

New England **Climate Adaptation** PROJECT



Case Study **Dover, New Hampshire**

PRODUCED BY:

Massachusetts Institute of Technology Science Impact Collaborative
Consensus Building Institute
National Estuarine Research Reserve System
October 2014

Acknowledgements

This Case Study was prepared by the Massachusetts Institute of Technology Science Impact Collaborative and the Consensus Building Institute, with the assistance of the Great Bay National Estuarine Research Reserve and partners in the City of Dover. It was produced as part of the New England Climate Adaptation Project, an effort funded by the National Estuarine Research Reserve System Science Collaborative.

Carri Hulet from the Consensus Building Institute provided guidance for the content of this Case Study. The graphic design and layout were done by Takeo Kuwabara and Julie Curti at MIT. The cover photo was by Pat Corlin.

Lawrence Susskind

Principal Investigator, MIT Ford Professor of Urban and Environmental Planning

Patrick Field

Principal Investigator, Managing Director of CBI

Danya Rumore

Project Manager and Collaboration Lead, PhD Candidate in Environmental Policy and Planning at MIT and Associate at CBI

Casey Stein

Report Author, Master of City Planning, MIT 2014

Rebecca Silverman

Writing Support, Bachelor of Science, MIT 2014

About the MIT Science Impact Collaborative

The Massachusetts Institute of Technology Science Impact Collaborative (MIT SIC) is a research group focused on developing and testing new ways of harmonizing science, politics and public policy in the management of natural resources and resolution of environmental disputes. MIT SIC's tools and approaches include collaborative adaptive management, joint fact-finding, scenario planning, collaborative decision-making and multi-stakeholder engagement, and the use of role-play simulation exercises.

MIT SIC was established in 2003 with initial support from the United States Geological Survey. Today, the research group has numerous partners and supporters, ranging from the U.S. National Estuarine Research Reserve System to the Dutch research organization TNO. By engaging in community-based action research projects, MIT SIC researchers—including doctoral students, masters students, and faculty from the MIT Department of Urban Studies and Planning—train emerging environmental professionals while simultaneously testing the latest environmental planning methods and providing assistance to communities and policy-makers who seek our help.

Visit the MIT Science Impact Collaborative website for more information: <http://scienceimpact.mit.edu>

About the Consensus Building Institute

The Consensus Building Institute (CBI) is a not-for-profit organization founded in 1993 by leading practitioners and theory builders in the fields of negotiation and dispute resolution. CBI's experts bring decades of experience brokering agreements and building collaboration in complex, high-stakes environments — and possess the deep understanding required to tackle negotiation and collaboration challenges in our practice areas. CBI's Founder, Managing Directors, and many of our Board members are affiliated with the Program on Negotiation at Harvard Law School and the MIT-Harvard Public Disputes Program.

Visit the CBI website for more information: <http://www.cbuilding.org>

About the Great Bay National Estuarine Research Reserve

The National Estuarine Research Reserve System (NERRS) is a network of 28 areas representing different biogeographic regions of the United States that are protected for long-term research, water-quality monitoring, education, and coastal stewardship. The reserve system is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. Reserve staff work with local communities and regional groups to address natural resource management issues, such as non-point source pollution, habitat restoration and invasive species. Through integrated research and education, the reserves help communities develop strategies to deal successfully with these coastal resource issues. Reserves provide adult audiences with training on estuarine issues of concern in their local communities. They offer field classes for K-12 students and support teachers through professional development programs in marine education. Reserves also provide long-term water quality monitoring as well as opportunities for both scientists and graduate students to conduct research in a “living laboratory.”

Located on the Great Bay Estuary in New Hampshire, the Great Bay National Estuarine Research Reserve encompasses 10,235 acres, including approximately 7,300 acres of open water and wetlands. It is managed by the New Hampshire Fish and Game Department and is supported by the Great Bay Stewards. Great Bay is often referred to as “New Hampshire’s hidden coast.”

Visit the Great Bay National Estuarine Research Reserve website for more information: <http://www.greatbay.org>

Table of Contents

Acknowledgements	2
Executive Summary	6
Introduction and Overview of NECAP	9
Situation Assessment	10
Workshops in Dover	15
Key Findings	20
Increased awareness and concern about local climate change risks and adaptation	21
Increased sense of local-level responsibility	22
Support for incorporating climate change planning into everyday decision-making	23
Increased confidence in the City of Dover's ability to address climate change risks	24
Perceived barriers to action	25
Suggested pathways forward	27
Usefulness of role-play simulations as a tool for climate change adaptation education	29
Conclusion	33
Project Staff and Partners	35

Executive Summary

This report summarizes findings from the New England Climate Adaptation Project's (NECAP) work in Dover, New Hampshire, from fall 2012 through spring 2014. The project aimed to increase public awareness about climate change risks and adaptation opportunities in Dover and build support for local adaptation efforts. NECAP workshops engaged a diverse set of city residents to test whether role-play simulations tailored to the city's particular setting could be effective as a public education tool for learning about climate change risks, adaptation, and collaborative decision-making.

Prior to writing the simulation and running the workshops, project staff assessed the range of climate change risks facing the city (the Summary Risk Assessment) and interviewed key stakeholders to determine current perceptions about these risks and the potential for adaptation (the Stakeholder Assessment). These findings were complemented by a public poll of 100 randomly selected Dover residents to establish baseline opinions about local climate change risk and adaptation.

Key Takeaways from the Summary Risk Assessment Include:

- Projections indicate that Dover is likely to experience increased precipitation, more extreme precipitation events, sea level rise, temperature increases, more days of extreme heat, and fewer days of extreme cold as a result of climate change. If not managed and prepared for, these climatic changes could threaten Dover's population, buildings, infrastructure, and ecosystems.
- Increased flooding is one of the most significant climate change risks facing Dover, especially along the Bellamy and Cochecho rivers.
- In response to extreme weather events, Dover has worked to improve its physical infrastructure and emergency response services. Nevertheless, the city is at considerable risk from climate change impacts, and there are many adaptation options that Dover can and should consider to improve upon what has already been done.

Key Takeaways from the Stakeholder Assessment Include:

- Although stakeholders typically did not refer to changes they had observed in the climate as "climate change," they were generally aware of and concerned about more extreme storms and rising temperatures. Flooding was a top climate-related concern among those interviewed, particularly flooding of the Bellamy and Cochecho rivers during storms.
- When it comes to climate change adaptation activities, most stakeholders expect the city to take the lead. However, interviewees expressed some doubt about Dover's readiness to take on climate change adaptation projects. Many interviewees saw public disbelief in climate change and/or a lack of public awareness about climate change risks as a key barrier to adaptation. The cost of adapting to climate change was also seen as a key challenge.
- Despite these challenges, many interviewees expressed confidence in the community's ability to learn about climate change impacts and pursue adaptation options. Many stakeholders thought that communicating climate change information to the public could help catalyze climate change adaptation efforts in Dover.

Key Takeaways from the Public Poll Include:

- About 64 percent of poll respondents reported being “somewhat concerned” to “very concerned” about the impacts of climate change on their community. These poll findings point to a higher level of concern about climate change in Dover than perceived by stakeholders, as indicated in their interviews. The climate-related concern that typically topped the list among poll respondents was ecosystem impacts, followed by severe storms and increased flooding.
- When asked to choose who should be responsible for preparing for the possible impacts of a changing climate on their community, the most common first response of public poll respondents was individuals (33 percent), followed by the national government (21 percent) and the state government (18 percent).
- The poll illuminated a gap in public confidence about Dover's ability to prepare for and adapt to climate change. While about 81 percent of participants said they believed climate change risks should be taken seriously in government decisions, only 34 percent felt that addressing climate change risks would actually be “somewhat significant” to “very significant” in the city's planning and decision-making over the next decade.

Key Takeaways from the Workshops

The Summary Risk Assessment and Stakeholder Assessment provided the basis upon which project staff wrote a tailored role-play simulation for Dover. In fall 2013, project staff ran eight workshops in the City of Dover and surrounding communities, engaging participants in the simulation. Through the simulation, workshop participants were invited to assume roles representing the key interests of city residents in a city very similar to Dover and to try to reach consensus on what adaptation policies to recommend to city leaders. Data was collected during workshops to allow project staff to gauge the effectiveness of the intervention. The workshops and subsequent data analysis revealed seven key findings from the role-play simulation workshops:

- 1. Increased awareness and concern about local climate change risks and adaptation.** While many participants were already concerned about climate change impacts prior to the workshop, involvement in the activity led to statistically significant increases in concern. Follow-up interviews indicate that, in addition to increasing concern about climate change risks, the workshop broadened many participants' understanding of projected local impacts and adaptation options.
- 2. Increased sense of local-level responsibility.** Participation in the workshops increased participants' perception that local parties have an important role to play in addressing climate change risks.



Image 1. Flooding in Dover; credit: Strafford Regional Planning Commission

- 3. Support for incorporating climate change planning into everyday decision-making.** Both public poll respondents and workshop participants (surveyed before and after the workshop) expressed significant support for incorporating climate adaptation into everyday planning in Dover.
- 4. Increased confidence in the City of Dover's ability to address climate change risks.** While many public poll respondents and workshop participants held the view that Dover should start taking future climate considerations into account now, their confidence that the city would actually do so was quite low prior to the workshops. Workshop participation increased confidence in local adaptation action, effectively reducing the "confidence gap" between what people think the city should do and what they think will actually be done.
- 5. Perceived barriers to action.** Lack of agreement on what to do, lack of financial resources, and lack of public support were widely perceived as the three largest barriers to climate adaptation in Dover by workshop participants.
- 6. Pathways forward.** Workshop participants generally expressed an interest in undertaking a collaborative problem-solving process to help the city move forward on climate change adaptation. A large majority of both public poll respondents and workshop participants pointed to the importance of stakeholder engagement. While there was widespread support of a consensus-building approach, concerns and caveats were frequently raised.
- 7. Usefulness of role-play simulations as a tool for climate change adaptation education.** Many workshop participants indicated that there was a need to communicate and share information about climate change risks and climate change adaptation, and they also expressed support for using role-play simulations as a component of a public education and engagement strategy. One of the benefits of using role-play simulations is that it encourages a better understanding of different perspectives and increases empathy for those with different beliefs or interests. However, workshop participants did see potential limitations in role-play as a tool for addressing climate change issues.

These findings provide insight into Dover residents' opinions regarding the management of climate change risks and adaptation at the local scale. They also indicate that role-play workshops can have a positive impact on public attitudes about climate change risk and adaptation.

Introduction and Overview of NECAP

The New England Climate Adaptation Project (NECAP) recognizes the serious threats that climate change poses to coastal communities, including an increased risk of intensified storms and flooding, sea level rise, saltwater intrusion into marshes and farmland, coastal erosion, and destruction of infrastructure and coastal properties. To help communities assess and decrease their vulnerability to climate change, the project engaged four coastal New England cities and towns in public climate adaptation workshops: Wells, Maine; Dover, New Hampshire; Barnstable, Massachusetts; and Cranston, Rhode Island. At the workshops, residents were invited to participate in role-play simulations tailored to their community. These games put residents into different roles representing various local constituencies and challenged them to reach agreement about potential adaptation policy options for a fictitious town similar to their own real town. The goal was to test this hands-on approach to public education about climate change adaptation and collective decision-making to solve challenging public problems. The project sought to investigate current perceptions about barriers to and solutions for climate change risk management and to test whether widespread use of such role-play simulations could help move a town toward proactive adaptation planning.

