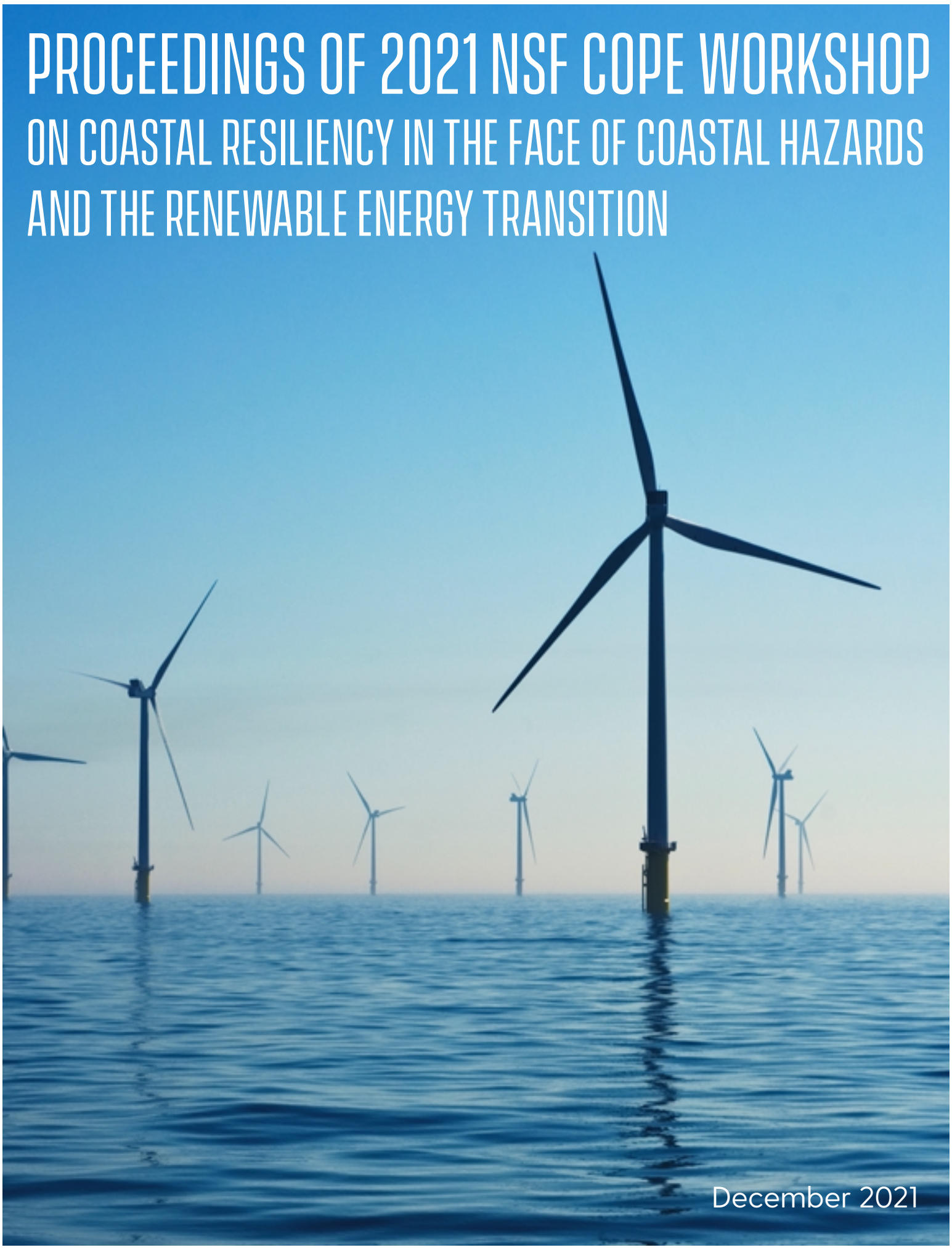
PROCEEDINGS OF 2021 NSF COPE WORKSHOP

ON COASTAL RESILIENCY IN THE FACE OF COASTAL HAZARDS AND THE RENEWABLE ENERGY TRANSITION



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Background

The National Science Foundation (NSF) Coastlines and People (CoPe) Virtual Workshop on Coastal Resiliency in the Face of Coastal Hazards and the Renewable Energy Transition was held April 20-22 (2021) and organized by the University of Delaware, with assistance from the University of Rhode Island. The workshop, and resulting research roadmap and best practices, was designed to complement the CoPe program mission statement and advance new interdisciplinary areas of research examining transitions across coastal communities in the U.S.

The workshop was designed around the following three questions.

1. How should non-local natural resource managers and energy regulators balance critical social, economic, and cultural needs of coastal communities in an era marked by climate change, including sea level rise, and proposals to industrialize the ocean through renewable energy development, primarily offshore wind power?

2. How can society improve collaborations between the research (science) community and small coastal towns and rural communities, including those that are underserved, so that scientific research and data can be more effectively leveraged ("useable science") to (i) support local capacity to implement resiliency projects and adapt to coastal change, and (ii) define and leverage potential benefits of development and adaptation, particularly for those communities that are already in transition?

3. Which risk communication strategies are likely to be most effective at reaching vulnerable populations on the coast (including underserved communities) and how should the tradeoffs, uncertainties or potential opportunities associated with climate change and offshore wind power development be communicated?

The workshop was organized by Jeremy Firestone, University of Delaware; Bonnie Ram, University of Delaware; Danielle Swallow, Delaware Sea Grant; and David Bidwell, University of Rhode Island. Bonnie McCay, Kirstin Dow and Melissa Finucane provided the keynote addresses, with Patrick Field, Darlene Finch, Marccus Hendricks and Vanesa Parks, and co-conveners, Danielle Swallow and David Bidwell serving as discussants/breakout facilitators.

