2 Asking questions for adaptation

Using public and stakeholder surveys as a tool within coastal climate change policy processes

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Introduction

For decades, academic researchers and polling organizations, often using similarly constructed measures, have asked people worldwide about their views regarding climate change's causes and their preferences for policies to lessen greenhouse gas emissions (Lorenzoni & Pidgeon, 2006; Nisbet & Myers, 2007). But survey research that addresses *adaptation policy choices* is comparatively under-developed. This is true even for climate impacts like sea-level rise (SLR) that broadly threaten a large number of people and coastal regions across the United States with increased flooding, inundation, and erosion (Akerlof et al., 2019). Professionals in civic and governmental organizations cite their lack of capacity to communicate climate change information and engage with stakeholders and the public as one of their biggest barriers in preparing communities to adapt to climate change (Moser & Pike, 2015). Indeed, communication represents a critical cross-cutting element across all stages of the adaptation process (Moser & Ekstrom, 2010). Survey research can act as a form of consultation that can provide data on the diverse ways individuals and organizations conceive climate adaptation. Accordingly, survey research can inform policy, support technical capacity to make adaptation decisions, and help with the design of stakeholder engagement and communication programs. In this chapter, we illustrate with four case studies – from North Carolina, Georgia, California, and Connecticut – how surveys can complement other participatory methods in furthering goals for communication, stakeholder involvement, and policy development and implementation regarding coastal adaptation.

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Public and stakeholder participation in environmental decision-making and governance

Both legally and philosophically, extended participation in environmental decision-making has been labeled a public good. The goals of broadening involvement in decision-making include incorporating public values in decisions, improving decision quality, resolving conflict, building institutional trust, and educating and informing the public (Beierle & Cayford, 2002). Moreover, public participation mandates are enshrined in federal laws in the United States, ranging from the Administrative Procedure Act of 1946 to the National Environmental Policy Act of 1969 (Dietz & Stern, 2008). As noted in a National Research Council report, surveys can serve as a counterpart to public participation by assessing audience values and concerns (Dietz & Stern, 2008).

For some policy areas, public and stakeholder involvement takes on even greater importance. Environmental issues like climate change epitomize the conditions for "post-normal science" in which the stakes are high and the uncertainties large (Funtowicz & Ravetz, 1993). This dynamic inverts the "traditional domination of 'hard facts' over 'soft values,'" requiring the involvement of extended communities in decision-making (p. 750). Indeed, in 1992, the United Nations Framework Convention on Climate Change suggested that facilitating opportunities for public participation is part of "developing adequate responses" to climate change (United Nations, 1992, p. 10).

The contexts in which collective governance of the environment has been successful are rich in communication[1] at the interpersonal and group level and extend outward to opportunities for social learning that cross established networks. In practice, there are any number of ways that communication can be implemented to provide information, strengthen relationships and social networks among actors, and address potential conflict. Each of the methods rests on a different level of Arnstein's (1969) ladder of participation in decision-making, offering trade-offs in terms of participants' level of engagement versus the ability to reach wide audiences. Toward the top of the ladder, adaptation policy forums (Hamilton & Lubell, 2019), stakeholder planning exercises (Moser & Ekstrom, 2011; Webler et al., 2014), and knowledge co-production efforts (Lemos & Morehouse, 2005) focus on building partnerships and close collaboration among small groups that span information and decision-making bodies. The nature of these exercises – face-to-face (whether in-person or virtual), time-intensive, and typically involving iterative communication over long periods of time – facilitates social cooperation. Yet some note that participation in these types of events is particularly daunting for historically underrepresented communities, who often lack capacity, resources, and opportunities to access and participate in these processes (Latulippe & Klenk, 2020; Rosentraub & Sharp, 1981). Their absence and

lack of representation may serve to further increase inequalities (Turnhout et al., 2020). Further down Arnstein's ladder, open meetings and surveys provide more limited and passive forms of engagement but allow potentially greater reach and inclusion, helping to expand participation in governance.

Surveys similarly grapple with difficulties in reaching less socially engaged populations (Amaya & Presser, 2017). However, surveys can be explicit in their design and methodology so as to enable the participation of specific groups (Groves & Couper, 1998). That is, they can representatively characterize adaptation information needs and decision-making preferences – and differences between groups on these measures – in ways that other methods cannot. Some researchers have found that stakeholders themselves believe that surveys have a greater potential to "treat all citizens equally" than other engagement methods, like closed or open meetings (Chase et al., 2002). Others have argued that surveys can help to broaden participation and diversify the voices incorporated into planning discussions, particularly in multi-level governance situations (Pomeranz et al., 2014). Furthermore, the ability of surveys to gather information – and evidence of policy support – from the public and stakeholders, in turn, can be used politically to help create coalitions, set issue agendas, or enact new policies (Akerlof et al., 2014; Basil, 2017; Johnson et al., 1993). When designed to be representative of a specific set of stakeholders whose support is vital to the success of the policy decision, surveys – and related efforts such as deliberation – may be particularly effective because they reflect the "voice of the people."