NECAP is a collaborative research partnership between the MIT Science Impact Collaborative (MIT SIC), the National Estuarine Research Reserve System (NERRS), the four New England coastal towns mentioned above, and the Consensus Building Institute (CBI). At the project outset, NERRS staff identified potential partner towns to serve as sites. The NERRS partner in New Hampshire, the Great Bay National Estuarine Research Reserve, identified Dover as a potential partner community because it is a medium-sized coastal city in close proximity to both MIT and the Great Bay Reserve, and the city was in the beginning stages of thinking about and planning for climate change risk and adaptation. In addition, local leaders from the Dover Planning Department were interested in participating in NECAP and were willing to commit time and resources to the project.

The project was officially launched in August 2012. During the first year, climate scientists at the University of New Hampshire produced downscaled climate change projections for Dover and the three other project sites. These projections provided the best possible scientific estimate of what the future climate will be like in each partner community. Projections were produced for temperature, precipitation, sea level rise, and a number of other key climate indicators, including extreme precipitation and extreme temperature events. NECAP staff worked with technical climate change experts and municipal partners to translate these climate projections into a Summary Risk Assessment for each site. Each Summary Risk Assessment broadly explains how projected climate changes could affect the municipality, providing a broad-brush evaluation of key local risks and potential adaptation options.

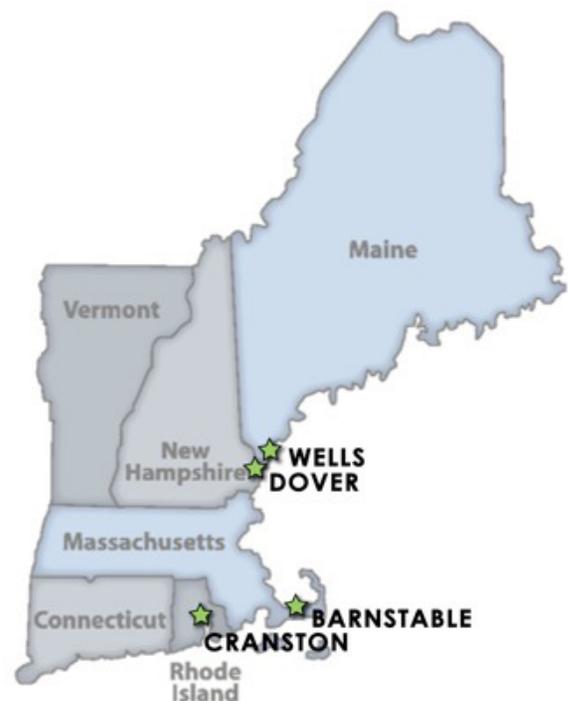


Image 2. NECAP towns; credit: NECAP staff

NECAP staff simultaneously conducted a stakeholder assessment for each community. This involved interviewing 15 to 20 key stakeholders at each site to gather their views about climate change risks and adaptation options. Dover's interviewees included local government officials; business owners; environmental organization representatives; engineering professionals; and residents. During the interview process, stakeholders were shown the climate change projections for their community and were asked to react to these forecasts. Findings from the stakeholder interviews were then used to write a Stakeholder Assessment document, which interviewees reviewed for accuracy and completeness. The Stakeholder Assessment was then shared with project partners and other officials in each municipality to inform their planning and public engagement strategies going forward.

Based on the stakeholder and risk assessment findings, MIT project staff wrote a role-play game tailored to each test site. In Dover, the role-play game was about the fictitious city of Northam, which was given a geography and population very similar to Dover as well as the same vulnerabilities and climate change risks. The role-play was designed to model for community stakeholders a collective approach to local policy-making on climate change risks.

Before running the NECAP role-play simulation workshops in Dover, project staff commissioned an independent firm to poll 100 randomly selected Dover residents via landline to establish baseline opinions about climate change risk and adaptation in the city. This poll, conducted in May 2013, will be referred to as the "public poll" throughout this report.

Between June and December 2013, NECAP staff ran eight workshops in the Dover area and engaged 120 participants in role-play simulations and follow-up debriefings. At the workshops, all participants began by filling out surveys to establish their baseline opinions on climate change risk and adaptation. They then completed a second survey at the end of the workshop to establish whether the experience had affected their views. Approximately four to six weeks after the workshops, NECAP staff conducted in-depth follow-up interviews with 35 participants to determine the longer-term effects, if any, of participation.

Key findings from the Dover Summary Risk Assessment, Stakeholder Assessment, and initial public poll are discussed below in the Situation Assessment section. The Situation Assessment is followed by an overview of the methodology used to develop and run the climate change adaptation workshops in Dover. The case study concludes with a detailed discussion of key findings from the workshops.

Situation Assessment

Dover is a coastal city in southeastern New Hampshire within the Piscataqua River watershed. The city's population is about 30,000, making Dover the largest community in the New Hampshire seacoast region. Dover was also the fastest growing community in New Hampshire between 2000 and 2010. While only a small portion of Dover is located directly on the estuary, tidal rivers run through the city, notably the Cochecho and Bellamy rivers. Median household income in Dover is around \$55,890, significantly less than New Hampshire's median household income of \$64,925. Approximately 10 percent of Dover residents live below the poverty level. The racial makeup of the city is predominantly white, accounting for more than 90 percent of the population.¹

¹ U.S. Census Bureau. Dover (city), New Hampshire. Last Revised 27 March 2014.
<http://quickfacts.census.gov/qfd/states/33/3318820.html>

Summary Risk Assessment

The Summary Risk Assessment for Dover, available in full at necap.mit.edu, outlines likely future climatic conditions projected for Dover, as well as major risks and vulnerabilities.² The risk assessment projects potential climate change impacts for both a low-emissions scenario and a high-emissions scenario across short-, medium-, and long-term time frames. The low-emissions scenario assumes that economies will shift to cleaner technologies that are less dependent on fossil fuels. The high-emissions scenario assumes that the world will experience economic growth dependent primarily on fossil fuels. The low- and high-emissions scenarios were contrasted to a historic baseline from data collected between 1980 and 2009.

According to these projections, Dover can expect temperature increases, increased precipitation, more extreme precipitation events, and rising sea levels as a result of climate change. These changes present risks that, if not managed, could threaten Dover's population, buildings, infrastructure, and ecosystems.

Projections estimate that between 2070 and 2099, the average annual maximum temperature in Dover could increase by 4.6 to 9.0 degrees Fahrenheit. Days of extreme heat (days where temperatures rise above 90 degrees Fahrenheit) are projected to increase from the historic baseline of 10 days per year to between 31 and 75 days a year. Similarly, the number of days of extreme cold (days where the temperature drops below freezing) is expected to decrease from the historical average of 155 to between 132 and 102 (see Figure 1).

Climate projections indicate that Dover can expect more annual precipitation and more extreme precipitation events in the future. For example, under the high-emissions scenario, the number of events

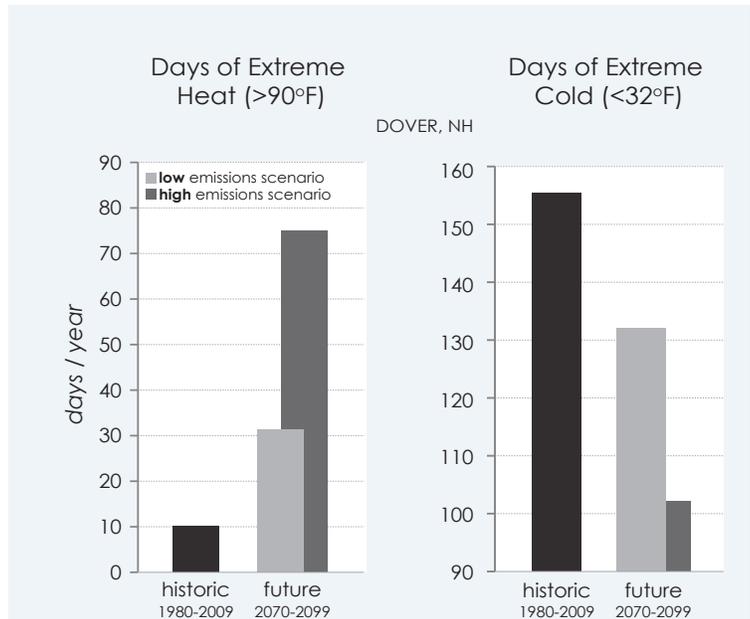


Figure 1. Temperature ranges, historical and projected

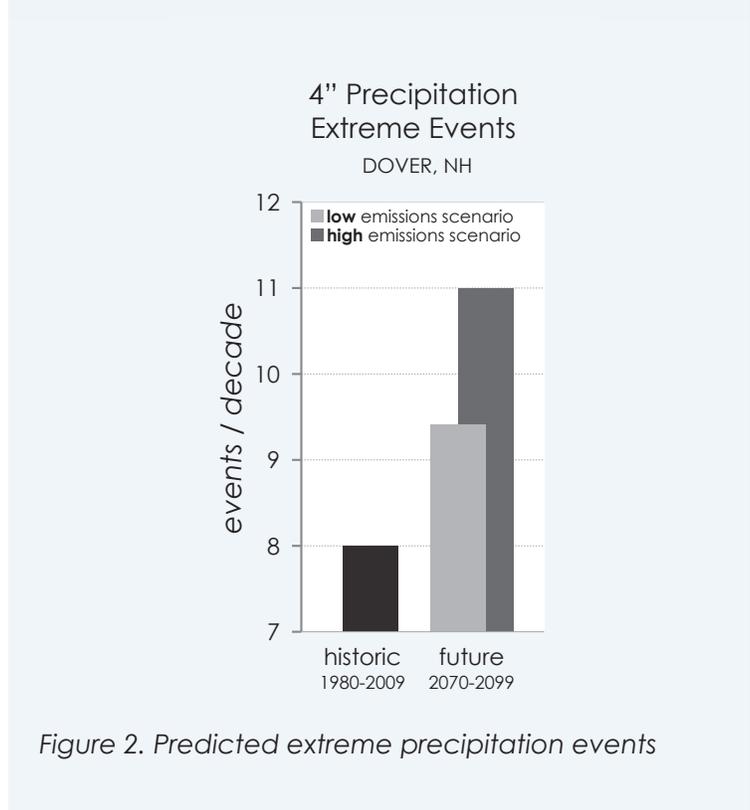


Figure 2. Predicted extreme precipitation events

² The direct link to the project's Summary Risk Assessment is <http://necap.scripts.mit.edu/necap/risk-assessments/>

in which 4 inches of precipitation fall in 48 hours is projected to increase by three additional events per decade in the long term, for a total of 11 events per decade (see Figure 2). By 2085, sea level rise in Dover is expected to increase by between 2 feet in the low-emissions scenario to almost 5 feet in the high-emissions scenario from the historic baseline. While the majority of Dover is 80 feet above sea level and thus not directly at risk from sea level rise, storm surge and higher sea levels can interfere with the drainage of rivers into the ocean, causing rivers to flood.