The workshop website includes the research questions, agenda, participants, participant biosketches, and presentations.

Workshop Organizers

Jeremy Firestone

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1. Introduction

"The emerging Coastlines and People (CoPe) effort seeks to build capacity and explore research focused on understanding the impacts of coastal environmental variability, coastal development, and natural hazards on populated coastal regions. CoPe explores the complex interface between coastal natural processes, hazards, people, and their natural and built environments. Coastlines are complex ecosystems that operate across multiple spatial and temporal scales— sub-meter to thousands of kilometers; fractions of a second to millennia— while interacting with human dimensions from individual to global species scales. The complexity of this challenge and its social urgency calls for research approaches that engage with local communities in ways that are locally relevant and that expedite knowledge creation for policies, management, and action. Therefore, the grand challenge for CoPe is to integrate human use and transformation of coastlines with an understanding of coastal processes, variability and hazards. CoPe-related efforts will forge new, transdisciplinary paths to integrate knowledge across physical, biological, socio-political, and economic processes with human dimensions." (CoPe Synthesis Report March 2020). Building on CoPe themes, a workshop was proposed and ultimately oriented toward future research and opportunities to mitigate climate change through offshore wind power and to adapt, advance preparedness, and build adaptive capacity to recover after storm events along with the identification of best practices.

The National Science Foundation (NSF) Coastlines and People (CoPe) Virtual Workshop on Coastal Resiliency in the Face of Coastal Hazards and the Renewable Energy Transition was held April 20-22 (2021) and organized by the University of Delaware, with assistance from the University of Rhode Island. This workshop explored the changing relationship between communities and their coasts as a part of NSF's CoPe initiative. Two objectives of the CoPe initiative are to build local capacity, particularly in underserved and under-resourced coastal communities, to respond to change and to engage and participate with the research community, and to explore research focused on understanding the impacts of coastal environmental variability, coastal development, and natural hazards on populated coastal regions, involving interacting elements of the physical, chemical, biological, geological, and human spheres. Defining these research topics and specific research questions calls for the formation of new relationships (across disciplines, sectors, networks, agencies, etc.) to enable locally relevant solutions that incorporate principles of the co-production of knowledge.

The three-day workshop brought together academics, government scientists, planners, citizen groups and practitioners that explored interdisciplinary research questions and identified and developed a research agenda concerning how risk management and community resilience are interlinked with complex coastal dynamics and critical offshore and shoreside energy infrastructures of the future. Although the workshop focused on the east coast of the United States given the advanced state of planning for offshore wind development there compared to other areas of the country, the recent 2021 Biden Administration announcements and state action in California regarding offshore wind power suggest that the research agenda coming out of the workshop will have relevance more broadly.

The workshop website includes the research questions, agenda, participants, participant biosketches, and presentations. The workshop was organized by Jeremy Firestone, University of Delaware; Bonnie Ram, University of Delaware; Danielle Swallow, Delaware Sea Grant; and David Bidwell, University of Rhode Island.

1.1 Changing Coastal Communities

Coastal communities along the east coast of the United States are in the process of a great transition characterized by two potent catalysts: human use of the oceans for renewable energy generation and the increasing occurrence and multidimensional hazards of sea level rise, increased precipitation, storm surge, and flooding. Compounded by climate change, coastal hazards — in the form of rising seas, tidal flow, storm surge and increased precipitation events — lead to flooding and inundation, threatening homes as well as compelling a re-envisioning of the relationship communities have to the coastal environment. In addition, approximately 37 gigawatts (GW) of installed offshore wind turbines are planned off the east coast of the U.S. (Massachusetts to North Carolina) with ten construction and operations plans under review (see Figure 1). These offshore wind power developments are driven by federal law (the Energy Policy Act of 2005) and policies (Section 207 of Exec. Order No. 14008) and by state renewable energy and climate goals and mandates. These hazards and developments will necessarily affect the complex interactions of coastal communities' resiliency, adaptation, economic development, and sense of place.

Given the federal government's constitutional authorities over interstate commerce, navigation, national defense, and foreign relations, the role of states in coastal zone management, the shared responsibilities of federal and state governments for electricity siting and regulation and for emergency response, most local governments in rural areas have limited experience or capacity in these areas. These two dynamics—adaptation to and mitigation of climate change—call for an interdisciplinary research agenda for the emerging coastal community transitions that identifies community values and priorities and specific best practices to build skills of local decision makers and enhance adaptive capacity. As such, the workshop considered how research on community resilience, local environmental knowledge, risk communication, and collaboration can inform federal and state agencies as they interact with communities, particularly those that are underserved or under-resourced, and can provide communities tools for responding to physical and economic changes along the coast.

Figure 1: Renewable Energy Program by the Numbers

Source: BOEM, 2021

1.2 Workshop Goals

This three-morning NSF-funded workshop explored the implications of the changing nature of the human relationship among coastal communities, coastal processes, and electricity infrastructure in the ocean (offshore wind turbines and cables). The workshop strove to improve (a) understanding of the links between large-scale coastal changes from physical processes engendered by climate change and industrialization of the ocean from offshore renewable energy, (b) how best to engage state and local policymakers in viewing these two forces of change together to find commonalities, new partnering opportunities and co-benefits, and (c) effective risk communication strategies that articulate tradeoffs and uncertainties related to rapid transitions propelled by climate change impacts and mitigation and related resilience-building across different population groups, particularly small and rural coastal communities. It facilitated learning, exchange and collaboration across academia; state, tribal, and federal government policymakers; and planners and outreach specialists.