People are extremely sensitive to the social norms of others around them, including their attitudes and behaviors (Bicchieri, 2005; Cialdini, 2007) but are typically poor at estimating levels of social consensus on any number of issues (Krueger & Clement, 1997). Because of the significant influence of social consensus perceptions on individuals' decision-making (Ballew et al., 2020; Ban Rohring & Akerlof, 2020; Goldberg et al., 2020), survey data can be highly valuable in addressing biases in human cognitive processing. The perceived social consensus at smaller scales is also likely to be more influential than at larger, national levels (Ban Rohring & Akerlof, 2020).

Other environmental policy fields may hold lessons for adaptation in balancing the use of surveys with other forms of public and stakeholder participation. Wildlife and natural resource management researchers (Chase et al., 2002; Johnson et al., 1993; Pomeranz et al., 2014) note that surveys can imperfectly represent stakeholder and public opinion (Chase et al., 2004; Heberlein, 1976). They advise balancing more highly participatory activities and representativeness, such as conducting both meetings and surveys as complementary tools or using other activities such as behavioral experiments and workshops that include representatives of decision-making organizations and the public (Heberlein, 1976).

Case studies

The following four case studies are set within unique geographic, socio-cultural, and political contexts (Figure 2.1). They illustrate the variety of ways in which surveys have been used to promote a range of climate change adaptation goals across different scales of governance and with varying audiences. The case study authors have extensive experience in coastal adaptation and straddle the boundaries between research and practice. They – and the boundary organizations in which they work – mediate the interface between science and policy in order to facilitate the creation and transfer of applied knowledge (Guston, 1999; Lynch et al., 2008). In their own voices, these authors tell how surveys were used to facilitate climate change adaptation at the community or state level, highlighting the role that surveys can play in communication, stakeholder participation, and policy development and implementation.

North Carolina: Surveying the public in launching the state's sea-level rise initiative (by Tancred Miller, Division of Coastal Management, North Carolina)

As one of the state's first steps in addressing sea-level rise, the North Carolina Division of Coastal Management (DCM) conducted a survey of public perceptions and policy preferences regarding SLR in the summer of 2009. The survey was intended to assess public support for a state-led SLR initiative, engage citizens and other stakeholders on the issue, and gather information for designing state outreach and education programs.

We were interested in the public's perception of the reality and magnitude of SLR in North Carolina, their perceived vulnerability to its effects, and their interest in, or demand for, a state-led SLR initiative. The survey presented respondents with a number of potential actions (e.g., mapping high hazard areas, providing technical assistance to local governments) and asked them to indicate their support for these actions. Respondents were asked who, if anyone, they thought should be taking action to address SLR – either in a lead or in a supporting role – and were given the opportunity to share their ideas through a series of open-ended questions. The DCM communicated to the public that it was beginning to approach SLR as a distinct subject and was actively seeking to engage them in the process.

We advertised the survey and solicited participation through direct email, the DCM website, and various Listservs. The survey also received significant coverage in print, television, and radio media. Respondents self-selected, and because of the broadcast nature of the solicitation, it is impossible to know how many individuals were invited by other participants to complete the survey.

We received 1,076 completed responses from North Carolina residents, 620 of those from coastal property owners. One hundred non-residents