For this reason, increased riverine flooding is expected to be the greatest climate change risk facing Dover. Flooding along the rivers could impact surrounding residences, businesses, and ecosystems, including the Bellamy River Wildlife Management Area and Bellamy Reserve.

The projected increased frequency of extreme precipitation events is also expected to increase flooding due to stormwater runoff. In developed areas, there are many impermeable surfaces and stormwater runoff flows quickly off these surfaces into drainage ditches and streams. During high precipitation events, large volumes of water can carry debris and sediment with it, significantly eroding stream banks and washing out roads. Stormwater runoff also has the potential to cause sewer system overflows, carrying contaminants into local waterways. Large volumes of runoff can significantly damage stormwater infrastructure.

Additionally, the risk assessment indicates heat waves may become more frequent and severe, groundwater supplies may become less reliable, and changing temperatures and precipitation patterns may significantly impact local and regional ecosystems in Dover.

Stakeholder Assessment

Stakeholder Assessment interviews conducted with 18 key stakeholders in Dover revealed concerns about threats similar to those identified in the Summary Risk Assessment. Although stakeholder interviewees did not commonly talk about climate change using scientific terminology, they had noticed changes in the weather, such as “freak storms,” “hotter summers,” and “less snow.” Most interviewees expressed a belief in and a concern about climate change—even those who struggled to clearly define it. However, there were those who questioned whether the changes in the weather might simply be haphazard variations. Even among those who acknowledged a trend toward hotter, wetter conditions, there was some disagreement about whether the changes were induced by human activities or part of a natural cycle.

Flooding—especially storm-related flooding of the Bellamy and Cochecho rivers—was at the top of interviewees’ climate-related concerns. Flooding from sea level rise was also mentioned, but less frequently and with less specificity about what the impacts of such flooding might be. Stakeholder interviewees also expressed concerns about other risks, including the impact of heat waves on the elderly and on those without air conditioning, the effects of power losses during storms, and the risk of having less snowpack to recharge the aquifer. Some stakeholders were also highly concerned about potential environmental impacts, such as the loss of salt marshes.

Many stakeholders broadly expressed the idea that “stewardship” should be the governing principle guiding the relationships between residents, the city government, and the environment. When it comes to activities related to climate change adaptation, most stakeholders expect the city to take the lead. According to interviewees, Dover has done, or is currently doing, a number of things to adapt to observed and anticipated changes in the weather, although

climate change was not necessarily cited as the reason for these actions. A number of these efforts are specifically aimed at improving infrastructure and increasing the city's capacity to handle extreme weather events.

However, interviewed stakeholders expressed some doubts about Dover's readiness to take on climate change adaptation projects due to an assumption that disbelief in climate change was widespread in Dover and/or that there was a lack of awareness or education about what such changes could mean for the city. Dover's tax cap and the costs associated with adaptation projects were also seen as key barriers to addressing climate change impacts proactively. Another major challenge identified by stakeholders was that adaptation is not a priority in the city.

Despite these challenges, many interviewees expressed confidence in the community's ability to learn about climate change impacts and pursue adaptation options—if the public becomes informed. In fact, many stakeholders thought that communicating climate change information to the public could help catalyze climate change adaptation efforts in Dover. In general, interviewees supported the idea that the city should actively explore adaptation options.

For more information on the views of key stakeholders in Dover, refer to the Stakeholder Assessment developed by the New England Climate Adaptation Project, available in full at necap.mit.edu.³

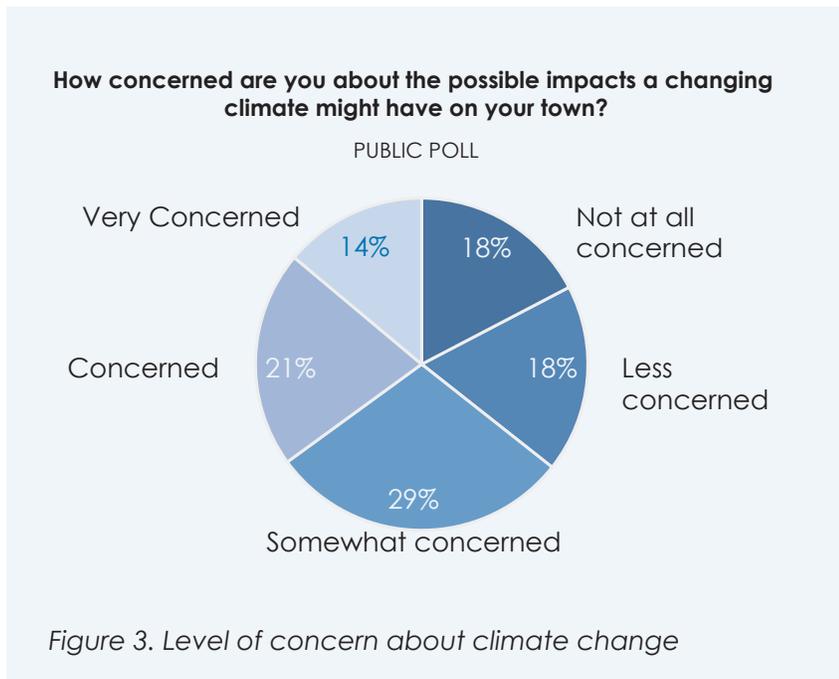
Public Poll Findings

The independent public poll of 100 Dover community members conducted prior to the project's launch provides a broad baseline measure for understanding local perceptions about climate



Image 3. Flooding in Dover; credit: Strafford Regional Planning Commission

³ The direct link to the project's Stakeholder Assessment is <http://necap.scripts.mit.edu/necap/stakeholder-assessments/>



change risks, barriers, and solutions.⁴ These poll findings point to a higher level of concern about climate change in Dover than stakeholders indicated in their interviews. Almost half of public poll respondents reported that they “often” think about how climate change will affect their community, and another 23 percent reported thinking about it “every once in a while.” Furthermore, when asked about the level of risk posed by climate change, 55 percent of respondents answered “very high” or “high,” while only 18 percent said the risk was “low” or “very low.” Similarly, about 64 percent of poll respondents reported being “somewhat concerned” to “very concerned” about the impacts of

climate change on their community. However, it is important to note that many of those fell into the “somewhat concerned” category, indicating that addressing climate change risks may not be a priority for many respondents (See Figure 3).

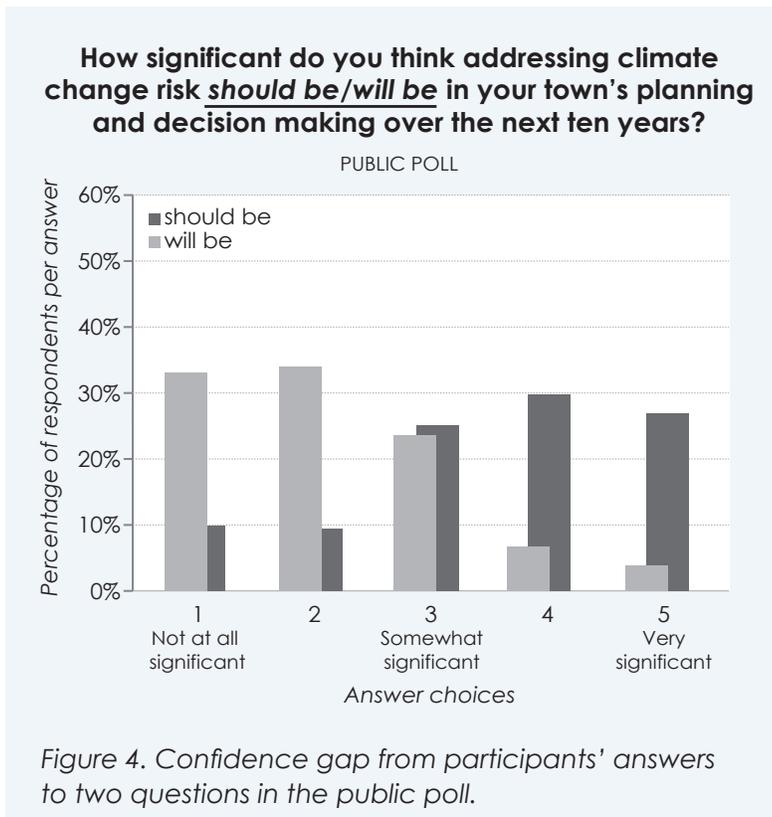
The climate-related concern that typically topped the list among poll respondents was ecosystem impacts (25 percent), followed by severe storms (21 percent), and then increased flooding risk (14 percent). About 15 percent of respondents said they believed there would be “no significant impact” from climate change.

When asked to choose who should be responsible for preparing for the possible impacts of a changing climate on their community, the most common first response given was individuals (33 percent). Approximately 21 percent said the national government, 18 percent said the state government, and 14 percent said the city government as their first response. This finding is somewhat at odds with the expectations of stakeholder interviewees, many of whom expect the city to take the lead. When asked if residents, local groups, and businesses should be involved in making decisions about how to respond to climate risks, about 63 percent of public poll respondents agreed that such involvement was “important” or “very important.”

The public poll findings also indicate that a majority of respondents support Dover taking action on climate change. About 81 percent of people polled indicated a belief that addressing climate change risks should be “somewhat significant” to “very significant” in Dover’s planning and decision-making over the next 10 years. Similarly, almost 60 percent of respondents agreed that decision-makers should take scientific projections about what the climate might be like in 50 years into account when making decisions today.

However, the poll also illuminates a gap in public confidence about the city’s ability to pre-

⁴ A sample size of 100 people is commonly used for broad-brush public opinion polls and provides for a 10% margin of error, regardless of the population size.



pare and adapt for climate change. While about 81 percent of participants reported that they thought climate change risks should be taken seriously in government decisions, only 34 percent said they believed addressing climate change risks actually would be “somewhat significant” to “very significant” in the city's planning and decision-making over the next decade (see Figure 4). This latter statistic is in line with the sentiments expressed in the Stakeholder Assessment, which demonstrated that many interviewees doubted that Dover was ready to take on climate change adaptation projects. While this project did not explore the reasons for this “confidence gap,” there are a number of potential explanations. It is possible that, despite the results of the poll showing that a majority of Dover residents are aware of and concerned about climate change, these residents—like the stakeholders interviewed—perceive themselves to be

in the minority and thus without sufficient clout to effect change. There may also be a tendency to see adaptation as a big, expensive undertaking, rather than as one that can be managed through every day planning. Another possible explanation is that Dover citizens lack trust in government.

Workshops in Dover

Dover Role-play Simulations

After conducting the Stakeholder Assessment and Summary Risk Assessment, project staff wrote a tailored role-play simulation for Dover. NECAP staff then ran seven workshops in Dover and one in the neighboring community of Greenland between June and December 2013, engaging a total of 120 participants.