1.3 Workshop Themes

The workshop was designed around the following three questions.

1. How should non-local natural resource managers and energy regulators balance critical social, economic, and cultural needs of coastal communities in an era marked by climate change, including sea level rise, and proposals to industrialize the ocean through renewable energy development, primarily offshore wind power? Subtopics include:

    a) The combined effects of industrialization of the ocean and the changing environment on coastal economies and sense of place;
    b) The effects of industrialization of the ocean and efforts to manage coastal risks on job opportunities, local community economic development and social structures; and
    c) The social and cultural effects of ocean industrialization and the changing environment on potentially underserved communities (including older adults, those of low-income, and other marginalized populations such as communities of color).

2. How can society improve collaborations between the research (science) community and small coastal towns and rural communities, including those that are underserved, so that scientific research and data can be more effectively leveraged ("useable science") to (i) support local capacity to implement resiliency projects and adapt to coastal change, and (ii) define and leverage potential benefits of development and adaptation, particularly for those communities that are already in transition? Subtopics include:

    a) Links (such as equity, lessons learned, community capacity building) between underserved urban and rural communities
    b) Opportunities for adaptive management and distributive justice

3. Which risk communication strategies are likely to be most effective at reaching vulnerable populations on the coast (including underserved communities) and how should the tradeoffs, uncertainties or potential opportunities associated with climate change and offshore wind power development be communicated? Subtopics include:

    a) Appreciation for the nature of a given challenge and the environmental, political, and social dynamics that may inhibit knowledge exchanges.
    b) Bridging the gap between decisionmakers, agencies, and communities, and how to incorporate more effectively host community voices.
    c) Incorporation of communities' current and past experiences with trust, underlying conditions, and existing stressors into communication strategies.

2. Day 1: Managing Coastal Economies Undergoing Rapid Transitions

The workshop started with question 1 and the themes of economic development and rapid transitions in coastal communities, with the focus on how non-local natural resource managers and energy regulators balance critical social, economic, and cultural needs of coastal communities in an era marked by climate change. Following a keynote and discussant presentations, workshop participants were assigned to one of three breakout sessions to expand discussion on the day's themes and suggest possible areas for future research, and then groups reported out in a second plenary session. The second and third day followed a similar format.

Question 1

How should non-local natural resource managers and energy regulators balance critical social, economic, and cultural needs of coastal communities in an era marked by climate change, including sea level rise, and proposals to industrialize the ocean through renewable energy development, primarily offshore wind power?

a. The combined effects of industrialization of the ocean and the changing environment on coastal economies and sense of place

b. The effects of industrialization of the ocean and efforts to manage coastal risks on job opportunities, local economic development and social structures

c. The social and cultural effects of ocean industrialization and the changing environment on potentially underserved communities including older adults, those of low-income, and other marginalized populations, e.g., communities of color.

2.1 Day 1 Keynote Speaker

The keynote speaker on the first day was Dr. Bonnie McCay, Distinguished Professor Emerita, Rutgers University. Dr. McCay studies the challenges people face making a living from and living near the sea along the Atlantic coasts of the U.S. and Canada and on Mexico's Pacific coast, with a view toward sustainable use and management of common pool and public trust resources. Dr. McCay's biosketch can be found in the Appendix. Her address, *A Piscatorial Perspective on Community Resiliency and Offshore Development,* examined coastal seas as a public good subject to the tragedy of the ocean commons, the multidimensional facets of coastal developments, and the value of robust community engagement. The complexities of what a "just energy transition" means for underserved/under-resourced communities were highlighted through the case of fishing communities and offshore wind development. She raised the possibility that 'epistemic communities'—a common term in international relations that refers to networks of individuals who are recognized for their expertise and who have policy-relevant knowledge—may be relevant to our research questions to ensure that the right people are at the table, are given voice, and are part of a consensus-building process. Additional notes on the presentation can be found on the Center for Research in Wind website.

2.2 Day 1 Discussants

Dr. McCay's presentation was followed by questions from the participants before moving to discussant presentations from Patrick Field, a Senior Mediator at the Consensus Building Institute, and David Bidwell, an Associate Professor of Marine Affairs at the University of Rhode Island. See Appendix 2 for their biosketches. Field noted that East Coast offshore wind development is a grand-scale experiment that will produce social changes on top of multiple threats including those induced by climate change. Fishing communities may have greater social vulnerability from offshore wind than other coastal communities, with commercial fishers not seeing an upside to the deployment of wind turbines. Therefore, there are deep uncertainties related to the concept of "co-existence" between the offshore wind industry and fishing communities. Indeed, for them, it may create not only the risk of losing fishing grounds, but a risk to their culture and a way of life. Dr. Bidwell examined how non-local natural resource managers and

energy regulators should balance critical social, economic, and cultural needs of coastal communities, through the lenses of distributive, procedural, and recognition justice. They both highlighted the difficulties of long planning processes and how to define meaningful community engagement.

2.3 Day 1 Breakout Session

2.3.1 Day 1 Discussion Summary

1. Emphasis was placed on the need to foster more 'bottom-up' engagement with communities and to identify locally based leaders to help establish trust. This would require establishing more long-term research funding, identifying community networks and liaisons, and gathering more baseline information to better understand community needs and values. For example, what options are there for career training or future opportunities among fishers and how do 'coastal communities' and 'fishing communities' view themselves? How do these stakeholders perceive risk?