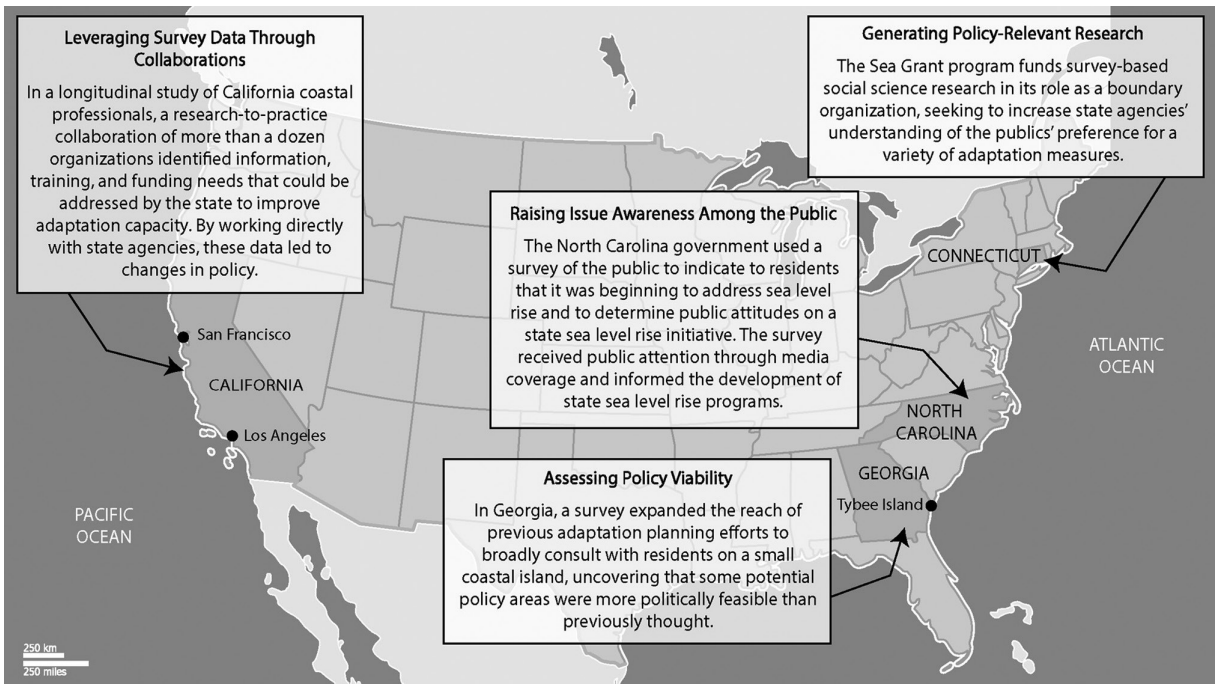

Figure 2.1 Distribution of the four US case studies. Source: Developed by authors.

responded, 53 of them coastal property owners. Responses came in from 77 of the state's 100 counties, and 26 US states, including all Atlantic coast states with the exception of Maine. Although a strong response to the survey was anticipated, the number and geographic distribution of responses exceeded our expectations. The strong interest in this issue by many respondents was readily apparent, no matter their perception of SLR. The vast majority of respondents completed the entire survey and provided thoughtful and detailed comments.

Three-quarters of North Carolina respondents said that SLR is occurring, and one-half of property owners said they would be affected. Just 12% said sea-level rise was not occurring. Two-thirds of all North Carolina respondents, and 59% of all coastal county residents, said that the state should begin immediately addressing SLR. Public education and inundation mapping were the most recommended actions, followed by technical assistance to local governments. Other recommended actions included adopting a planning benchmark, prohibiting the expenditure of public funding on infrastructure in highest-risk areas, and updating state flood maps to account for SLR.

We considered the survey a success in meeting the goals of scoping public perceptions and opinions, gathering new information and contacts, and communicating outwardly with broad segments of the public. What was not anticipated was that the lengthy and controversial public policy development process would generate more awareness of SLR than would have otherwise occurred.

The survey was conceived as the initial step in our strategy to start incorporating SLR into our work as a distinct focus area. The North Carolina Coastal Resources Commission's Science Panel subsequently released the state's first *Sea Level Rise Assessment Report* in 2010. Building upon survey results and scientific assessment, we developed a draft policy statement, which underwent extensive public review and revision. However, the policy statement generated opposition from a regional advocacy group due to concerns about the potential for new regulations and disagreements over the planning recommendations.

We have found that the survey, the ensuing public debate over the policy statement, and the recent spate of devastating storms and flooding have heightened public awareness of SLR and coastal change in North Carolina. This heightened awareness resulted in a desire among individuals and coastal communities to be better prepared to withstand and recover from coastal hazards.

Georgia: Utilizing surveys within a mix of community-level engagement approaches (by Jill Gambill, University of Georgia Marine Extension and Georgia Sea Grant)

In 2011, my colleagues at the University of Georgia and I began working with the small barrier island community of Tybee Island, Georgia, to assist

their local government in preparing for SLR over the next 50 years. This grant-funded partnership resulted in the first SLR plan in Georgia and one of the first municipal plans to be adopted in the entire Southeastern United States. Developing a process for engaging local political leaders and the broader public took time. We anxiously watched a standoff unfold in North Carolina, where state legislators, business leaders, and advocacy groups grappled with the potential economic repercussions of SLR for the state. The issue of how quickly SLR would accelerate in the years ahead held, and still holds, enormous implications for real estate, development, and coastal industries. As we ventured into a similar conversation in Georgia, we worried about the potential fallout of what was, at the time, a very polarizing topic.

