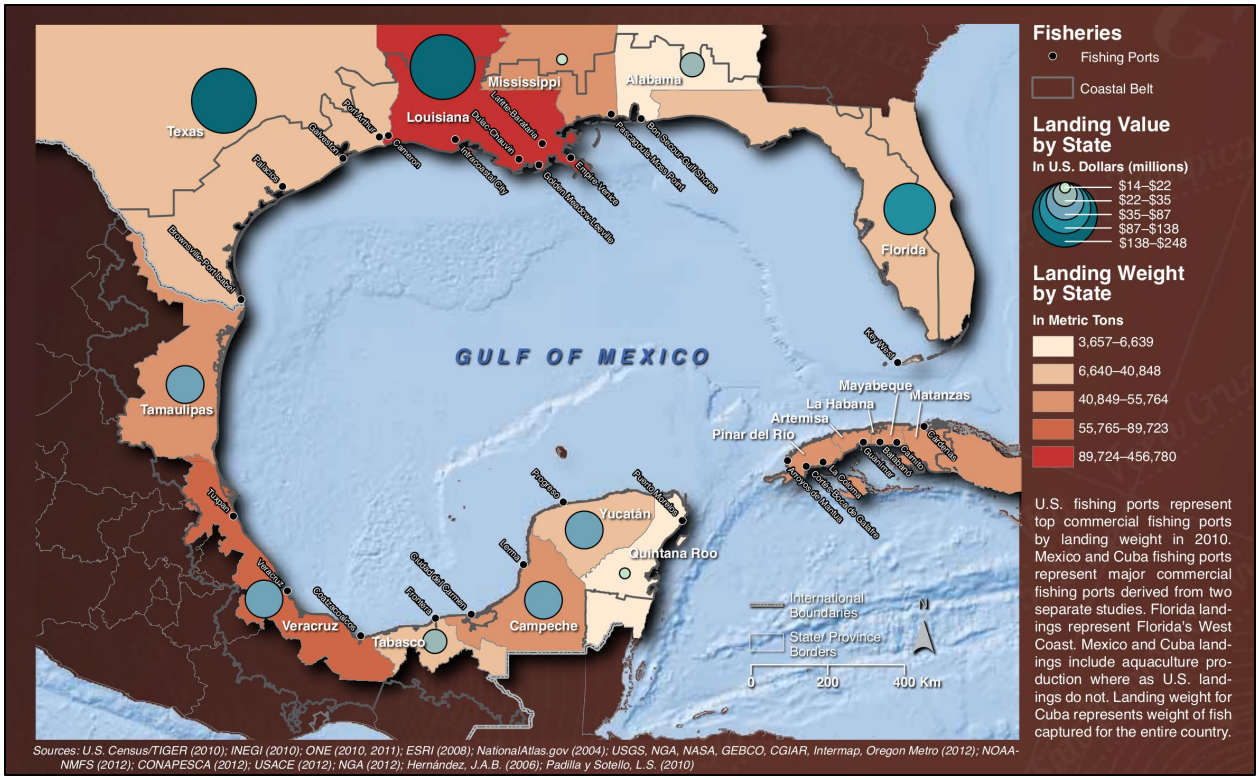

Figure 23. Fisheries landings by state.
From Yoskowitz et al. (2013).

Yet, this important resource can be compromised and there exists a delicate balance between human activities that can influence the health of a system and human needs of that system. The fishery closures that took place after the DWH oil spill are one example of the interconnectedness of the economic interests and the ecosystem. At its maximum, the closed area to fishing occupied 37% of US GOM federal waters on 2 June 2010.

1.2.7.3.3 Transportation

The movement of people and commerce between the three countries in the region is an important element (Figure 24). For example, the north and south crossings of noncommercial vehicles in South Texas was 29.9 million in 2011. Commercial crossings of trucks and rail boxcars in the same region in 2011 amounted to 5.4 million. In 2015, Cuba imported $176 million USD in products—mainly agricultural—from the United States and $355 million USD in goods and services from Mexico (OEC 2018).