2. Participants also called for research to clarify and define what is meant by the term 'coastal communities' and find ways to account for the diversity of cultures and communities in a given area. These include both communities of place (e.g., Rehoboth Beach, Delaware) and communities of practice (e.g., commercial scallop fishers), and could extend inland given that the broader effects of offshore wind power development and climate change.

3. Research efforts should grapple with the differences between broader societal (non-local) needs and local needs and how to better communicate risks, benefits, and tradeoffs across communities. This includes consideration of flexible adaptation pathways, use of long-term funding to support communities as they transition, and integration of local voices into federal and state planning processes and decision-making.

4. Attention should be paid to re-evaluating survey and assessment tools – which assessment tools are available and how they were developed, for which audiences, and where are there gaps? Participants emphasized the need for equitable access to tools and noted that "just because you build it, doesn't mean it will get used."

5. There was discussion about capacity issues at the local level and the challenge this presents for coastal adaptation and resilience efforts. Potential solutions mentioned include long-term funding, reassessing what communities need and want, and finding ways to build more flexibility into the planning processes.

6. 'Tragedy of the Commoners' (a point brought out in Dr. McCay's keynote address). In contrast to the Tragedy of the Commons, which focuses on resources, the Tragedy of the Commoners focuses on those who lose out when society works toward a more sustainable resource, and perhaps as well those who lose out to more profitable or more efficient modes of production. Stemming from this there is a notion that those who are commoners have common 'rights,' and although these 'rights' may fall short of property rights in the fullest sense, there is a thought that something has been taken from them, and they thus deserve compensation. Recognition of this ('recognition justice'), which could then be advanced and given meaning in the consideration of the distribution of costs and benefits (distributive justice), when the siting of offshore wind turbines/projects is considered. Incorporating the concept of the 'Tragedy of the Commoners' into decision-making frameworks could thus have value.

7. Conversations also referenced the importance of understanding various perceptions of 'industrialization' of the ocean, and what that looks like for different communities and policy makers. Researchers should be cautious with this term and perhaps develop a better phrase or term to describe the various existing ocean activities and future energy infrastructures as there are conflicting risk and benefit perceptions of 'pristineness' and of industrialization given the current reliance on maritime domains for activities such as commercial shipping, commercial fishing, sand mining, and telecommunication cables.

2.3.2 Potential Research Questions

1. Is offshore wind (OSW) Blue Growth (sustainable economic and social development of the ocean) and/or Ocean Grabbing (expropriation of the ocean space and the dispossession of prior users, including coastal communities, and uses of the marine environment)?
    a. How do we think more clearly and in a more nuanced fashion about trade-offs between action and non-action and various impacts of each?

2. How do we define and develop baseline data on coastal communities, including communities of practice, when there are multiplying sources available (e.g., Regional Ocean Planning Bodies)?
    a. How do coastal communities see themselves?
    b. How do others see coastal communities?
    c. What is their level of awareness, knowledge, and perceptions of various kinds of marine commerce?
    d. What are mental models of community inhabitants, those who work in the communities, and those that visit the communities and how do those models affect how they perceive risks and changes?

3. What does industrialization of the ocean mean to people and coastal communities?
    a. Can technical redundancy and restoration be built into offshore wind power systems so that IF research shows irreparable negative ecosystem impacts in a specific location, then equipment could be decommissioned at that location?
    b. Should a compensatory system for impacted sectors be developed, and if so, what should it look like?

4. How do we make communities who are invisible, visible?
    a. Invisibility – Recognition justice speaks to the need to make communities who are invisible visible

5. How do we build in flexibility for analysis and decision-making?

6. What governance arrangements are possible that might increase voice, co-production of information and decisions?

These questions were developed during the breakout sessions and reflect the participants' views. The questions here and those set forth in the two following sections were refined and edited in Section 5, Research Roadmap and Best Practices by the organizers of the workshop.

7. In what way will resilience efforts reinforce existing power structures and economic and governance disparities or offer something different?

8. What tools do we have to answer concerns and questions? What are decisions that need to be made and what answers can tools best address?

9. How can we improve or incorporate the role of traditional knowledge and capture of different mental models (i.e., non-scientific perspectives, long-term data collections)?

10. How do researchers account for different community values and vulnerabilities, and more immediately how do they measure them? For example, OSW developments present vulnerabilities that are layered on top of climate change; some risks and vulnerabilities are short term while others are long term, and potential solutions may not always align with the direct and urgent needs of communities.

11. How can community monitoring help? Is there a way to monitor benefits, including long-term benefits, that may be invisible otherwise?

12. How do we monitor to ensure that solutions are environmentally just (e.g., community-based air quality monitoring to document whether or not a benefit is accruing)?

13. How do we measure co-benefits, including non-monetary benefits, and the benefits of doing or foregoing offshore wind development.? How do we then translate this into cost-benefit analysis or other languages that decision makers can use?

3. Day 2: Community Engagement

3.1 Day 2 Keynote Speaker

Question 2

How can society improve collaborations between the research (science) community and small coastal towns and rural communities, including those that are underserved, so that scientific research and data can be more effectively leveraged ("useable science") to:

a. support local capacity to implement resiliency projects and adapt to coastal change, and
b. define and leverage potential benefits of development and adaptation, particularly for those communities that are already in transition?