To obtain more buy-in from the community, we employed several strategies. First, we decided that we would not swoop in as "experts" and tell Tybee Island residents how to solve their problems. Instead, we utilized a community-driven, participatory approach, where local leaders and community members determined their risk tolerance and prioritized actions for making the island more resilient. Second, we used traditional public engagement approaches. We participated in town hall meetings, presented to the Tybee Island City Council, facilitated small group discussions, conducted real-time polling, and pushed out information through broadcast, print, and social media. Community champions helped spread updates and solicit feedback through neighborhood Listservs and email blasts.

The final Tybee Island Sea Level Rise Adaptation Plan was unanimously approved by the city council in May 2016 and went on to receive several national awards (Evans et al., 2016). It was, by all accounts, a significant achievement. However, even the best-laid plans can provide lessons in hindsight. In our first meeting with the Tybee Island City Council, a central concern emerged around the role of private property and the possibility that the city council's efforts to mitigate SLR could stir up legal and political sensitivities. Upon reflection, a survey could have helped us better gather community feedback on values, perceptions, experiences, and priorities. Two years after Tybee Island's plan had been adopted, a graduate student in the University of Georgia's Master of Environmental Planning and Design program conducted a survey on the island. The survey remained open for two weeks in March 2018 and received a convenience sample of 185 responses. Some of the results were surprising.

The majority of respondents indicated that they had already been affected by SLR (Sauer, 2018). Most expressed support for measures such as elevating buildings, buying out land at risk of flooding, restoring wetlands, and enhancing dunes. An overwhelming majority expressed a willingness to work with their neighbors to implement adaptation measures. When shown a map of Tybee Island and asked to identify a place in need of protection, accommodation, or retreat, the area of greatest concern was the residential backside of the island. The possibility of tackling the threat of SLR to

private properties seemed within reach. Knowing that the public recognized the vulnerability of these neighborhoods helped the local government take action. Tybee Island received a grant from the National Fish and Wildlife Foundation to develop a community-centered blueprint for mitigating flood exposure. One of our first steps will be to conduct a survey to assess current risk perceptions, identify adaptation opportunities, and examine the public's willingness to pay for various actions.

California: Supporting adaptation planning and policy through survey assessments of coastal professionals (by Phyllis Grifman, Sea Grant Program, University of Southern California, and Susanne Moser, Susanne Moser Research & Consulting)

The California Coastal Adaptation Needs Assessment is, to our knowledge, the only longitudinal study of its kind anywhere in the United States involving surveys every five years with coastal adaptation professionals in the state (Finzi Hart et al., 2012; Moser et al., 2018; Moser & Tribbia, 2006; Tribbia & Moser, 2008). In conducting these needs assessments, we aimed to (1) understand the changing status of coastal adaptation; (2) evaluate how improved scientific information, tools, and science-practice interactions might move adaptation efforts forward; (3) identify needs for information, training, technical assistance, financial, and other support; and (4) in tracking the answers over a decade, assess what difference technical and financial assistance made in advancing coastal adaptation.

The needs assessment surveys took place in 2006, 2011, and 2016, a period characterized by the initial emergence and then rising prominence of SLR on the state and local policy agenda in California. An executive order in 2005 mandated that California state agencies "report on mitigation and adaptation plans to combat [the] impacts" of climate change. In 2007, the California Natural Resources Agency initiated state-level adaptation planning; a year later, an executive order directed state agencies to plan for SLR and climate change impacts. In 2009, the state released its first statewide adaptation strategy. Since then, adaptation has gained in prominence, driven, in part, by the emergence of climate change impacts and extreme events all across California, including coastal flooding and extreme high tides. State legislation has further advanced adaptation policy, maybe most significantly by mandating that local governments – when updating their general plans and hazard mitigation plans – account for climate change impacts and environmental justice.

A number of adaptation policies have been adopted specifically supporting coastal adaptation. The two regulatory coastal state agencies have a long-standing interest in SLR, dating back to the 1980s. One of these, the California Coastal Commission, released guidance to local governments in 2015 on how to integrate SLR considerations when updating Local Coastal Programs. In 2018, the Commission released guidance on how homeowners

can adapt to growing coastal risks. Its sister agency in the San Francisco Bay, the Bay Conservation and Development Commission, undertook parallel efforts to develop policy and procedures for integrating SLR into Bay shoreline development. Meanwhile, driven by concerns of then-Governor Jerry Brown, the California Ocean Protection Council requested an update on SLR science in 2017 to inform the update of its SLR Policy Guidance. This guidance is aimed at both state and local governments.

