

# The interactions between coastal communities and ocean resources

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## Introduction

Much of the focus on coastal communities has been on vulnerability to extreme events and long term climate change. Underpinning the response of these communities to such events is the relationship between coastal communities and ocean resources.

The ocean is the source of a number of resources, including food, energy, water, transportation, and recreation. These resources have served as the basis for the livelihoods of coastal communities throughout history. The economic, cultural, social, and environmental health of coastal communities is strongly connected to their relationships to ocean resources. In this whitepaper we suggest that research can support the development of symbiotic relationships, thus serving to develop long term sustainability.

## Proposal

The interactions between coastal communities and ocean resources would be most profitably studied in large interdisciplinary teams that cover topics from end to end of the system. Here we present two specific examples from two of the categories, energy and food.

**Energy.** The design of offshore wind turbines, the siting of offshore wind farms, and the development of the supply chain will have a large impact on employment in coastal communities. Coastal communities will be impacted by offshore wind farms in a number of ways, including potential impacts on tourism and fishing, the construction and ongoing operation of infrastructure such as transmission lines and staging ports, and impacts on local wildlife. All of these impacts could be positive or negative. For example, studies have shown that some tourists are particularly interested in having a view of large offshore wind turbines, while others might be put off. Of central importance to economically disadvantaged coastal communities is the development of high quality employment opportunities.

The degree to which offshore wind energy provides employment opportunities depends on a myriad of factors and stakeholders, from engineering design, to regulations, to education and the supply chain. For example, the design of wind turbines and their support structures impact whether they are assembled, and even partially fabricated, at the port. In this design, many more jobs are opened up locally. As another example, if wind farms are sited in relation to economically disadvantaged communities, especially communities who have made their living from the sea, it may improve access to jobs; especially if combined with workforce training and STEM training. The degree to which turbines are

manufactured and assembled locally has a significant impact on the economic and cultural health of coastal communities, especially communities that have been adversely impacted by changes in fisheries and loss of manufacturing. On the other hand, it is important to respect all community's sense of connection with the coastline and the sea when citing wind farms and infrastructure.

An interesting example is New Bedford, MA. The city is most famous for its whaling, which was the pre-eminent industry until the late 1800s when petroleum replaced whale oil. The city was successful with textile and other manufacturing until the mid to late 1900s when these industries moved out. Fishing is a large part of the identity of the city, and it is still the highest valued port in the US. Nevertheless, the fishing industry has been devastated by overfishing and resulting regulations, and fishermen make up less than 1% of the employed. The city has high unemployment and a median household income that is barely half that for the whole of Massachusetts.

Offshore wind provides great hope for this community. Massachusetts invested in the New Bedford Marine Commerce Terminal. This is consistent with the culture of whaling and fishing – But, it is only promise so far, there are a number of possible roadblocks that may prevent the city fully participating in this industry, including the engineering designs for the wind turbines, the degree to which the international developers focus on a local supply chain and local employment, and local challenges in workforce development. On the other hand, the development of this industry could lead to other improvements in the economy. For example, the design of the wind turbine sub-structures can form thriving eco-systems in the form of artificial reefs, which may improve fishing.

**Food.** The resident knowledge and experience of the fishing community may be successfully reinvested into coastal and offshore aquaculture. Sustainable aquaculture with polytrophic components can provide positive feedback to the oceans in the form of reduced erosion and support to thriving aquatic life. Seaweed forests can help improve nutrient quality and promote seafloor stability. In addition, by mitigating some storm surge effects, coastal erosion may be progressively reduced. By proper siting of the aquaculture farms based on nutrient supply and current patterns, the detritus of a farm may be suitably disbursed and complement the seabed nutrient levels for crustaceans and shell fish growth. Communities can develop long term livelihoods by developing and maintaining their farms, while providing employment opportunities through the marine industry supply chain (e.g. supply boats and service industry). Fresh produce can serve the protein needs of the local community for smaller scale operations. If produced in larger quantities, the communities can become suppliers to the food industry nationally or even internationally.

A successful research program in this area should consider community perceptions to aquaculture and find ways to balance the social and community elements with the science of developing food in a symbiotic relationship with the oceans.

### Impact

Incorporating the impacts of ocean resources – both positive and negative – on coastal communities, is a move toward equity. Careful design of the research can engage the community from the beginning, in understanding the unique challenges and opportunities, and in the design of solutions and opportunities.