Each workshop lasted approximately two and a half hours. The first 15 minutes were designated for people to check in and the next 15 minutes for providing the group with an overview of the NECAP project and an introduction to the Dover simulation. Participants were then given half an hour to read their game materials. The role-play portion of the workshop ran for one hour, and the final 30 minutes were devoted to a group debriefing. This involved discussing participants' role-play experiences and considering how to apply the lessons learned in their own communities.

The role-play simulation created for Dover is based on the findings of the Summary Risk Assessment and Stakeholder Assessment, reflecting the main climate threats facing the city as well as the political dynamics and history of Dover. However, to provide a safe space for participants to engage, staff intentionally developed the scenario for a fictitious city called Northam.

The Northam role-play simulation focuses on the issue of stormwater management, because Dover has a history of problems surrounding stormwater runoff, specifically water quality and flooding issues. Dover's stormwater system is currently underfunded, and older portions of the infrastructure have fallen into disrepair. Although the stormwater system receives funds from the General Fund portion of the city budget, it often falls lower on the priority list than other city needs. This funding shortfall prompted Dover to form a committee a couple of years ago to look into establishing a reliable funding stream to improve stormwater management. However, the committee's recommendation—that the city establish a stormwater utility—was ultimately voted down by the City Council in early 2011.

In order for Dover to meet long-term stormwater commitments to the U.S. Environmental Protection Agency and prevent future flooding, the city will need to do something to address its runoff problems. Furthermore, Dover's stormwater issues are likely to get worse in the future as climate change projections indicate that the number of extreme precipitation events in the city is expected to increase.

For all these reasons, the Northam role-play simulation centered on the issue of stormwater management. During the hour-long role-play simulation, participants were asked to assume different roles in the city, and, with the help of a trained facilitator, try to come to a consensus around three key issues:

- 1) Which climate projections should the city require engineers to use when designing stormwater infrastructure?
- 2) How much stormwater should developers be required to manage on site?
- 3) If there are any changes to the regulations, when should they go into effect?

Each participant in the Northam role-play simulation received a set of background instructions that included an overview of the scenario, a summary of the issues under consideration, a short description of each representative at the table, and an excerpt from Northam's subdivision regulations. In addition, each person received a set of confidential instructions specific to the role he or she was assigned to play. These roles were: the city engineer, the planning director, the public works director, a resident, the president of the Chamber of Commerce (who is also a developer), the Conservation Commission chair, and the professional facilitator. Each set of confidential instructions was broadly based on the findings of the stakeholder interviews conducted in the winter of 2012–2013, although roles often combined the interests and perspectives of multiple real-world stakeholder groups.

Outreach Strategy

The team used a multifaceted outreach strategy to attract Dover residents to participate in the role-play workshops. By intent, the first workshop primarily comprised people interviewed for the Stakeholder Assessment, City of Dover employees, and Great Bay National Estuarine Research Reserve staff. Building on their recommendations for who should be engaged in future

workshops, the team generated an email list of potential participants that continued to expand throughout the fall. The team relied on civic organizations, places of worship, political organizations, educational institutions, and business associations as channels to attract diverse community members to the workshops. Leaders of these organizations were asked to announce workshop opportunities to their memberships. In addition, the City Planning Department and the Great Bay Reserve publicized the workshops via their email lists and by briefly presenting the project at meetings they attended. City partners talked about the project on the radio. The team also posted fliers at downtown businesses and institutions and asked participants to share their workshop experiences with family, friends, and colleagues. Plus, project staff implemented a raffle, giving workshop participants the chance to win gift certificates to downtown businesses.



Image 4. Dover workshop; credit: Chris Keeley

One of the principle recruitment strategies in Dover was the use of “co-hosts.” Beginning in August, NECAP staff and partners from the city and the Great Bay Reserve reached out to organizations that might be interested in hosting or co-hosting workshops. Co-hosts were organizations that volunteered to “sponsor” the event, which meant that they were responsible for inviting their professional and personal connections to attend. Co-hosts were not responsible for any financial contributions, nor were they responsible for running the event. Five out of the eight games were sponsored by at least one co-host. These included an education assessment company, a brewery, the school board, an environmental organization, a community organization whose mission is to preserve and revitalize the downtown, a local children’s museum, and boards and organizations affiliated with local government. In return for their efforts, co-hosts were given the chance to speak about their organization at the workshops, and their organization’s names were included in event materials.

Despite the team’s multifaceted approach, recruiting sufficient participants for the Dover workshops proved challenging. The success of the co-host strategy varied; some co-hosts were able to bring in more than 10 people, while others were only able to recruit a couple of participants. Additionally, the team’s main method of outreach—email—did not seem to be the most effective way to reach Dover residents. The survey administered at the workshops revealed that only about a quarter of participants learned about the event via email. About a quarter of participants found out about the workshop through friends, and almost half of the participants reported learning about the event through some other method. These methods included hearing about the workshop from a relative or co-worker or via an announcement from the Dover Planning Department or the Great Bay Reserve partners. For example, one partner from the Great Bay Reserve encouraged a class at the University of New Hampshire to come to the workshop, and quite a few of those students attended.

Project staff also learned that using the phrase “game” in project advertising materials may have turned off some residents, so the team changed the messaging on workshop announce-

ments and posters to describe the event as a “workshop” and “role-play simulation.” However, the team did not notice a significant difference in attendance following this adjustment in outreach strategy.

Data Collection and Analysis

NECAP staff administered surveys to all workshop participants before and after each event. For the remainder of this document, these surveys will be referred to as “pre-surveys” and “post-surveys,” respectively. Complete survey data was collected from 115 workshop participants. The surveys sought to measure participants’ concerns about climate change risk as well as their opinions about barriers to adaptation and possible solutions. Many of the same questions appeared in both the pre- and post-surveys so it would be possible to measure any change caused by participation in the workshops. Each workshop ended with a debriefing, which sought to capture people’s impressions about the activity and the prospect of managing the risks associated with climate change. Project staff also conducted 35 in-depth follow-up interviews with workshop participants four to six weeks after each simulation. These interviews probed more deeply into what participants took away from the workshops.

After the final Dover workshop in December 2013, MIT staff analyzed the data. Survey results were coded for anonymity and entered into a database. Project staff tallied statistically significant shifts between the pre- and post-survey results.⁵ Graduate student staff also compared workshop survey data to the public poll data conducted at the start of the project to look for any major similarities or differences in the views of those who attended the workshops versus residents in general. Project staff transcribed every qualitative interview and examined them for key themes and takeaways. Debriefing notes were similarly organized and analyzed.

Workshop Participants

The gender breakdown for attendees of the eight Dover-area workshops was almost identical to the breakdown in the public poll: There was an approximately even split between women and men. However, workshop participants did differ from polled residents in several important ways. They tended to be older than public poll respondents; about a third of workshop participants were over the age of 60, compared to only 26 percent of public poll respondents. Workshop attendees were also more liberal than public poll respondents (44 percent of workshop participants said their political viewpoint was liberal compared to 19 percent of public poll respondents) and fewer of them reported living in the community year-round (81 percent of workshop participants compared to 97 percent of polled respondents). Fewer workshop participants reported living in the community for more than 20 years (35 percent of participants compared to 46 percent of public poll respondents). They tended to have reached higher levels of education than public poll respondents—52 percent of workshop participants had a graduate degree compared to only 24 percent of poll respondents. A higher percentage of workshop participants also belonged to environmental groups than public poll respondents (42 percent of workshop participants versus 27 percent of those polled). Although the post-survey results suggest that workshop participants tended to have higher incomes than poll respondents, it should be noted that these demographics could be skewed since 42 percent of those polled chose not to answer this question, while only 13 percent of workshop participants chose not to answer, thus making it difficult to accurately compare the two numbers. See Figure 5 for additional demographic statistics.

⁵ In this paper, statistical significance refers to significance at the 95 percent level, unless otherwise noted.

	PUBLIC POLL		WORKSHOP SURVEYS	
AGE	COUNT	PERCENTAGE	COUNT	PERCENTAGE
29 & Under	16	14.2%	16	14.4%
30-39	12	10.9%	14	12.6%
40-49	28	24.5%	18	16.2%
50-59	27	24.1%	27	24.3%
60+	30	26.3%	36	32.4%
LENGTH OF RESIDENCE				
Less than 1 year	7	5.9%	12	10.6%
1-3 years	3	2.8%	10	8.8%
3-10 years	24	21.4%	18	18.6%
10-20 years	27	24.2%	27	19.5%
20+ years	30	45.7%	36	35.4%
Other	0	0%	8	7.1%
TYPE OF RESIDENCE				
Year-round	110	97.3%	99	80.5%
Summer	1	.9%	4	3.3%
Autumn	0	0%	4	3.3%
Winter	0	0%	3	2.4%
Spring	0	0%	3	2.4%
Holidays only	0	0%	0	0%
I am here sporadically	0	0%	2	1.6%
Other	2	1.8%	8	6.5%
POLITICS				
Conservative	28	25.1%	12	10.6%
Liberal	21	18.7%	50	44.2%
Independent	62	54.7%	44	38.9%
Other	2	1.6%	7	6.2%
ENVIRONMENTAL GROUP MEMBERSHIP				
No	83	73.3%	65	58.0%
National group	4	3.1%	17	15.2%
Local group	18	15.9%	18	16.1%
Yes, other	9	7.7%	12	10.7%
EDUCATION				
No formal schooling completed	2	1.6%	0	0%
High school graduate (or equivalent)	34	30.2%	7	6.1%
Bachelor's degree	47	41.3%	46	40.4%
Graduate degree (JD, MA, MSc, PhD)	27	24.1%	59	51.8%
Other	3	2.9%	5	1.8%

Figure 5. Comparison of public poll and workshop participant demographics

Overall, workshop participants tended to be more concerned about climate change than public poll respondents. For example, 88 percent of workshop participants on the pre-survey answered that they were “somewhat concerned” to “very concerned” about the possible impacts of a changing climate on their community, compared to 64 percent of poll respondents. Similarly, workshop participants were somewhat more likely to regard climate change as risky, with 63 percent reporting that they thought the level of risk associated with climate change was “high” or “very high,” compared to only 55 percent of poll respondents. This is unsurprising given that workshop participation was voluntary and therefore more likely to appeal to the portion of the population that was already concerned about climate change.

While the Dover workshop population differed somewhat from the public poll respondents, this did not significantly interfere with the project objectives because one key goal was to model a way in which city decisions about climate change adaptation planning could be made collaboratively. The people who attended the workshops may actually be more likely than Dover residents in general to get involved in trying to influence local political decisions. Consequently, engaging these stakeholders could theoretically have an even greater impact on adaptation planning than engaging a “representative sample” of Dover residents at large.

Key Findings

The analysis of the Dover data was guided by two overarching research questions. The first, “What are the major impacts or effects of the role-play workshop on participants?” sought to identify whether people changed their thinking as a result of participating in the workshops. The second, “What did we learn about the attitudes of Dover residents regarding the management of climate change risks and the possibilities of climate adaptation?” sought to provide a snapshot of the level of public “readiness” and “willingness” to engage in adaptation planning.