To build on the 2006 and 2011 assessments and ensure broad statewide coverage, the University of Southern California (USC) Sea Grant Program and Susanne Moser Research and Consulting combined forces and partnered with 13 other coastal organizations to develop and distribute the third assessment. We administered an updated version of the extensive survey instrument in the summer and fall of 2016 to target populations in local, regional, state, federal, and private sectors, and non-governmental organizations involved in coastal management and adaptation. The total survey population was more than 2,700. The partners involved, the response rate, and the survey population were very similar to the previous survey population engaged in 2011, enabling a statewide comparison.

Over the course of the three needs assessments, we have observed significant shifts. The most important overarching finding is that SLR has become the leading present-day coastal management concern. We also found that coastal adaptation, across California, has become more advanced over the last 15 years.

Feedback from state and federal agencies suggested that the 2011 survey results motivated a state investment of $2.5 million for coastal adaptation planning. Subsequent funding in the form of grants to coastal communities for Local Coastal Program updates came from the California Coastal Commission, the State Coastal Conservancy, and the California Ocean Protection Council, totaling approximately $8,250,000 overall (California Coastal Commission, 2020).

Following the release of the second and third needs assessments, the partners on the survey project were the primary users of the survey results, planning their technical assistance and training on the basis of the identified needs. The insights also informed larger shifts in how services are provided to coastal professionals. For USC Sea Grant, one of the chief uses of the survey was the development of a regional approach to capacity building for coastal communities, such as the Regional AdaptLA program. Workshops, training, and webinars were based on the stated needs of survey respondents. This program, seeing how adaptation planning had advanced from 2011 to 2016, pivoted to cover new subject areas, particularly the stronger prioritization of SLR issues and related adaptation approaches.

The findings from the surveys pointed to the continued need for capacity building for coastal professionals, funding to support risk assessments, and the exploration of new adaptation approaches. State agencies, from the Governor's Office to the California Natural Resources Agency, have

provided support to coastal jurisdictions as they comply with a growing body of state mandates. However, the need to generate consistent and sufficient financial support for large-scale implementation of adaptation projects remains unmet. Active outreach from the survey partner organizations to state policymakers and agencies, on the basis of periodic updates to the needs assessment, will continue to bring these unmet needs to the attention of state-level decision-makers.

Connecticut: Funding sea-level rise survey research within a Sea Grant portfolio (by Syma Ebbin, Connecticut Sea Grant and University of Connecticut)

Founded in 1974 as a marine extension program, Connecticut Sea Grant (CTSG) became a full-fledged state Sea Grant program in 1988 with a mission to "generate and provide science-based information and tools to help Connecticut residents and communities balance diverse coastal and marine interests and adapt to changing conditions" (CTSG, 2017, p. 2).[2] Like other state Sea Grant programs, CTSG leverages state funding to match federal research investments and serves as a boundary organization, with staff engaged in outreach and education programs to produce and communicate relevant information. Sea Grant prides itself on being a "neutral and objective broker of science-based information" (CTSG, 2017, p. 3). Its state programs have been identified as boundary organizations because they select and support cutting-edge, relevant, and actionable natural and social science research that contributes to achieving strategic planning objectives and then communicate that research to managers and stakeholders. CTSG staff convene stakeholders, translate and disseminate scientific information, and conduct trainings, all with the purpose of "foster[ing] the wise use and conservation of coastal and marine resources of the Long Island Sound (LIS) estuary, as well as work[ing] regionally, nationally and globally on issues of relevant concern" (CTSG, 2017, p. 1).

As its research coordinator, I administer all CTSG's research funding programs, including the omnibus research and development awards, and administer the CTSG side of the various graduate and undergraduate fellowship opportunities. Around 2011, the National Sea Grant program formed a social science "community of practice" (COP), in which I participated. The COP issued several research calls that aimed to grow the amount of coastal- and marine-focused social science research. CTSG's research portfolio for the past few years included several social science research projects that utilized survey methods to address questions surrounding climate change adaptation. The COP has noted that augmenting Sea Grant's research efforts in the social sciences can help illuminate the socioeconomic constraints to behavior change among our target audiences and stakeholders, provide decision-support tools for managing value/valuation conflicts, and facilitate more reflective and intentional practices.

