

NORTHEAST SEA GRANT CONSORTIUM RESEARCH PROJECTS: 2010–2014

Decision-support for the economic analysis of trade-offs in coastal and marine spatial planning for the U.S. Northeast region.

Porter Hoagland, WHOI Marine Policy Center

2012–2014 | managed by Woods Hole Sea Grant

This research projects aims to develop a model that will assess tradeoffs, using regional-scale scenarios, to identify and characterize comparisons of social welfare gains or losses, or other tradeoffs, from marine spatial planning choices. Economic qualifiers such as sales of goods and services, employment income, jobs, personal expenditures, taxes, and prices of goods and services, for instance, can be used to evaluate choices made during marine spatial planning efforts. Employment of the model, through Choice–Outcome scenario outputs, will help decision-makers plan for economic sustainability in a more informed manner. The primary audience for model use is the Northeast Regional Ocean Council (NROC), but the model would have broader application in state-level ocean zoning or planning. Case studies used to develop the model would use wind energy development scenarios in Maine and Rhode Island, and a groundfish management scenario lining nearshore and offshore fisheries habitats.

Outreach has consisted of engagement with stakeholders, including the U.S. Navy, Deepwater Wind, and Northeast Regional Planning Body through meetings and/or actual collaboration in project activities. NROC has been a major stakeholder throughout the project. Investigators have given presentations at a variety of professional meetings, as well as to local stakeholder groups such as the Massachusetts Office of Coastal Zone Management. They have published several peer-reviewed papers, with several, more in preparation. ■

Buy out or build back? A comparative assessment of approaches to employing public funding to vulnerable coastal properties in the Northeastern United States.

Porter Hoagland, WHOI Marine Policy Center

Di Jin, and Hauke Kite-Powell, Woods Hole Oceanographic Institution

John Duff, University of Massachusetts-Boston

2014–2016 | managed by Woods Hole Sea Grant

The foundation of this work—a decision-support model—derives from earlier Sea Grant-funded regional research, scaling decision-making from regional to local. This project examines the possible utility of buy-outs as a mechanism for mitigating loss of, and damage, to coastal properties resulting from sea-level rise and increased storminess. A model is developed to help local municipalities and state agencies assess Choice–Outcome scenarios regarding buy-out or build-back (or new build) actions. The model will weigh existing zoning and condemnation laws, as well as “takings” opportunities, against buy-out options, and allow users to economically evaluate, over the long-term, best use of disaster funding—build-back or buy-out? Given a local, and often unique, set of legal frameworks, the model will assist in making choices regarding federal disaster fund allocations.

Outreach has consisted of presentations at public forums, such as local meetings and state or federal agency hearings, and to professional societies such as The Coastal Society, Coastal Education & Research Foundation, etc., and several peer reviewed publications. The investigators intend to connect findings to members via StormSmartConnect (Stormsmart.org), and will merge results, where practical and applicable, with those of previous Sea Grant funded regional research on development of a decision-support economic model.

Progress Report: Met with MA CZM officials to review draft coastal erosion report relative to findings of their research project. Participated in 9 meetings with practitioners and gave 3 public presentations on the research. ■

The governance role of local authorities in marine spatial planning: a legal assessment of prospects and problems.

John Duff, UMass Boston

2012–2014 | managed by MIT Sea Grant

With increased emphasis on Northeast coastal waters as a place of renewable energy development, especially wind power, the roles of local, state, and federal authority will merge. This project seeks to identify the opportunities and challenges that exist, or may come into play, as local, state, and federal entities embark upon managing marine offshore resources in an ecosystem-based fashion. Outputs of the research will provide the information needed by management authorities at all scales to effectively assess each other's roles and authorities, and use that information to find efficient and effective ways to work together.

Outreach plans include delivering research results via existing outreach conducted (by Duff) with local, state, and national resource management agencies; professional and academic organizations; and Sea Grant education, outreach, and advisory channels. Information will be made available to all Sea Grant programs via web-based GIS representations. Professional journals and web accessible reports will be used as well.