The major findings from the Dover workshops fall into seven categories—increased awareness and concern about local climate change risks and adaptation; increased sense of local-level responsibility; support for incorporating climate change planning into everyday decision-making; increased confidence in the City of Dover’s ability to address climate change risks; perceived barriers to action; pathways forward; and the usefulness of role-play simulations as a tool for climate change adaptation education. These are detailed in the sections that follow.

How concerned are you about the possible impacts a changing climate might have on your town?

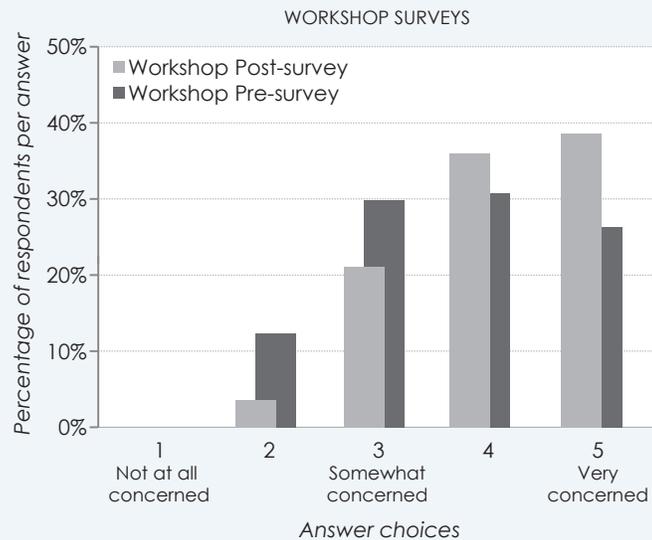


Figure 6. Levels of concern among Dover workshop participants before and after the workshops

Increased Awareness and Concern about Local Climate Change Risks and Adaptation

Many people in Dover are concerned about climate change impacts. As discussed above, 55 percent of residents surveyed in the public poll said they believe the level of risk associated with climate change is “high” or “very high,” and 64 percent of public poll respondents are “somewhat concerned” to “very concerned” about the possible impacts a changing climate might have on Dover. Workshop participants showed even higher levels of concern on the pre-survey, with 63 percent saying climate change risk is “high” or “very high,” and 88 percent being “somewhat concerned” to “very concerned” about the possible impacts a changing climate might have on Dover.

While many workshop participants were already concerned about climate change impacts prior to the workshop, participation in the workshop led to a statistically significant increase in concern. For example, in response to the question “How concerned are you about the possible impacts a changing climate might have on your town?” 27 percent of workshop participants said that they were “very concerned” before the workshop; 39 percent gave this answer after the workshop (see Figure 6).

Although many workshop participants reported being concerned about climate change prior to the workshop, follow-up interviews suggest many may not have had a comprehensive understanding of what climate change and adaptation means for Dover. For example, although a large majority of interviewees said they had considered the effects of climate change on Dover prior to the workshops, most of them outlined only one or two risks.

In light of this baseline understanding, it is notable that in about a quarter of follow-up interviews, residents indicated that the workshop had broadened their understanding of local impacts and adaptation options. One interviewee noted that the role-play simulation illustrated “the vast amount of different areas that can be affected due to climate change” and that it showed him “how climate change can have such an effect on even a small place like Dover.” Another participant remarked, “The discussion about the local businesses and the Chamber of Commerce input—that was a piece I had never really thought a lot about—and how the cost of climate change affects them.” A third participant noted that he had not previously thought about making developers manage stormwater on site.

Some of the people interviewed were surprised that climate change planning could have such a large impact on stormwater, businesses, development, and infrastructure. One participant commented that the game made him think about the type of effects climate change will have on stormwater, how that will affect development, and the related financial impacts on developers and businesses. Another participant said that the “biggest eye-opener” for him was, “It’s not just a brook or stream or river just overflowing its banks. ... There’s a lot more to it. It’s the construction of buildings and ... paving parking lots.” Prior to the workshop, one participant noted that while she had thought about “things getting inundated,” she “didn’t really think about all of the other kinds of things that were being brought up” such as the effect on infrastructure and possible preventive measures.

Although participation in the simulation appears to have broadened many people’s understanding of climate change risks and adaptation options, several people commented that the role-play alone would not ensure that residents acquired a basic level of information about climate change and its projected impacts on Dover. People suggested pairing the role-play simulation with a lecture about climate change and its effects and preparing a handout highlighting

climate change risk information for Dover. One participant noted, “Even though the numbers that were used for the imaginary community [in the role-play simulation] were grounded in reality ... that still doesn’t mean that people are going to take those numbers and tell them to their friends or internalize them in a way that they would if they were connected specifically to Dover.”

Increased Sense of Local-level Responsibility

Public poll respondents and workshop participants in Dover gave somewhat different answers when asked who should be responsible for taking action to adapt to climate change. In response to the question “If the climate is changing, who do you think should be responsible for preparing for the possible impacts this might have on your community?” the most commonly stated first choice by poll respondents was individuals, followed by the national government. In contrast, prior to participating in the role-play simulation, workshop participants prioritized involvement of city and state governments in the pre-survey, which featured the same question.⁶



Image 5. Flooding in Dover; credit: *Strafford Regional Planning Commission*

Moreover, workshop participation appears to have led to an increased emphasis on local parties as having responsibility for dealing with climate change impacts. This trend is reflected in participant responses to the question “If the climate is changing, who do you think should be responsible for preparing for the possible impacts this might have on your community?” When answers to the pre- and post-surveys were compared, a statistically significant shift appeared—away from emphasizing the responsibility of the state and national governments and towards emphasizing that of local businesses. City government remained the most frequently selected option on both the pre- and post-surveys; views on that did not change significantly as a result of the workshop. However, it is important to note that the survey question only asked for participants’ top three choices, so there is no reason to conclude that participants believe the state and national governments have no role to play. Rather, this result indicates an increase in some participants’ perception that local actors should play a role in addressing climate change. On a similar note, in the workshop post-survey, 90 percent of respondents said that it was “important” or “very important” for residents, local groups, and businesses to be involved in deciding how to respond to climate change risks.

Data from the follow-up interviews point to a similar conclusion. About a third of those interviewed indicated that the workshop affected their opinion of who should be involved in climate change planning. In particular, interviewees often indicated that the workshop either broadened their idea of who should be involved or led to an increased emphasis on the role that

⁶ Due to differences in survey design, project staff was unable to directly compare the public poll responses to the workshop survey responses. The public poll reports only which option respondents stated first, even if they listed two or three options. The workshop surveys, on the other hand, allowed participants to select up to three options, all of which were recorded.

local actors—government, organizations, businesses, and residents—could play in addressing climate change risks. One interviewee noted that it “opened my eyes as to the responsibility of local government and local organizations in the community ... We can as communities control the climate change effects that are happening in our communities. ... I think that we do have more power than we think.” One emergency management professional noted that before the workshop, he would have left preparing for climate change up to “the MIT scientists and people that deal with climate each and every day”; after the workshop, he said he “definitely learned that ... I need to take a bigger role in it.” A few of those interviewed also indicated that the workshop had sparked their interest in becoming more involved in climate change issues on the local level in the future.

It is possible that the game design itself may have played a role in the changes described above. It is notable that the Dover game did not include any state or national representatives. The stakeholders “at the table” were representatives of the local government and other local interests. In addition, the costs of some of the measures under consideration in the role-play simulation, such as managing stormwater on site, would fall on local developers. Another consideration is that this series of workshops was sponsored by local government.

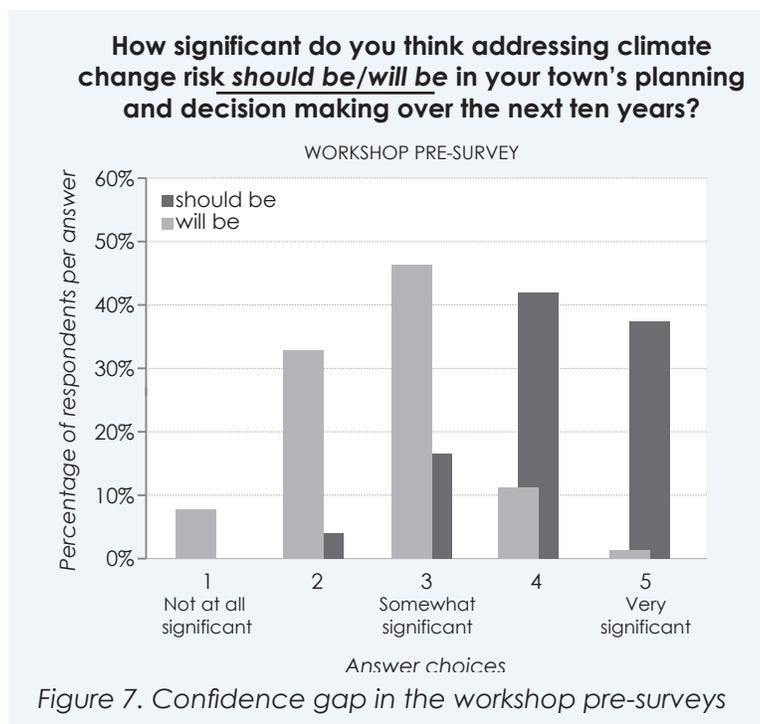
Support for Incorporating Climate Change Planning into Everyday Decision-making

There appears to be significant support in Dover for incorporating climate change into the everyday planning of local government. About 81 percent of public poll respondents thought that addressing climate change risks should be “somewhat significant” to “very significant” in Dover’s planning and decision-making over the next decade.

Workshop participants appeared to be even more supportive than public poll respondents of the idea that climate adaptation planning decisions should be integrated into daily decision-making by local government. The vast majority of workshop participants said addressing climate

change risks should be “somewhat significant” to “very significant” in Dover’s planning and decision-making over the next decade (96 percent on the pre-survey and 97 percent on the post-survey). Additionally, in response to the survey question “What do you think local decision-makers should do now to address climate change, if anything?” 84 percent of workshop participants on both the pre- and post-survey answered that the single most urgent thing should be changing “the way they make every day planning and infrastructure decisions.”