Connecticut is a densely populated state with heavy development along the coastline adjacent to Long Island Sound. Rising at an ever-increasing rate from a baseline of about nine inches per century (CT CEQ, 2019; O'Donnell, 2019), higher sea levels threaten coastal communities as well as natural habitats, including the ecologically critical fringing salt marshes (smaller or narrower salt marshes that line the edges of bays and rivers and that border the coastal margin) that have already suffered substantial declines due to human activities (Basso et al., 2015). Combined with more intense and possibly frequent storms exacerbated by anthropogenic (or human-generated) climate change, scientists anticipate more coastal flooding, erosion, and impactful storm surges (U.S. Environmental Protection Agency, 2016). The two CTSG-funded survey projects described below address these threats and provide insights into the impacts of SLR on the coastal region and how to manage ongoing and anticipated future changes.

In 2014, CTSG supported a study of public support for adaptation to SLR. Chris Elphick, a professor in the University of Connecticut's Department of Ecology and Evolutionary Biology, worked with doctoral student Chris Field and conservation social scientist Ashley Dayer to develop a statewide survey to assess coastal landowners' attitudes and behavioral intentions regarding the impacts of SLR on their properties. Of 3,050 initial survey contacts, 1,002 completed the surveys (a 33% response rate). The results were used to understand public preferences for conserving marshes as they migrate due to SLR. Residents said they were not likely to enter into popular land protection strategies such as conservation easements (or constraints on land use by the landowner), but there was slightly more support for restrictive covenants and future interest agreements, in which the landowner agrees to sell their property to a conservation organization and receives fair market value if a flood reduces the property value by more than half.

The researchers found that educating people about climate change or ecosystem services was not the most effective way of attaining more support for conservation. Instead, strategies that emphasized fairness related to incentives for conservation agreements were seen as more effective (Elphick et al., 2017). "Research that combines social science and ecology is challenging," noted Chris Field. "But the insights we can gain into how landowners are likely to determine the future of coastal ecosystems are critical for better understanding conservation and policy options as coastal communities continue to adapt to sea level rise" (Balcom, 2019, p. 15).

In 2016, CTSG funded another research project focused on the willingness of Connecticut residents to engage in adaptation to coastal inundation and flooding. Stephen Swallow, a professor in the Department of Agricultural and Resource Economics, used surveys to conduct a choice experiment related to stated preferences regarding management scenarios used to address adaptation to SLR on Connecticut's shoreline (Swallow et al., 2019). Focus groups and an online survey were used to understand inland residents' preferences for adaptation in 24 coastal towns; 1,147 respondents

took the online survey (response rate of 9.5%). The researchers found that a majority of individuals who lived in coastal towns, but further from the shoreline and thus less at risk from SLR, still desired to help those likely to be more heavily affected (Dumaine, 2019). These residents supported plans to reduce the loss of natural ecosystems such as beaches, saltmarshes, and fish populations. They also indicated support for adaptation strategies that assist vulnerable homeowners in retreating or defending their homes, with some increase in support if buyouts are voluntary or the homeowners of vulnerable properties contribute a larger share of the adaptation costs.

The Connecticut Department of Energy and Environmental Protection (CT DEEP) – the Connecticut agency responsible for developing environmental regulations – was named as an end-user of both projects' research results. However, the director of its Land and Water Resources Division, Brian Thompson, indicated that research has not yet been used in the policy arena and the agency has been conservative regarding adaptation efforts. Thompson commented, "The wheels of policy and regulatory change turn very slowly. I think the research has informed thought processes but has not yet resulted in change." The newly initiated process created by Governor Lamont – the Governor's Council on Climate Change, labeled the GC3 – began in early 2020 but was slowed by the COVID-19 pandemic. Thompson said he hoped the GC3 process would be reinvigorated and that the council would review relevant research, including the two CTSG-funded projects discussed. "There will be lots of opportunities to bring that research into the process moving forward," he noted. Stitching together the interface of policy and science, whether generated by the natural or social sciences, takes time and dedicated efforts. CTSG has worked to both support the production of science and make it available to policymakers, facilitating adaptive efforts at local, state, national, and even international levels.