The keynote presentation for the workshop's second day was provided by Dr. Kirstin Dow, professor in the Department of Geography at the University of South Carolina. Dow is a social-environmental geographer focusing on understanding climate impacts, vulnerability, and adaptation using methods involving extensive participation of stakeholders and decision-makers. Her presentation, *Community Resiliency in the Face of Coastal Hazards and the Renewable Energy Transition*, examined how collaborations between the research community and small coastal towns and rural communities may be strengthened to address their concerns when these populations often may not know what they need. This question was placed in the context of increasing impacts from global climate change, changing socio-technical interconnected systems, and the social risk landscape of small, rural, and often underserved communities. These complex and unexpected system interactions, in some cases, reveal 'deep uncertainties' and 'wicked problems.' Moreover, many rural and small communities have very limited institutional capacities, tax bases and funding streams available. The benefits of co-learning and co-production of knowledge through the interaction of researchers, decision makers, and communities were placed alongside broader visions of dynamic adaptation pathways, as steps in the transition to a more sustainable and just future.

3.2 Day 2 Discussants

Comments on Dr. Dow's keynote presentation were provided by Darlene Finch, the Mid-Atlantic Lead for NOAA's Office for Coastal Management, and Danielle Swallow, the Coastal Hazards Specialist with Delaware Sea Grant (see Appendix 2 for biosketches). From the perspective of a government analyst, Ms. Finch provided additional context on the issues facing small and rural communities. These smaller communities have limited tax bases and staff, often resulting in less capacity and resources available to meet emerging coastal challenges. The dynamism of these communities was emphasized, with two major trends being the growing ethnic diversity of rural areas as well as the disparate rates of poverty compared to urban centers. Darlene Finch's presentation is linked here. Ms. Swallow continued the discussion, placing greater emphasis on working with small coastal towns along the Atlantic coast, drawing on her experience as a community engagement specialist in Delaware. Working with small, rural communities, she pointed out the particular needs of senior citizens who often have less adaptive capacity in terms of health, mobility, and nearby support networks, and who, along with other disadvantaged communities, can be disproportionately impacted by disasters. Attention was drawn to building capacities as a critical need for these communities in order to address complex coastal and marine effects along with new energy infrastructure. Identifying community needs and establishing ongoing collaborative partnerships to aid addressing local capacity issues are research and engagement areas that require greater attention and investment.

3.3 Day 2 Breakout Session

3.3.1 Day 2 Discussion Summary

1. Emphasis was placed on the importance of research teams maintaining continuity in communities, with each having a dedicated member to provide support to the community as the community works to identify its needs. Researchers ought to be in the community long enough to gain trust; typically, this cannot be achieved with a two-year grant. To this end, identifying local community liaisons can be critical to project success metrics. It can be difficult to successfully engage with communities, and perceptions toward researchers may not be positive (despite intentions), or community participation in a project may be lackluster. It is hard to gain trust, and easy to lose.

2. There are significant issues with current funding mechanisms, including favoring research papers over realizing community outcomes, quantitative over qualitative or integrative studies, and near-term results over sustained community programs. This implies a need for a fundamental change in the research process. "Equity" or "co-development" cannot just be added on top of existing frameworks, rather community involvement ought to be integrated throughout each stage of the process. A change in the incentives to build trust and collaboration also would be beneficial.

3. Attention should be paid to the commitments asked of community members. Research methods that are less burdensome on communities (document review, twitter, health data, etc.) should be explored and encouraged. Providing reimbursement to community members for their time and effort should be part of research plans.

4. Adaptation pathways is a useful concept to link long-term thinking and infrastructure challenges to incremental policy steps. The goal is to design long-term solutions that have low-hanging, near-term fruit. Community engagement is critical in identifying these actions. Projects should further recognize the importance of time scales. There are few incentives for long-term planning: local communities have budget constraints and short-term priorities, and funding agencies want immediate, tangible results. However, communities have a direct stake in long-term outcomes and may be proactive in adaptation planning.

5. It is more effective to be proactive than reactive, e.g., regarding a community's disaster preparedness and response.

6. Bridging organizations (such as Sea Grant and RISA that link scientists with local and state marine/coastal managers, coastal communities, and coastal community members) are particularly useful, helping facilitate active engagement with community members. The question of "what communities need" is more difficult than it sounds, in that communities may not know the range of possibilities or may not be active in voicing concerns. Also, community needs may change over time. Extension agents can be helpful by listening to communities, and then bringing ideas back.

7. Some communities may experience study fatigue, raising the issue of how to coordinate and avoid overlap. A positive example of this effort at coordination is the Resilient and Sustainable Communities League (RASCL), which brings in diverse stakeholders and acknowledges various strengths.

8. Data and research are not impediments to adaptation and resilience, rather the question is how do we process the information that already exists and then incorporate it into decision making? The issue is often not how to get information to communities, but instead, what they seek out and find useful. It is important to have connections and trust to allow the creation of pathways.

9. Conflict management in community engagement is a complicated barrier to project success. Training in mediation or "polarity management" (Barry Johnson) are potential avenues toward addressing this barrier. A related challenge is to increase social learning (raised in Dow's keynote) and get communities to communicate with each other and collaborate among themselves.

10. There is a need to define and measure co-benefits. What are a project's goals, what are its benefits, and what benefits does the community realize? How to reconcile concepts of civic service, equity and community benefits into conventional risk assessment methods and cost-benefit analysis?

3.3.2 Potential Research Questions

1. What are the best practices of bridge organizations and how can they be replicated?

2. What are the barriers to identifying community liaisons?

3. How can researchers best facilitate the identification of community needs?

4. What "co-benefits" can be realized? How to create community-identified co-benefits?

5. How can funding structures be altered to change the process for research and include more community partners in projects so that they are more likely to produce co-benefits and generate more long-term investment?