While incorporating climate change into everyday planning was not a large theme in either the interviews or the workshop debriefings, it is interesting to note that a couple of key Dover officials

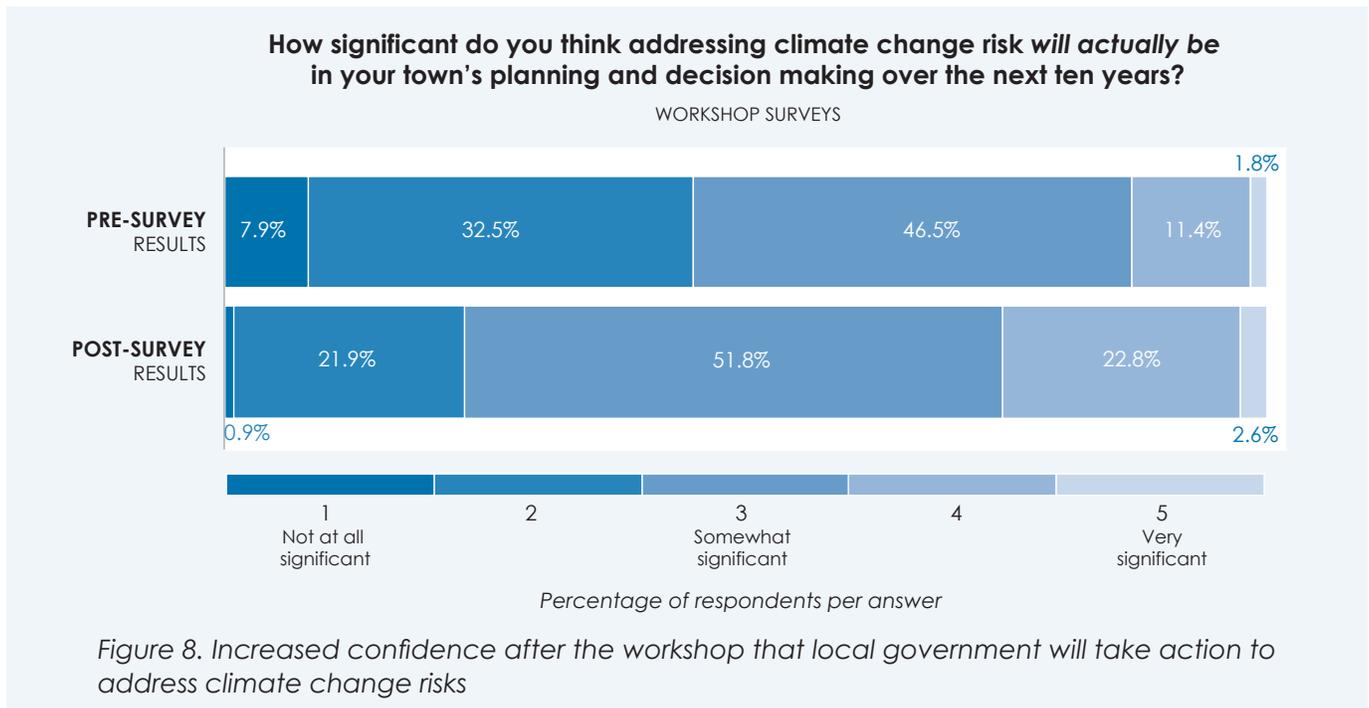


who attended the workshops commented on this idea. For example, one government official observed that he feels that when department heads in Dover get together to make decisions in the future, they “will take a more active role” in climate change planning because many of them participated in the NECAP project.

Increased Confidence in the City of Dover’s Ability to Address Climate Change Risks

As discussed above, while many public poll respondents reported believing that Dover should take future climate changes into account now, there is a “confidence gap” between the actions people think their government should take and what they believe the government will actually do. This confidence gap was also evident among workshop participants. In response to the survey question “How significant do you think addressing climate change risk should be in your town’s planning and decision-making over the next 10 years?” 79 percent chose “significant” to “very significant” on the pre-survey. In contrast, when asked “How significant do you think climate change will actually be in your town’s planning and decision-making over the next 10 years?” only 13 percent answered “significant” to “very significant.” These findings suggest that there is a lack of confidence among Dover residents regarding the city’s ability to effectively respond to climate change risks locally (See Figure 7).

Given these results, an important finding is that participation in the workshops contributed to an increase in confidence that local government could and would take action to address climate change risks. After the workshops, in response to the question “Has your confidence in the ability of your town to prepare for the risks of a changing climate changed as a result of your participation in this exercise?” around 42 percent of participants reported an increase in confidence, while only 5 percent reported a decrease in confidence. In addition, in answer to the question “How significant do you think climate change will actually be in your town’s planning and deci-



sion-making over the next 10 years?" there was a statistically significant shift in the after-survey toward the belief that climate change planning would be more significant. For example, after the workshop, the percentage of participants who said they thought climate change would be "significant" to "very significant" in the city's planning and decision-making over the next 10 years increased from 13 percent to 25 percent (see Figure 8). Moreover, in response to the survey question "How confident are you that your town will be able to respond to climate risk?" there was a statistically significant shift toward participants feeling more confident in their city government after the workshop.⁷

Follow-up interviews with workshop participants provided some possible explanations for these upward shifts in confidence. Interestingly, several interviewees offered unprompted observations about this topic, indicating either explicitly or implicitly that their increase in confidence was at least in part due to the city's willingness to participate in this project. One participant had read that Dover was one of only three or four communities in New England that was participating in NECAP and commented that he "was kind of impressed" that Dover was thinking about this kind of thing and "maybe Dover is a lot more proactive" than he had previously thought. Another participant noted that the workshop "gave me some confidence that the city officials and citizens were really trying to engage in this. And that gave me some hope that Dover as a community can ... do some good planning." A follow-up interviewee who had recently moved to Dover commented that the workshop gave her confidence in the city, because it showed her that "they want people engaged"; she also said, "I was happy that I picked a town that would be open to something like this."

There is also some support for the idea that clear and visible support from local government at the actual workshops may have been a factor that contributed to increased confidence. One interviewee noted that she "liked the fact that there was a clear sort of partnership [between the city, MIT, and the Great Bay Reserve] and that the city was really behind [the workshop] ... so that gave it a lot of legitimacy." A participant at the first workshop, which was attended by the mayor and members of the City Council, reflected that she was "very impressed that the city was doing it at all and even more impressed when I got there and I was sitting across from the mayor and half the City Council."

There are some limitations to the findings cited above. First, although confidence in the city increased after the workshop, the magnitude of this change appears to be modest. Second, it is unclear how much of the increase in confidence is attributable to using role-play simulations.

Perceived Barriers to Action

In both the pre- and post-surveys, workshop participants were asked, "If the climate is changing, what is most likely to prevent your community from taking action?" They were presented with a list of choices and asked to choose no more than three. On the pre-survey, workshop participants identified "lack of agreement on what to do" (25 percent), "lack of funding or financial resources" (25 percent), and "lack of public support" (21 percent) as the three largest challenges. On the post-survey, workshop participants identified the same three barriers to a similar degree: "lack of agreement on what to do" (27 percent), "lack of funding or financial resources" (25 percent), and "lack of public support" (23 percent).

While the similarity between the pre- and post-survey responses indicates that the workshop did not lead to a reprioritization of perceived barriers, follow-up interviews suggest the role-play

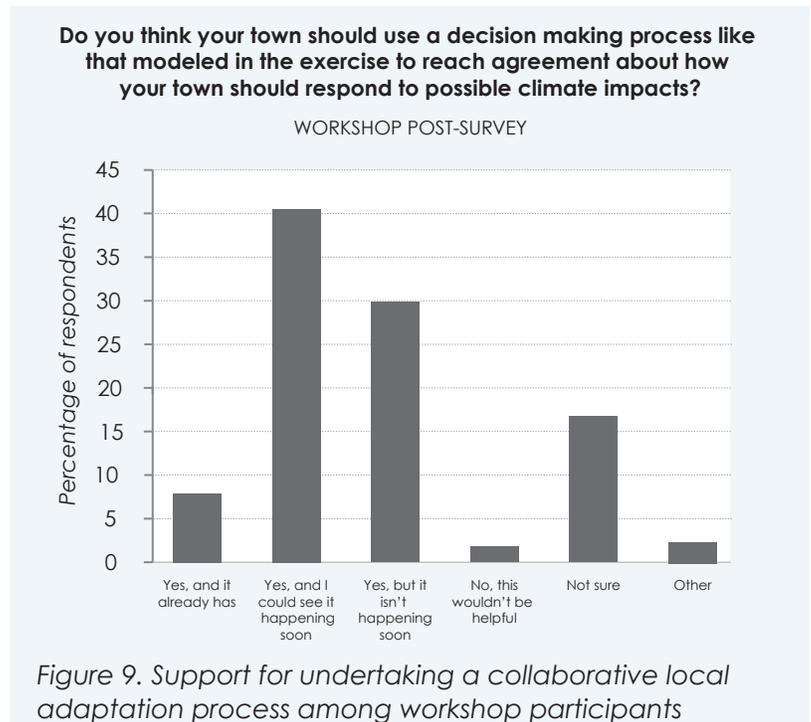
⁷ This finding was statistically significant at the 90 percent level.

simulation may have reinforced, or led to a shift in, participants' understanding of the challenge of tackling a "lack of agreement." Specifically, more than a quarter of those interviewed said that the role-play simulation demonstrated the difficulty of addressing climate change impacts because there are so many competing views and interests. One follow-up interviewee noted that the workshop underlined the fact that "it is not easy, you gotta be patient ... you gotta be persistent, and you gotta be in there for the long haul. ... People have very strongly held beliefs." Other comments from the interviews included, but were not limited to: "This really opened my eyes to just how complicated [reaching consensus] could be at a local level" and "[The workshop] highlighted the difficulty of having all the people at the workshop or at the table trying to make these decisions; everyone has different amounts of knowledge, everyone has different opinions and priorities and concerns."

A few other interviewees commented that the workshop made them realize that doing something about climate change could be a longer and slower process than they expected. For example, one person said, "You realize that there are going to be barriers and there are going to be naysayers and you know it might be a longer road to reach consensus than what I think any individual would imagine, when there are so many different viewpoints." Another participant noted that the workshop made her think that adaptation could take longer than she expected because the businesses that are required to implement changes in stormwater management "would need time to adapt slowly to these changes." This relates back to the substance of the role-play game. One possible, partial explanation for the perception of the difficulty of agreeing on climate change issues could be that, during the role-play simulation, about a sixth of the groups did not reach consensus.

As noted above, in addition to lack of agreement, the other top two barriers identified in the workshop surveys were lack of funding and lack of public support. This is consistent with findings from the stakeholder interviews. Nearly all stakeholders interviewed mentioned that Dover's tax cap was a financial impediment to taking proactive measures with respect to climate change. The Stakeholder Assessment also found that most stakeholders thought that the biggest challenge to adapting to climate change in Dover is that people do not "believe" in climate change. Interestingly, as noted earlier, this last concern is somewhat at odds with the public poll results, which indicate that a significant percentage of respondents are concerned about climate change.

Lack of funding was also one of the most common barriers raised by follow-up interviewees; about a quarter of them commented on it. One person said, "I'm always thinking about money, the need for fund-



ing for preparing for this. And in all levels of government today, funding is tighter than I think it's ever been." Another workshop participant commented that he has become increasingly worried about where they're going to find the resources for planning, especially because Dover is a tax-capped community. On a related note, a couple interviewees raised concerns about time and resource constraints. One person said, "Those people that are present in the scenario as it is rarely have the opportunity in small municipalities to sit down together."

Other barriers that were mentioned in follow-up interviews included, but were not limited to, a lack of urgency, the difficulty of dealing with scientific uncertainty, and the challenge of coordinating actions from one community to the next. Some participants volunteered different ideas for addressing these barriers; some of these ideas are explained in the following sections.