Discussion

This chapter illustrates a number of ways that surveys have been designed and implemented with the goal of facilitating coastal adaptation. While surveys are regularly used to understand people's attitudes and policy preferences for mitigating the *causes* of climate change, in this chapter, we highlight the use of surveys in adapting to place-specific coastal climate change *impacts*. Each of the four cases presents unique approaches to survey design, implementation, and data use. Within these examples, surveys have been used to (1) raise issue awareness among the public, (2) design outreach and education programs, (3) assess policy viability, (4) inform state action, and (5) generate policy-relevant social science research to inform governance decisions. However, the decision of whether to implement surveys as a part of climate change adaptation planning processes, and how and when, can be complex to navigate. We conclude this chapter by discussing five lessons from the case studies and implications for future research and practice.

Lesson 1: Implement surveys among a mix of participation methods

As revealed by the case studies, surveys are just one tool for public participation and communication in the context of climate change adaptation, and their deployment can be highly complementary to other outreach and education efforts. From workshops and deliberative exercises to public meetings and surveys, each stakeholder participation method has strengths and weaknesses with respect to the representativeness of the views gathered and perceptions of influence and involvement in decision-making processes (Chase et al., 2002, 2004). For example, in Georgia, Gambill observed it is critical to gather public input beyond traditional public meetings by using mixed method approaches like geodesign,[3] focus groups, and interviews (Gambill et al., 2017). In North Carolina, Miller described the online survey as one component of the state's public outreach strategy, which prefaced public review of its draft policy statement and contributed to the design of education and outreach programs. Connecticut Sea Grant-funded researchers paired focus groups with surveys of coastal towns.

Lesson 2: Identify clear project goals

Implementing stakeholder participation activities – including surveys – can be motivated by a number of goals, such as gathering public input and improving or informing decisions (Chase et al., 2002). Additionally, stakeholder participation can vary with respect to the degree of influence, authority, and power that their voices are afforded in the decision-making process (Chase et al., 2002; Raik et al., 2008). Identifying goals, and working from a clear orientation toward community involvement at the project outset, supports decisions about the geographic scale, time frame, representativeness, and design of the survey. As exhibited in the case studies, the geographical scope of surveys can vary from state, regional, and local to even hyper-local. Surveying at the appropriate jurisdictional scale(s) can ensure that stakeholders within these communities are appropriately represented. For example, in Georgia, Gambill knew that local residents' views were most important for the decision-making context and should be prominent. Another lesson from Georgia has been to ensure that surveys include marginalized communities who may be disproportionately affected by climate change. As the team has engaged these communities, it has compensated respondents for their participation and conducted in-person surveys to overcome technology barriers.

Lesson 3: Align survey research with policy (and political) processes

Planning for sea-level rise is an iterative, long-term process that can become highly politicized. Surveys can play different roles at distinct stages and over extended periods of time. For example, in California, Grifman and Moser

explained how their longitudinal survey tracked trends. By maintaining a set of consistent questions and tailoring a subset to investigate the evolving context, surveys can both benchmark progress and explore new issues as they arise, providing timely input to government programs and decision-making. Similarly, Miller in North Carolina used the state's online survey to estimate levels of public SLR understanding in advance of policy and outreach initiatives and to raise issue awareness. Miller said that if he were to do another survey, it would parallel the types of decisions currently before the state, such as asking the public to evaluate adaptation policy options.

The political dimensions of pursuing adaptation policies can serve as both perceptual and real barriers to decision-making and stakeholder participation. In North Carolina, even though public opinion from the survey revealed support for state actions, when a draft state policy was released, organized groups were able to significantly hinder adaptation policy progress by appealing for legislative intervention. Conversely, Gambill discerned from her work on Tybee Island that findings of public support through surveys helped local leaders build confidence in tackling difficult issues and illustrated what policy options are potentially palatable, reducing concern about potential political opposition. Negotiating the interests of the broad public and particular stakeholder groups versus the concerns of organized interest groups is a longstanding challenge within policymaking, particularly regarding climate change (Brulle, 2020). Surveys are one of the ways that decision-makers can be informed about true levels of social consensus within communities.

However, policies do not necessarily change just because scientific data are published. As Ebbin noted in Connecticut, the results of two survey-based studies have yet to be used by the state due to the slow pace of policy change and disruptions from COVID-19. Both policymaking and research are slow processes. The design and execution of surveys can be time-consuming, ranging from a couple of months to more than a year. Efforts to include survey data in decision-making processes must consider planning timelines. For example, in California, where both climate assessments and adaptation policy initiatives advanced on different but interrelated timelines, the longitudinal survey informed ongoing agency and adaptation service provider decisions, raised policymakers' awareness, and stimulated funding initiatives. These outcomes were the result of researchers actively engaging state agencies and policymakers, either in producing the survey or by sharing survey results.

