2025 UMERC Socioeconomic Abstract

Linkages between environmental, social, and economic effects of marine renewable energy

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The abundance of marine renewable energy (MRE) resources worldwide provides opportunities for communities to gain energy independence, reduce overall electricity costs, and produce reliable energy. Harnessing the power of waves, tides, rivers, ocean currents, and temperature and salinity gradients, MRE technologies are uniquely suited for coastal, island, and remote areas. While MRE can provide benefits such as economic development and employment opportunities, uncertainties and concerns about potential adverse socioeconomic and environmental effects continue to slow permitting and deployment timelines. The effects of MRE can be interdependent, with environmental effects driving certain social or economic effects. For example, the presence of an MRE device may displace a commercially valuable species, leading to reductions in fisheries revenue and employment. To enhance benefits and limit adverse effects, the linkages between environmental, social, and economic effects of MRE need to be carefully considered. The OES-Environmental initiative, a collaboration of 16 member nations, works to increase understanding on environmental effects of MRE by identifying and addressing key knowledge gaps, providing recommendations, and creating resources tailored to MRE regulators, advisors, developers, researchers, and stakeholders. Recently, OES-Environmental produced the 2024 State of the Science Report, which included a chapter reviewing the social and economic effects of MRE. This chapter provides an overview of the socioeconomic effects of MRE organized by groups that may be affected by MRE, methods for measuring these effects, case studies of MRE socioeconomic planning and stakeholder engagement efforts, and recommendations for improving understanding and aiding responsible MRE development. The key affected groups identified in the chapter are fisheries, aquaculture, other maritime industries (e.g., supply chains, ports), workforce, Indigenous and coastal communities, tourism, conservation, and energy-end users. Building on this effort, OES-Environmental worked with country representatives from member nations to review the current state of knowledge and identify linkages, or connections, between social and economic effects and environmental effects of MRE. These linkages were evaluated based on affected groups, and contextual factors such as off-grid applications and deployments in tropical regions. Environmental effects that can lead to social and economic effects were identified to include harm to fished populations, changes to ecosystems or food webs, changes in water flow or quality, displacement of key species, and changes in habitat. These environmental linkages can affect fisheries, conservation, tourism, coastal communities, and workforce. A majority of socioeconomic effects discussed in the literature resulted from an environmental linkage, and each linkage led to effects across multiple affected groups. The findings indicate a need for further research on the specific MRE effects for these groups at all scales of development.

This poster will provide an overview of OES-Environmental's research to assess social and economic effects of MRE in relation to environmental effects. It will highlight key findings and knowledge gaps from the literature and provide recommendations to support the responsible development of MRE while considering social and economic effects.