Progress Report: Findings have been shared with stakeholders in study states and at two Sea Grant sponsored events (MIT Sea Grant Social Science Research Symposium April 2013, and Maine Beaches Conference July 2013), a 2012 Marine Spatial Planning conference in Portland, ME, and the National Council for Science and Environment in Washington, DC, in January 2013. A Frequently Asked Questions and a poster have also been completed. ■

Climate change adaptation and ecosystem service resilience in Northeast coastal communities: quantifying economic values and tradeoffs for regional decision support.

Robert Johnston, Clark University

2012–2014 | managed by MIT Sea Grant

Impacts of changing climate, particularly threats posed by sea-level rise and increased storminess, are realities for coastal communities. Ecosystem-based management approaches to coastal hazards mitigation can preserve ecosystem services and associated benefits not accounted for in traditional engineering approaches. This research and engagement project assesses the vulnerability of Northeast coastal communities to hazards from a changing climate and evaluates how communities can best adapt to these vulnerabilities. The project develops an economic valuation component that builds on biophysical and other data in the Coastal Resilience modeling and visualization tool (coastalresilience.org). The project quantifies the benefits realized by communities under alternative adaptation scenarios, with particular attention to choices between hard and nature-based adaptation. Economic values are estimated using survey-based choice experiments that quantify values and tradeoffs for ecosystem services and other natural/socioeconomic outcomes, revealed through households' voting choices over adaptation alternatives for their town. Results reveal economic benefits and tradeoffs of different adaptation scenarios, including those associated with changes in ecosystem services. The project is designed to help communities plan for sea-level rise and coastal storms in a way that is most beneficial to (and supported by) the public, recognizing the tradeoffs that are involved. This requires strategies that protect homes, infrastructure, and public services, but also recognize the benefits provided by threatened natural areas such as beaches, dunes, and marshes. Given appropriate data inputs, the model should be transportable to other areas within the Northeast.

Outreach has been conducted via work in pilot communities, and in partnership with The Nature Conservancy Connecticut Chapter, presenting and working with municipalities in Connecticut. Project outcomes have been developed into communications materials which have been used as the basis for pilot community workshops, and have formed the basis of ongoing dialogues with these communities. Selected project results are available through websites of the George Perkins Marsh Institute at Clark University, and the Nature Conservancy. Multiple presentations at professional conferences have occurred, and additional presentations are planned for the future.

Progress Report: "Choice" surveys have been completed and analyzed for each of the pilot towns, and used as the basis for outreach reports, workshops with communities, and publications presented at academic and practitioner conferences. Additional presentations are planned for the coming year, during and beyond the end of the formal project. ■

Coastal hazards and Northeast housing values: comparative implications for climate change adaptation and community resilience.

Robert Johnston, Clark University

Klaus Moeltner and Christine Blinn, Virginia Polytechnic Institute and State University

Christine Feurt, University of New England

2014–2016 | managed by Woods Hole Sea Grant

This project analyzes property values and tax base in coastal communities in Maine, New Hampshire, Massachusetts, and Connecticut, as affected by coastal hazards and associated adaptation activities. The research evaluates how property values and tax bases respond to coastal flood risk (e.g., being in or out of a flood zone), and actions that might be taken to mitigate that risk (e.g., hardened shorelines or nature-based protection). Project outcomes illustrate how changes in property value and tax base create incentive or disincentive to build or rebuild in risk prone areas, or to property owners undertaking their own actions to adapt to or mitigate risk from hazards. Similarly, the project seeks to illustrate how property value and tax base change when adaptation and mitigation measures are implemented. The model can help show if outcomes were as expected by local community residents and municipal officials, and the implications of this for future planning and adaptation measures. Pilot projects are run in four communities, one each in Maine, New Hampshire, Massachusetts and Connecticut. Differences between pilot communities will help shape possible application of findings at broader regional extent.

Outreach includes direct work with Wells, Great Bay, and Waquoit Bay National Estuarine Research Reserves and their stakeholder communities; engagement directly with pilot community work groups and their colleagues. The results have been incorporated into ongoing projects, including previous Northeast Sea Grant Consortium funded research project. Peer-reviewed and other relevant publications have been produced, and the investigators plan to incorporate, as appropriate, results into the Coastal Resilience project (coastalresilience.org) to reach regional audiences.