6. How can toolkits and models be made more 'adaptive' so that they are more effectively distributed, digested, and modified based on community needs and values?

7. How can adaptive systems better examine rates of change, as communities may not be able to adapt as quickly as the physical system is changing?

4. Day 3: Risk Communication

4.1 Day 3 Keynote Speaker

Question 3

Which risk communication strategies are likely to be most effective at reaching vulnerable populations on the coast (including underserved communities) and how should the tradeoffs, uncertainties or potential opportunities associated with climate change and offshore wind power development be communicated?

a. Appreciation for the nature of a given challenge and the environmental, political, and social dynamics that may inhibit knowledge exchanges.
b. Bridging the gap between decision makers, agencies, and communities, and how to incorporate more effectively host community voices.
c. Incorporation of communities' current and past experiences with trust, underlying conditions, and existing stressors into communication strategies.

The keynote presentation for the third and final day of the workshop was provided by Dr. Melissa Finucane, Senior Social and Behavioral Scientist at RAND, Pittsburgh PA, Senior Fellow at the East-West Center, Honolulu HI, and Lead Principal Investigator and Director of the Consortium for Resilient Gulf Communities, an interdisciplinary partnership aimed at advancing understanding of disaster health and socio-economic impacts, risk communication, program evaluation, and resiliency. Her presentation, *Communicating About Environmental Health Risks*, stressed the importance of understanding risk and decision processes in resource-dependent social systems while cautioning researchers that traditional risk assessments have a bias towards wealthier communities as they emphasize damage to 'assets.' She also raised the question: How should researchers and policy makers communicate about different uncertain futures when it is not clear which future is best? Risk perceptions reflect deep-seated values and different world views that have policy implications.

4.2 Day 3 Discussants

Following the keynote presentation, Dr. Marccus Hendricks and Dr. Vanessa Parks provided their comments. Marccus Hendricks is an Assistant Professor of Urban Studies and Planning and the Director of the Stormwater Infrastructure Resilience and Justice (SIRJ) Lab in the School of Architecture, Planning, and Preservation at the University of Maryland, where he researches infrastructure planning and management, social vulnerability to disaster, environmental justice, sustainable development, public health and the built environment, and participatory action research. Dr. Hendricks focused on the importance of how various stakeholder and groups process information differently and that points to the importance of scientific literacy in early education. Also hazard research needs to shift from built structures and assets to be more 'people-centric,' including an examination of the root causes of vulnerability for black and brown communities. Vanessa Parks is an environmental and health sociologist studying human-environment interactions, particularly natural resource-based occupations and how they shape people's health and well-being in the Mississippi Delta and the Gulf South regions, as a postdoctoral research associate at the University of Mississippi's Center for Population Studies. Dr. Park's presentation focused on identifying and addressing the needs of underserved/under-resourced populations, meaningful engagement, and knowledge gaps that remain in developing risk communication strategies. She advocated moving away from 'announce and defend' approaches and better definitions of communities of practice (e.g., fishers) versus communities of place (towns that identify with fishers and coastal living).

4.3 Day 3 Breakout Session

4.3.1 Day 3 Discussion Summary

A constant struggle for researchers and practitioners is devising the best ways in which to engage communities so that critical information can be shared at the right time. It is important to emphasize that such sharing be bi-directional and reach broadly into diverse communities instead of being sourced from only the most interested or powerful parties. Often, risk communication strategies are ineffective.

1. An important assumption is that engaged parties may be knowledgeable, interested or affected by topics like community resilience, climate change or offshore wind development. Communities do have unique interests and contexts which could serve as ice-breaking tools for further engagement strategies. For example, if a community brings up a concern (e.g., increasing electricity costs), the researcher could listen and then work toward conversations about topics such as sea level rise and social costs of carbon emissions.

2. It is critical to resist simplification and aggregation of community actors and groups of actors, especially into hierarchical, binary, or power-based groups (i.e., researcher and underserved/under-resourced communities).

3. Practitioners and researchers could work at building institutional capacities for communication at various stages of the ongoing conversation. This includes providing space for sharing ideas and information as well as encouragement of wide participation. Selected research ideas for building these capacities include:

i. Mental-models research and similar qualitative approaches may be helpful in better understanding community nuances, as defined by the communities themselves.
ii. Baseline studies of community needs and shared and differing experiences associated with those needs.
iii. "Communities of practice," including, but not limited to, social networks, are areas with limited research.
iv. Identification of underserved as well as under-researched communities.

4. Current institutional structures are inadequate for ensuring developers, practitioners, and researchers are cognizant of and account for community benefits and costs. More robust engagement strategies and development of best practices are needed. For example, there is a need to account for costs of participation and engagement, including opportunity costs of time taken away from family or work.

5. Much of the current emphasis on risk accounting including tools like vulnerability indices are problematic. As Dr. Finucane noted, these indices simplify complex information, are often not validated, and have internal and theoretical inconsistencies. In addition, they can fail to incorporate the cultural dynamics of communities and other local dimensions. Sensitivities to cultural humility and community respect are needed. In addition, perceptions of intergenerational effects are under-researched.

4.3.2 Day 3 Potential Research Questions

1. How can researchers constructively critique current regulatory practices?

2. How can researchers be transparent about how regulatory frameworks operate and how they constrain or inhibit inclusive and diverse inputs?

3. What are the important differences between theoretical constructs of cost/benefit and risk analysis in relation to community engagement and understanding?

4. How do we gain sensibilities around circumstances that communities face before, during, and in the aftermath of events?