Suggested Pathways Forward

Workshop participants generally expressed an interest in undertaking a collaborative problem-solving process going forward. While there was widespread support of the consensus-building approach, this support was frequently accompanied by concerns or caveats. A large majority of both public poll respondents and workshop participants also pointed to the importance of stakeholder engagement.

Support for Collaborative Processes in Dover

A large number of workshop participants expressed an interest in undertaking a collaborative problem-solving process. In response to the post-survey question "Do you think your town should use a decision-making process like that modeled in the exercise to reach agreement about how your town should respond to possible climate impacts?" 79 percent of workshop participants answered affirmatively (see Figure 9). A majority of follow-up interviews also indicated support for using a consensus-building process. One workshop participant explained that a consensus-building approach would be better than "doing nothing like they do in Congress."

Interestingly, several follow-up interviews suggested that the consensus-building approach could be applied to many issues, not just climate change adaptation. One participant noted that there was a "sense of procedure and that sense of working together toward a solution." Another participant explained that Dover bureaucrats have had "really drawn-out battles due to a conflicted City Council and School Board" in the past, so "having an alternative arena for political consensus-building and problem-solving is really very helpful."

While there was widespread support of the consensus-building approach, this general support was frequently accompanied by concerns. One common caveat was that there would need to be some kind of process to educate people about climate change risks or to "help everybody understand what the other side does" prior to using a consensus-building approach. One follow-up interviewee emphasized, "You're going to have to convince people that the waters are rising."

Many of those interviewed said the success of a consensus-building approach would largely depend on the logistics, including having the "right topic" and the "right people" involved in the process. One interviewee said, "You have to get people involved that can reach people"; another noted that "if the people at the table are the decision-makers," then he thought the

process would work, but otherwise it might be difficult to have an impact. A third participant said, “It kinda depends on who you get to represent the particular interest. ... It is not just a matter of getting different points of view. The people who represent those views have to have enough gravitas to make sure that people in their field are following them.”

Other participants pointed out the differences between a game and real life. One person commented, “[Consensus-building] worked really, really well in our role-playing. But I am not sure how it would work in real life ... [because] when you are emotionally invested in something, it's completely different.” In several of the debriefings, participants also mentioned either that the game lacked the emotional charge that drives community processes, or that in real life, people have a tendency to dig in their heels.

Worth note, while many participants came away from the workshops with an enhanced appreciation for the value of bringing stakeholders together, it appears that many interpreted the approach modeled in the simulation as being more about “compromise” and “meeting in the middle” than finding mutual gains through negotiated solutions or identifying no-regrets solutions. Many participants noted the importance of “compromise”, “meeting in the middle”, and “not getting everything you want” in their write-in comments on the post-survey. “ For example, one participant wrote: “ours was a good compromise—no one was happy.” Given that introducing the consensus building, mutual gains approach to decision-making was one of the intents of the simulation, this finding highlights the need to provide more context and explanation for participants in advance of the simulation to help them fully understand the process being modeled.

Support for Stakeholder Engagement in Dover

A large majority of both public poll respondents and workshop participants identified stakeholder engagement in general as being very important to climate adaptation planning. In response to the question “How important is it that residents, local groups, and businesses be involved in deciding how to respond to climate change risks?” 63 percent of public poll respondents answered “important” or “very important.” Another 22 percent of those polled answered “somewhat important.” The workshop pre- and post-surveys asked the same question, and 86 percent of participants on the pre-survey and 90 percent on the post-survey answered “important” or “very important.”

Follow-up interviews offer some insight into these results. One interviewee commented, “If the actors aren't able to get together in a collaborative way now, they really need to, and I hadn't really been aware of that ... If the Public Works Department isn't talking to the Conservation Commission or ... the city engineer, then they're not going to be able to come up with the holistic kinds of solutions that are needed to deal with extra rainwater and deal with higher risks of big storms.” Another interviewee noted, “If there is a gap ... a missing perspective, then you



Image 6. Downtown Dover; credit: Chris Keeley

really are shortchanging the process. ... If you're leaving some people ... off the table because you think that they're going to sideline the process or their perspective is going to differ so much that it is going to make it difficult to reach consensus, then you're not really going through a fair process because you're stacking the deck in your favor. ... You really need to have all the perspectives for the entire community to recognize that this was a fair process and whatever decisions are made ... have the voice of the whole community."

Usefulness of Role-play Simulations as a Tool for Climate Change Adaptation Education

Support for Role-play Simulations



Image 7. Dover workshop; credit: NECAP staff

The need to communicate and share information about climate change risks and adaptation was another theme that came up in the Stakeholder Assessment, follow-up interviews, and the debriefings. There was support for the idea that role-play simulations could play a part in meeting this need. On the post-survey, 26 percent of workshop participants reported that the exercise had affected their views about climate change. A large majority of those interviewed said they thought the workshops were valuable as a public education and awareness-raising tool. Many remarked that role-playing encourages a better understanding of others' views, a concept described in more detail in the next section. About half of

workshop interviewees also indicated that they

found the role-play "fun" and "engaging." One participant said, "Everybody seemed to have a really good time doing it."

About a third of those interviewed indicated that they found the role-playing experience valuable because it got people engaged in the issue. One person observed that simulations "get people participating rather than just listening. Even if they were not the most aggressive participant, everybody had some level of engagement, rather than just listening. Typically, issues like that would be either a lecture or what I would call a public hearing, where people get up and talk for five minutes and then they sit down. In that context, 20 percent of the people get up and talk, and the other 80 percent listen. We get a lot of that, and role-playing has none of that." Another interviewee commented that in a lecture "you can take away only what you want to hear or 'zone out,'" while in the role-play simulation "you really ... had to be engaged and hear everyone's side and maybe even argue for a side that you don't believe in."

A few participants pointed out that the role-play simulations had value from a networking perspective. One said, "It was a good opportunity for me to interact a little more closely with the people who are managing my city." Another commented that he was hoping "to meet other people who are interested in the same subject, and I found that the exercise accomplished that. ... Being involved in city government is what I call the usual suspects who show up at meetings. And, in this particular setting, there were people that I had never even met before, which

I thought was refreshing and interesting at the same time, and people who were quite accomplished in their individual endeavors. ... The exercise brought people together.”

Other reasons for participants' support of role-play as an educational tool varied. One participant, who described himself as being “a typical skeptical Yankee” about the role-play simulation prior to the workshop, said afterward, “I think it’s an excellent model because ... everybody who goes out of there has probably had a pretty interesting evening and kind of understood different perspectives. ... I think it also builds confidence in the notion that folks can come together and discuss rather complex issues and do it in a thoughtful way. And that ... will help build up the kind of cultural capital and political capital of the voters and ... residents.” He also noted that the role-play simulation “lets people imagine themselves into a situation [in which] these decisions have to be dealt with.” Another interviewee stated that the role-play simulation was a “way to make something that is kind of abstract or intangible,” more “concrete and real.”

Enriched Perspective

Project data indicates that one of the major takeaways from the workshops was a better understanding of the perspectives of other stakeholders. This is key if collaborative adaptation planning efforts, which require working across divergent perspectives, are to move forward in Dover. As one participant nicely summarized, “What comes out of the workshop is a better understanding of what everybody has to do and what kind of problems everyone is confronted with and how to make a solution for those problems.”

References to thinking about climate change through the eyes of others were one of the most common answers in the “write-in” section of the surveys administered to all participants after the workshops. The concept of understanding the perspectives of others also came up in more than

half of the debriefings. The vast majority of participants interviewed also made some reference to enriched perspective. These interviews in particular offer some valuable insights. Specifically, many participants indicated that the role-play exercise improved their understanding of different perspectives or increased their empathy for those with different beliefs or interests.

Survey results and follow-up interviews suggest that this learning occurred in two ways: 1) Taking on a role that differed from their personal beliefs and interests enabled participants to see the issues from a different perspective; and 2) Hearing a range of different perspectives in the course of the role-play exercise gave participants the opportunity to gain insight into different points of view. One participant reflected that walking in someone else’s shoes allows you to “see a different perspective than perhaps you normally would in your everyday life, and your job, and your position, and your relationship.” Another



Image 8. Dover workshop; credit: NECAP staff

participant said, "It was interesting to put myself in that position and see that there are alternative points of view and that people can have strong arguments for their own beliefs, even though they're different from mine." Other interviewees indicated that simply participating in a facilitated discussion with five other viewpoints gave them the opportunity to hear "a wide range of thoughts and opinions and viewpoints" which "allows you to step back and see alternate points of view in a new way."

About a third of the follow-up interviewees indicated that increased empathy was also a benefit of the role-play simulation. An elected official who participated in a workshop commented, "Most of the time people think of kind of faceless city folks in those roles. And I'm hoping that [the role-play exercise] helps people understand better that everybody, even though you may disagree with them ... share[s] a core investment in the community." Another participant echoed this sentiment in the write-in section of the post-survey, noting that the role-play simulation "was a good reminder that very good people think differently than I. They are still good people."

Theory suggests that games may create spaces for people to engage in discussions more freely, and there is limited but intriguing evidence from the interviews to support this. Namely, a couple of interviewees noted that game setting made it easier to express, listen to, or take in perspectives about planning for climate change risks. One participant explained that while he had heard other viewpoints in the past, he was "a little more receptive" and less defensive when he heard them in the fictional setting of the role-play. Another interviewee noted, "It felt safe to share these thoughts because you were playing a role, so you weren't necessarily exposing yourself or your true feelings, but you were getting to hear a wide range of thoughts and opinions and viewpoints."

While the majority of interviewees did not express any difficulty with the act of role-playing, more than a quarter of interviewees indicated that the role-play exercise could be "challenging" or "uncomfortable." Several workshop participants mentioned in the debriefings that they felt they had a hard time staying in character. Different explanations for this can be found in the follow-up interviews. One of the most common was that it was challenging to pretend to have a different view or a different personality. Others commented that the ability to take on a role varies, that some people came to the workshop less informed about the issues than others, or that there was not have enough information to adequately justify the role's positions.

Interestingly, the majority of interviewees who self-identified as having some level of difficulty role-playing still indicated that the exercise improved their understanding of other perspectives. One participant reflected, "It was a little awkward, but it was good for me, because it gave me the insight for the other side." Her experience suggests that having difficulty in role-playing does not necessarily negate the benefits of participating. However, when a workshop participant was truly unable to stay in character, data suggests that this did affect the experience of other participants. A more detailed discussion of this result appears below in the section on climate change adaptation education.