Progress Report: Final data are being compiled for regional models that will be estimated for nearly all coastal counties from Connecticut to Maine, addressing the impact of flood risk on property values. Interim, proof-of-concept results have already been presented at multiple academic conferences. Targeted models analyzing the impact of adaptation activities are planned for specific coastal communities, including (first) two communities in Connecticut. Models for other communities will follow. Meetings have been held with stakeholders to discuss the coordination of results with ongoing coastal adaptation decisions and efforts. A no-cost extension will likely be requested to enable us to complete proposed project objectives, given delayed start date of the project. ■

Mitigating risk to whales from lobster fishing

Hauke Kite-Powell, WHOI Marine Policy Center

2010–2012 | managed by Woods Hole Sea Grant

This project used data on right whale movements and key seasons for fishing activity to assess the risk of entanglement of endangered right whales in lobster fishing nets off the coast of Maine. The project objective was to model changes in whale entanglement risk that follow from changes in lobster fishing effort and practice. Results were expected to suggest ways to prevent harm to whales without disrupting fishing activities.

Outreach involved working directly with the Maine Lobstermen's Association, who gathered input from lobstermen, information needed make the model accurate. New England is Aquarium also a partner.

Maine Sea Grant video on Maine Lobstermen's Association portion of project, 2012
[youtube.com/watch?v=mw9kzshND00](https://www.youtube.com/watch?v=mw9kzshND00)

Connecticut Sea Grant article, *Wrack Lines*, Spring/Summer 2012
seagrant.uconn.edu/publications/magazines/wracklines/sprsum2012/index.php ■

Using technology to assess the invasive sea squirt, *Didemnum vexillum*

Franz Hover, Massachusetts Institute of Technology

2010–2012

The long-term goal of this project was to refine the conceptual model of *Didemnum* as an ecological engineer and explore options for its management and control in the context of ecosystem-based management. Project objectives included: 1) Prototype and test an optical sensor (e.g. a hyperspectral radiometer) for rapid spatial surveys that detect *Didemnum*; 2) Adapt the sensor for use on the Reef Explorer II, a hybrid AUV; 3) Map the spatial coverage of *Didemnum* using digital cameras and optical sensors; and 4) Examine benthic species diversity composition in the presence and absence of *Didemnum* mats, and develop a conceptual model of the role of *Didemnum* as an ecological engineer to identify critical areas for future research. ■

Social and economic impact assessment of catch share management in the Northeast multispecies fishery

Christopher Glass, University of New Hampshire

2012–2014

To evaluate whether the multispecies catch share fishery in the Northeast US is achieving the hypothetical benefits of sustainable harvest and viable fishing industries, there must be regulatory program evaluations of social and economic impacts. The objectives of this project were to 1) Measure quantitative and qualitative social and economic changes that have occurred relative to the Northeast multispecies sector program via collection and analysis of sector manager and stakeholder interview data; 2) Focus on the New Hampshire fishing industry, but determine the applicability of the results to the other sectors in the Northeast; and 3) Involve a multi-stakeholder team to collect social and economic data, conduct the analysis, and then disseminate the results to end users, particularly in the management and fishing arenas. ■

Social and ecological factors influencing shoreline hardening in the Northeast: Implications for vulnerability, resilience, and informed decision making

Jonathan Grabowski and Matthias Ruth, Northeastern University

2014–2016

The objectives of this project are 1) to identify potential linkages among shoreline development, coastal and marine habitats, ecosystem services and human vulnerability throughout the northeastern U.S.; 2) to characterize linkages between social capital, environmental connectedness, resilience and adaptive capacity; 3) to determine the extent to which coastal development and armoring affects perceptions and acceptance of ocean-based wind energy development; and 4) to examine the effectiveness of coastal policy at protecting shoreline habitats, ecosystem services and reducing human vulnerability to natural disturbances. ■