5. What can researchers and practitioners learn from communities about vulnerability and adaptation?

Community Engagement Example: Delaware Sea Grant

Regular community engagement is critical to understanding community needs, values and building research partnerships that can be transformative. In this photo, Delaware Sea Grant and a dozen partners host an emergency preparedness workshop for older adults in Roxana, Delaware in 2019.

5. Research Roadmap and Best Practices

5.1. Outcomes

1. How to best facilitate the identification of community needs and plan for risks and uncertainties with more effective communication? How do we ensure that communities who are often invisible, are visible (e.g., underserved local populations and students)?

2. What means/methods can be employed to gather better baseline data about underserved coastal communities and to better define community structures, perceptions, cultures, and demographics over time? Can a common set of criteria to characterize underserved/ under-resourced communities be devised to assist in standardizing approaches (e.g., SoVI index, CDC index) and ensuring before and after data and views are examined? Is there a way to standardize the different tools/models of vulnerability so that we are able compare communities across time and space?

3. How can adaptive systems better examine 'rates of change,' as communities may not be able to adapt as quickly as the physical system is changing?

4. In the context of global environmental change, is offshore wind "Blue Growth" and/or "Ocean Grabbing"? How can the risks and benefits of these offshore concepts be defined more clearly with the values and perceptions of local stakeholders and other interested and affected parties?

5. What are the range of "co-benefits" that can be defined and developed for local communities? How should researchers help to co-create these benefits with communities that may be impacted? Can multi-objective planning processes be designed to identify co-benefits and advocate for more equitable solutions?

5.2 Engagement

6. How to define and communicate about the uncertain futures of climate change vulnerabilities and offshore wind infrastructure across different spatial and temporal scales? How can this move forward with a process that emphasizes co-creation of knowledge between experts and small and/or rural towns, including local policymakers?

7. What are the barriers to broadening participation among underserved communities and aging populations? How can this participation address complex ecosystem and socio-economic problems and opportunities? How do we better support equitable partnerships and strategies?

8. How can researchers and practitioners learn more effectively from a variety of coastal communities about vulnerability and adaptation over time? And how should researchers incorporate the co-creation of knowledge between experts and small and/or rural towns into decision making with short-term funding mechanisms and with limited public participation opportunities that are robust and two-way?

9. Multiple knowledge gaps[1] that need to be addressed to improve risk communication include:

- What constitutes meaningful engagement?
- How could risk communications address contextual, procedural, and distributional dimensions of equity?
- How might connections between natural and social systems be disrupted for some groups and not others?
- How can communications integrate multiple perspectives on the opportunities and challenges posed by transitions?
- What frameworks and methods can help to integrate diverse types of knowledge?
- What decision support tools facilitate discussions about tradeoffs?
- What data are needed to track how community needs and concerns change over time?
- How would those data inform adaptive improvement of risk communications?

5.3 Capacity and Funding

10. The funding streams for this interdisciplinary work is very uneven across regions and communities and typically short-term (less than 2 years). How can NSF and other funders change the funding streams and the decision process for competitive research that encourages partnering with small and rural communities over a longer period of time? This shift in funding stream would help communities realize potential co-benefits of developments while building capacities that address coastal resiliency.

11. Regarding toolkits and models, the participants found that there are many effective tools and models, however, for small and rural communities, there is often neither the capacity nor time to apply these models and tools. How can expert networks provide more extension services and continuity of assistance while also making the tools/models more 'adaptive'? How can they be applied more effectively at the local level so as to reflect distributive values and changing conditions and needs over time?

1 Reference: Keynote presentation of Dr. Melissa Finucane

Best Practices

Build on successful models such as Sea Grant and RISA (funders)
Legitimize diverse knowledge – epistemic communities (society)
Appreciate diversity in communities and in stakeholder groups within communities (society)
Incorporate flexibility into systems (society)
Institute meaningful and not diffuse engagement (government, developers)
Establish cultural liaisons (developers)
Form long-term relationships with towns, with a pipeline of funding and technical expertise (researchers)

6. Conclusions and Recommendations

This workshop and resulting research roadmap was designed to complement the CoPe program mission statement and advance new interdisciplinary areas of research examining transitions across coastal communities in the U.S. The nexus of coastal sustainability, human dimensions and coastal processes was discussed within the context of the current clean energy transition related to the deployment of offshore wind along the Atlantic Coast and activities that related to coastal resiliency. Given the accelerated speed of potential climate impacts on small and rural communities, there is a worry among researchers that our work and best practices may not be able to keep up with this pace. As well, offshore wind infrastructure will be developing along its own potentially steep trajectory. A more comprehensive approach to the complex interface between people and their natural and built environment is needed while working towards the co-production of this knowledge base across underserved and under-resourced coastal communities and a multitude of stakeholders. Each community may follow a distinctive pathway as it adapts to climate change and/or offshore wind power projects. Rather than a research agenda that treats resiliency separately from mitigation in terms of offshore wind power, we envision one that aims to identify different combinations of interests in different types of communities. Our hope is that this workshop sets the stage for the research community to integrate these complex topics and engagement processes with a broader lens that helps build capacities, co-designs best practices with local communities and strengthens risk communication strategies.

Appendix 1: Workshop Format, Outcomes, and Evaluation

1. Workshop Format and Outcomes

Originally planned as a two full-day in-person event to be held in Annapolis, Maryland in mid-May 2020, considering the challenges posed by the COVID-19 pandemic, the workshop was first delayed until 2021 and then changed to a virtual platform and held during the mornings of April 20, 21, and 22 of 2021.