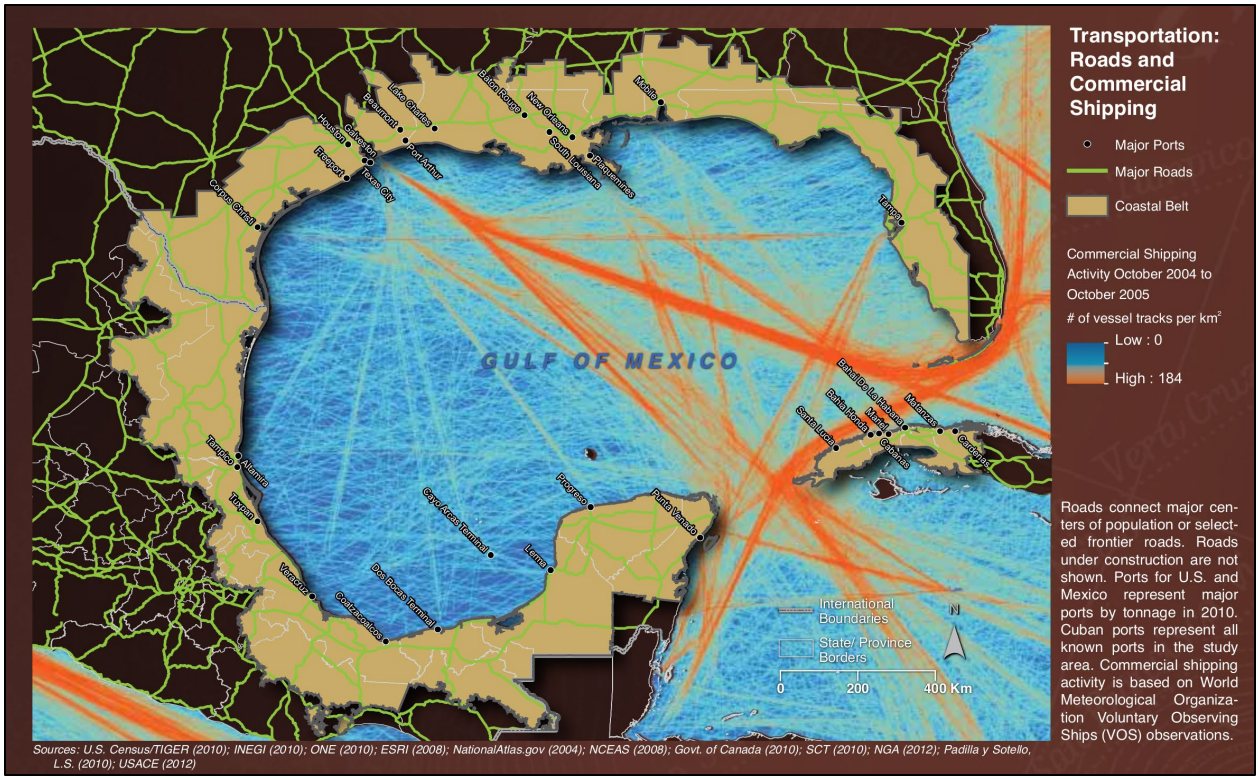

Figure 24. Transportation routes in the GOM region.
From Yoskowitz et al. (2013).

1.2.7.3.4 Protected Areas

Figure 25 represents designated terrestrial and MPAs on the international, national, and local levels as of September 2012 for United States–Mexico and 2010 for Cuba. MPAs in the United States that have been designated as gear-restricted areas, fishery closures, and reef fish stressed areas by the National Marine Fisheries Service have been excluded. Most Cuban protected areas on the local level are not shown, due to a lack of data availability.

Figure 25. Protected areas in the GOM region.
From Yoskowitz et al. (2013).

Much progress has been made in connecting protected areas amongst the three nations. In November of 2015, the United States and Cuba signed a memorandum of understanding to develop and coordinate a number of activities, including research and best management practices, between US sanctuaries (Flower Garden Banks and Florida Keys) and parks (Dry Tortugas and Biscayne) and Guanahacabibes National Park and offshore Bank of San Antonio in Cuba.

1.2.7.4 Conclusion

The GOM region is rich in cultural, biophysical, and socioeconomic diversity, and there is a lot that is similar between the bordering nations. Understanding the social and economic implications of natural resource management decisions for the GOM is critical in all three countries. Though the United States has begun to address its shortcomings on socioeconomic research and Cuba and Mexico are calling for similar efforts, there is still an opportunity to consider a regional approach to address some of the gaps. Specifically:

1. Conduct a regional (GOM) assessment of the "Coastal and Ocean Economy" to benchmark the impact and exposure of these sectors (fishing, tourism, oil and gas, shipping, etc.).
2. Identify commonalities in coastal and ocean resource management policy between the three countries as a starting place for regional coordination of resource management.
3. Develop a protocol to share socioeconomic data, information, and policies between the three countries that can potentially improve natural resource management.

1.2.7.5 References

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