Limitations of the Dover Role-play Simulation

While many interviewees thought the workshops were a good learning mechanism, some participants were skeptical of its ability to reach a wide audience. Reasons cited for doubt included general apathy, the idea that the workshops would be "preaching to the choir," and the con-

cern that role-playing was uncomfortable or sounded childish. A former elected official in Dover noted, “Apathy is the Number 1 issue that I foresee. ... Just to try to get the general public involved, and to get any type of meaningful cross-section I think will be very, very difficult.” Other participants believed that “only people who have kind of bought into it are going to come and participate.” About a quarter of interviewees suggested that the very idea of role-play might turn some people off, either because it is uncomfortable or seems childish. One participant who thought that the role-play simulation was helpful said that he was “not sure ... I would be comfortable participating in the role-playing again other than maybe being an observer.” Another person also described the role-play experience as valuable, but noted that he thought the role-playing concept is uncomfortable for many people and that he “went to the session begrudgingly” to support the project and the City Planning Department. A couple of participants suggested having residents watch the role-play simulations, instead of participating, to overcome some of these issues. One educator who attended reflected that she was not sure “how one would engage our real people in something like that ... It seems childish, and then when you participate you realize, ‘Wow this really works,’ and you think, ‘Why don’t we do this?’ But how do you convince somebody to even engage with it in the first place? We’re no longer a culture that does anything like that.”

As noted previously, other participants said they thought the role-play simulation couldn’t be the sole educational tool used to explore climate change adaptation—especially since the simulations did not focus on explaining the science and risks. One person interviewed said, “I don’t think [a simulation] can be the sole tool because it wasn’t something that was terribly informative in terms of the science.” In several debriefings, participants commented that the scenario lacked specific budgetary numbers, which made it more difficult to make decisions. Additionally, in about half of the debriefings, there was at least one comment that the game was unrealistic, oversimplified, or lacked the emotional charge of a real-life situation.

A couple participants said they did not believe the role-play simulations had enough value to merit community use. One person said, “The cost time-wise that is necessary to encourage a political discussion would be better spent with a climatologist coming in and educating people and then it going out into the public media.” Another participant said she was disappointed and underwhelmed by the role-play simulation. “We were rushing toward our inevitable conclusion is what I felt,” she said, noting that the exercise didn’t have much in the way of “serious exploration of different perspectives.” Furthermore, while the workshop outlined many of the perspectives people have on climate change issues, it didn’t necessarily give participants any new tools to “deal with that.”

The identity of participants at the workshops, and the ability of participants to take on roles and play them well, may be an important consideration in determining whether role-play simulations are an effective tool. About a third of interviewees offered unprompted observations about other participants at their event—apart from comments about preaching to the choir. These fell into three main categories: 1) The interviewee knew some of the participants; 2) People at the table played their roles well; or, conversely, 3) People did not play their roles well. In regard to the first, one interviewee stated that the workshop “was really interesting because I knew the majority of players in the group and it was kind of interesting to see, knowing their personalities and how they are, having them play a different role.” This suggests that the identity of individuals at workshops played a role in shaping participants’ experience of the activity. In regard to people playing roles well, comments from follow-up interviewees included, “Many people

became thoroughly convincing in the character that they were asked to portray. And they were creative in the way they approached it," and "I found the interaction with the people that evening was great."

In regard to the third category—not playing their roles well—one interviewee said, "The only reason I would say it was not fully enjoyable was because there was one guy who didn't quite get what was going on." Another interviewee noted, "It seemed to me that many of the folks very quickly fell out of the role-playing. That they were so interested in just having a conversation or being agreeable that they did not persist in following ... the kind of positions that were staked out for them in the documents." This suggests that some of the value of the workshops may be lost if participants are unable to take on roles successfully.

Conclusion

These findings provide insight into the opinions of residents of Dover and surrounding communities regarding the management of climate change risks and adaptation. They also highlight how role-play workshops can have a positive effect on public attitudes about local climate change risk and adaptation.

For Dover leaders, the NECAP findings show that more people in the city are concerned about climate change risks than stakeholder interviewees perceived and that there is support for incorporating climate change planning into everyday decisions. The majority of workshop participants also said they believed the collaborative approach is a good way to address climate change risks and adaptation. However, the high level of concern about climate change in Dover is coupled with a confidence gap between what people think local government should do and what they think it actually will do to address climate adaptation.

While these findings indicate that there is significant support in Dover for addressing potential climate change risks, tough decisions will still have to be made. Adaptation planning will require proactive thinking, time, and continued political and public support. Some adaptation options, even no-regrets options (those that are good for the community regardless of the severity of climate change), will require funding, which may present challenges given Dover's tax cap. Additionally, it is possible that attempts by the city to add regulations or limit property rights may lead to opposition that was not previously apparent.

These challenges explain why actions to raise awareness and encourage collaborative decision-making are crucial for climate adaptation planning. Government regulations and government spending will only gain support if residents believe such actions are in the best interests of the community. Role-play simulations can be a valuable part of the educational effort in coastal communities such as Dover. Workshop survey data, follow-up interviews, and game debriefings suggest that, among other things, role-play simulations can increase awareness about local climate change risks and adaptation options, illustrate the use of a consensus-building approach, demonstrate the role that local stakeholders can play in effecting change, and increase confidence in a community's ability and willingness to address climate change risks. Role-play simulation workshops can also increase participants' understanding of, and empathy for, other people's perspectives about climate change, helping to pave the way forward for the difficult conversations necessary to determine how to address climate change locally.

While findings from Dover indicate that role-play simulation workshops are valuable, some participants suggested that they could be even more worthwhile if used in tandem with other local efforts to raise awareness and engage in climate adaptation planning. Since role-play simulations are not intended to explain the spectrum of climate change risks, other efforts to educate the public about such risks in their community may be beneficial. These efforts could even spur workshop participation. Furthermore, integrating role-play simulation workshops into a community's larger climate adaptation efforts could increase the legitimacy of the exercise, making it clear that this is much more than a "game."

Dover has an opportunity to capitalize on the high levels of concern about climate change and on the increased interest in adaptation planning generated by these workshops to increase the city's preparedness and resiliency to climate change risks. To this end, the city may wish to begin exploring ways to mitigate the projected climate risks outlined in the Summary Risk Assessment, such as riverine flooding, stormwater flooding, and heat waves. Recommendations from such an effort could then be included in a climate adaptation plan or integrated into Dover's existing plans. Data from NECAP indicates that stakeholder involvement in these efforts will be important. However, since meaningfully engaging residents can be difficult, the city may want to explore further strategies to engage residents in preparing for the impacts of climate change.

If the city moves forward on climate adaptation efforts, it is likely that additional public awareness efforts will be needed. Finding ways to make risks tangible and meaningful to the people in Dover will be key stakeholders. Showing that the city is committed to action and that there are clear and feasible pathways forward could also help generate support for local action.

NECAP Project Staff and Partners

Project Management

Lawrence Susskind, Principal Investigator, MIT Ford Professor of Urban and Environmental Planning

Patrick Field, Principal Investigator, Managing Director of CBI

Danya Rumore, Project Manager and Collaboration Lead, PhD student in Environmental Policy and Planning at MIT and Associate at CBI

Carri Hulet, Project Advisor, Senior Associate at CBI

NERRS Partners

Tonna-Marie Surgeon-Rogers, Coastal Training Program Coordinator, Waquoit Bay Reserve, Massachusetts

Kate Harvey, Coastal Training Program Assistant, Waquoit Bay Reserve, Massachusetts

Jennifer West, Coastal Training Program Coordinator, Narragansett Bay Reserve, Rhode Island

Steve Miller, Coastal Training Program Coordinator, Great Bay Reserve, New Hampshire

Chris Keeley, Coastal Training Program Assistant, Great Bay Reserve, New Hampshire

Christine Feurt, Coastal Training Program Coordinator, Wells Reserve, Maine

Annie Cox, Coastal Training Program Associate, Wells Reserve, Maine

Mike Mahoney, Coastal Training Program Intern, Wells Reserve, Maine

Municipal Partners

.....
JoAnne Buntich, Director, Growth Management Department, Town of Barnstable, Massachusetts

Elizabeth Jenkins, Planner, Town of Barnstable, Massachusetts

Jason Pezzullo, Principal Planner, City of Cranston, Rhode Island

Peter Lapolla, Planning Director, City of Cranston, Rhode Island

Steve Bird, City Planner, City of Dover, New Hampshire

Chris Parker, Director of Planning, City of Dover, New Hampshire

Jon Carter, Town Manager, Town of Wells, Maine

Mike Livingston, Town Engineer, Town of Wells, Maine

Jodine Adams, Code Enforcement Officer, Town of Wells, Maine

Analytics Support

.....
Ella Kim, Analytics Manager, PhD candidate in Environmental Policy and Planning at MIT

Tijs van Maasakkers, Analytics Manager, PhD in Environmental Policy and Planning from MIT

Ezra Glenn, Analytics Advisor, Lecturer in the MIT Department of Urban Studies and Planning

Consultants

.....
Paul Kirshen, Climate Change Adaptation Consultant, Research Professor in Civil Engineering at the University of New Hampshire

Cameron Wake, Climate Change Adaptation Consultant, Research Professor in Earth Sciences at the University of New Hampshire

Ona Ferguson, Stakeholder Assessment Consultant, Senior Associate at Consensus Building Institute

Michal Russo, Risk Assessment Support, PhD Student in Water Diplomacy at Tufts University

**Graduate
Research
Assistants**

Casey Stein, 2012-2014 Research Assistant, Dover Coordinator, Graduate of the Master of City Planning program at MIT

Toral Patel, 2012-2014 Research Assistant, Cranston Coordinator, Graduate of the Master of City Planning program at MIT

Katie Blizzard, 2013-2014 Research Assistant, Barnstable Coordinator, Master of City Planning student at MIT

Julie Curti, 2013-2014 Research Assistant, Wells Coordinator, Master of City Planning student at MIT

Lisa Young, 2013-2014 Research Assistant, Project Management Assistance, Master of City Planning student at MIT

Katherine Buckingham, 2013 Research Assistant, Graduate of the Master of City Planning program at MIT

Zachary Youngerman, 2013 Research Assistant, Graduate of the Master of City Planning program at MIT

Jessie Agatstein, 2012-2013 Research Assistant, Barnstable Coordinator, Graduate of the Master of City Planning program at MIT

Melissa Higbee, 2012-2013 Research Assistant, Cranston Coordinator, Graduate of the Master of City Planning program at MIT

Erica Simmons, 2012-2013 Research Assistant, Wells Coordinator, Graduate of the Master of City Planning program at MIT

**Undergraduate
Research
Assistants**

.....
Rebecca Silverman, 2012-2014 Research Assistant, MIT

Paula Gonzalez, 2013-2014 Research Assistant, MIT

Elizabeth Berg, Spring 2014 Research Assistant, MIT

Kaylee Brent, Fall 2013 Research Assistant, MIT

Priyanka Chatterjee, Spring 2013 Research Assistant, MIT

Tiffany Chen, Fall 2013 Research Assistant, MIT

Anthony McHugh, Spring 2014 Research Assistant, MIT

Jordan Mlsna, Fall 2013 Research Assistant, MIT

Madeline O'Grady, Fall 2013 Research Assistant, MIT

Fiona Paine, Spring 2014 Research Assistant, MIT

Tiana Ramos, Spring 2013 Research Assistant, Wellesley College

Emily Thai, Spring 2014 Research Assistant, MIT

New England

Climate Adaptation PROJECT