Lesson 4: Take a co-production approach

If the goal for the survey is to inform government actions, researchers need to have an understanding of how decision-makers could use the survey data – whether in vetting policy preferences, designing educational programs, or using the results to inform or legitimize policy decisions. Optimally, the

survey design and execution itself is co-produced, ensuring that the information gathered is relevant to emerging decisions (Djenontin & Meadow, 2018). For example, the North Carolina survey was conducted in collaboration with the state, which allowed the state to shape the instrument to its internal needs and the researchers' interests. The 2011 and 2016 California needs assessments were conducted by a collaboration of coastal organizations, which also constituted the biggest users of the findings. For the same reason, Connecticut Sea Grant requires its grantees to identify the users of the research information in grant proposals and develop an education component or an outreach plan that translates those results for external audiences.

But under the best circumstances, the use of survey research by decision-makers – like that of all scientific research – can be limited by a wide range of barriers (Lemos et al., 2012; Oliver et al., 2014). As described by Lemos and colleagues (2012), climate change information may not be a good fit for decision-makers' needs based on the information's accuracy, reliability, credibility, salience, and timeliness. Additionally, it may not be usable because of an organizational lack of capacity or culture, or infrequent and poor communication between the information provider and user may make it appear untrustworthy or illegitimate. When building close relationships between researchers and decision-makers to co-produce information is not feasible due to time or financial constraints, Lemos and colleagues recommend shaping the information in ways that make it more relevant to specific types of decision-makers who have similar needs to increase the likelihood that it is widely used (p. 792).

Lesson 5: Be judicious in interpreting survey data

Even after making careful decisions about the design and testing of questionnaires, modes of delivery, and identification of the survey sample, the interpretation of surveys can be challenging (Heberlein, 1976). Decision-makers should take care in interpreting and using survey data, especially in evaluating stakeholder preferences or likely behavior. Because surveys expand the reach of communication beyond those that are already highly involved in the issue, the people who receive them often have little knowledge about the topic or hold any prior opinion. As a result, the survey itself can serve to raise awareness – as Miller found in North Carolina – but the answers that people give may be more for the purpose of doing the minimum to complete the survey (known as "satisficing") than indicative of any deeply held convictions (Krosnick et al., 1996). As a result, in contexts where small-sized issue groups have strong opinions (e.g., North Carolina), their voices can obscure those of the masses who are supportive but whose attitudes are weakly held and are unmotivated to become civically engaged. Using mixed methods can address these types of concerns. For example, one way to evaluate potential opinion change and its likely directionality is

to implement small group meetings that use pre- and post-surveys to detect changes in public opinion after stakeholders have interacted with other community members and became well-informed on the issues (Akerlof et al., 2016; Fishkin, 2011).

Often, what decision-makers want to know is not just what people think but what adaptation actions people are likely to take. Predicting behaviors can be particularly difficult from survey responses. Surveys typically ask questions about knowledge, attitudes, and behavioral intent, but researchers have found that there is a wide range in their ability to explain what people do within a specific context as related to an individual's stated intent and other precursor variables (Ajzen et al., 2009). Therefore, preference studies like those conducted in Connecticut can provide a lens on how audiences might respond to various adaptation policy options but may be less informative about what people will actually do when faced with the need to make real decisions and take concrete actions. Surveys that measure actual behavior – for example, actions of coastal residents after the devastation caused by extreme weather events – can be time-sensitive and difficult to conduct but can bridge these gaps.

Conclusion

Communities of stakeholders and coastal residents have important roles to play in climate adaptation decision-making. But adaptation professionals and researchers are faced with a difficult balancing act: developing participation strategies that can elicit a depth of rich interpersonal communication experiences and full representation of stakeholder and resident voices. Surveys can raise issue awareness, guide the development of education and outreach programs, assess policy validity, promote representative decision-making, and generate research that informs governance. The case studies and discussions presented here offer a variety of practical considerations for using surveys for climate change adaptation. However, there is much opportunity for future research to more systematically document broader uses of the survey in furthering climate change adaptation processes – even perhaps through a survey.

Notes

1 We use communication to denote the process of information transferal or exchange, and engagement to denote forms of communication in which participants become more deeply "cognitively, emotionally, behaviorally, professionally, socially, spiritually, civically and/or politically involved" (Moser & Pike, 2015, p. 112).
2 Connecticut Sea Grant is part of the National Sea Grant College Program, which was established by Congress in 1966.
3 Geodesign is an interdisciplinary, collaborative framework that integrates design and geospatial technologies.

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