There were 42 participants, including the organizers and four graduate research assistants who assisted in the organization of the workshop and its implementation, three keynote speakers, six discussants (two of whom were also organizers), and invited participants. Bonnie Ram developed a detailed facilitation game plan with input from David Bidwell and comments from the larger team.

The workshop was held on the Zoom virtual meeting platform over three consecutive mornings, with each morning following a similar format. After a brief introduction (and recap of the previous day on mornings two and three) by the workshop moderator, Professor Jeremy Firestone, a given day's topic was motivated by a keynote presentation, followed by a question-and-answer session. After a brief break, two discussants commented on the keynote presentation and took the keynote presentation into new directions. Next, the workshop participants assembled in three pre-assigned (primarily arranged around diversity of expertise, interests, professions and position) smaller breakout groups, with each facilitated by two of the six discussants, who were in turn assisted by a graduate research assistant. Participants, facilitators, and graduate student assistants returned to the same breakout group on each of the three days. At the conclusion of the breakout session, the participants returned to the main session, with each group reporting out the key points discussed. Finally, the workshop moderator recapped each day and on the final day all three days were summarized. All presentations were plenary sessions to advance learning across domains of expertise. In contrast, smaller breakout sessions were used to facilitate more active participation, information sharing, observation, reflection, and deeper dives into topics. The workshop was deliberatively discussion-oriented and interactive.

2. Workshop Evaluation

At the close of the workshop, participants were asked to complete a short questionnaire regarding their experience and assessment of the event. A total of 18 participants submitted completed evaluations, representing a roughly even distribution among federal government, state governments, academia, and non-profit organizations, with one respondent indicating "other." Despite the fact that this workshop was initially scheduled to be held as an in-person, two-day event, participants were overwhelmingly positive about the modified online format, with the vast majority indicating being "highly satisfied" or "satisfied" with the quality of speakers; presentation content; length and format of the workshop; facilitation of breakout sessions; level of interaction through the question-and-answer segments, chat, and breakout sessions; and the quality and breadth of research topics raised. The only "dissatisfied" response was a single response regarding facilitation of breakout sessions. Similarly, when asked to evaluate whether the workshop was a "good use of my time" between 1 and 5, the mean response value was 4.33.

When asked to indicate which research ideas or presentations particularly resonated, a diverse range of positive comments were provided. These included multiple mentions of the concept of equity and environmental justice, risk communication and the role of the research, and the contextualizing of offshore wind energy within a coastal community resiliency framework.

Finally, participants were given the opportunity to provide any additional feedback on their workshop experience. Apart from several positive comments on the event facilitation, many responses were appreciative of the diverse and multidisciplinary range of speakers and discussions. As more critical feedback, a few respondents noted that the guiding questions for each day were overly-complicated and did not always easily lend themselves to discussion. One respondent indicated that they would have liked to see more attention paid to BIPOC (Black, Indigenous, and other People of Color) perspectives. Another stated they would have preferred more focus on specific wind energy changes to communities. Yet another participant said they would have liked more time to discuss these topics, and raised the suggestion for continuing collaboration, or some form of conversation, from this "fascinating group."

Appendix 2: Organizers, Keynotes, Discussants and Participants

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Biosketches for the speakers and discussants are available online.

Appendix 3: References to Sources, Planning Bodies, and Databases

1. Review Paper – Haggett, et.al. (2021) "Offshore Wind Projects and Fisheries: Conflict and Engagement in the United Kingdom and the United States" (Link)

2. Atlantic Offshore Renewable Energy Development and Fisheries: Proceedings of a Workshop — in Brief (2018) (Link)

3. MAFCM - Mid-Atlantic Fisheries Management Council (Link)

4. Paper – Colburn, et.al. (2016). "Indicators of climate change and social vulnerability in fishing dependent communities along the Eastern and Gulf Coasts of the United States" (Link)

5. Mid-Atlantic Regional Council on the Ocean (Link)

6. MARCO's Data Portal (Link)

7. Responsible Offshore Development Alliance (RODA), on the Atlantic coast of the US, formed in early 2018 to interface with developers, regional fishery management councils, NOAA, and BOEM to ensure that offshore wind development is compatible with the fisheries. (Link)

8. Fisheries management councils
    a. Mid-Atlantic Fishery Management Council (FMC) is a key source of information via free subscriptions to weekly or biweekly "offshore wind updates" compiled by Julia Beaty (jbeaty@mafmc.org)
    b. New England FMC also has wind updates, and combine their periodic news roundups (Janice Plante jplante@nefmc.org).

9. Business Network for Offshore Wind (Link)

10. Important sources of data found in the Community Social Vulnerability Indicators (CSVI) project of NOAA Fisheries, that can be used for broader work on coastal community resilience (Link)

11. John Alford & Brian W. Head (2017) Wicked and less wicked problems: a typology and a contingency framework, Policy and Society, 36:3, 397-413, DOI: 10.1080/14494035.2017.1361634

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14. Dynamic Adaptive Pathways Papers

15. Northeast Fisheries Science Center (NFSC) (Link)
    a. Databases for NFSC

16. PolicyMap databases to find data and mapping tools used by government agencies, universities, healthcare institutions and nonprofits to solve place-based problems. (Link)

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21. Marccus D. Hendricks and Shannon Van Zandt. Environmental Justice. Apr 2021.87-97. (http://doi.org/10.1089/env.2020.0054)

22. Practitioner Led Urban Sustainability Workshop: Final Report. NSF SUS Workshop, July 8 - 10 2019, Ann Arbor MI (link)